



Predictive Maintenance for the BP Wind fleet in the USA

585 assets protected by ONYX InSight across **10 wind farms**

CLIENT

BP has the largest operated renewable business of any major international oil and gas company. 13 wind farms are directly operated and their gross generating capacity is 2,259 MW. Using advanced technology the remote operations center (ROC) teams monitor all BP sites 24/7.

CHALLENGE

The asset base is diverse and without existing or effective CMS hardware. Implementing predictive analytics required retrofit of vibration and oil sensors, with high performance while affordable, proven at scale and deployable to a multi-brand turbine asset base.

BENEFITS

With the market leading solution for independent multi-brand turbine monitoring and affordable next generation vibration sensing ecoCMS™ ONYX InSight was able to provide BP a state-of-the-art technical solution, that reduces long term unplanned OPEX with rapid payback.

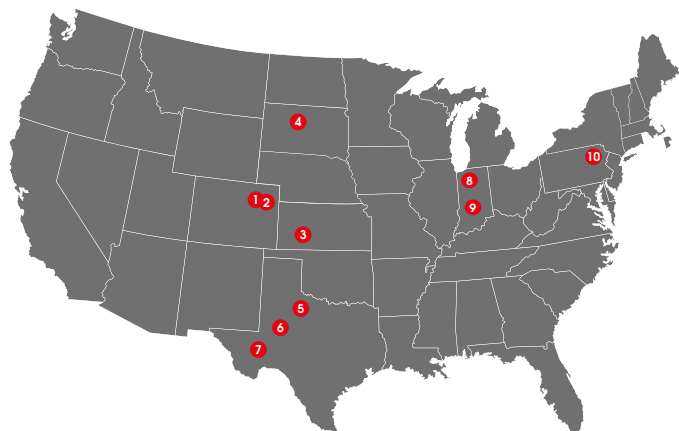
Over **\$1.6m annual savings** on complete ecoCMS™ retrofit

BP Wind Energy has been supported by ONYX InSight for 5 years on a variety of engineering and predictive maintenance projects. In 2016, a fleet wide predictive expansion began, rolling out ONYX InSight's technology, first with the cloud-based software, fleetMONITOR™ on six wind farms, connecting legacy condition monitoring hardware, and then in 2017/18 with the vibration measurement hardware, ecoCMS™, along with fleetMONITOR™ on four additional wind farms.

The most recent expansion covered Fowler II, Mehoopany and Cedar Creek, with ONYX InSight managing a turnkey installation of ecoCMS™, including installing ethernet cables down the towers and implementing the required IT security protocols. The system is unique in the market, utilizing MEMS sensor technology for tri-axial sensor data along with temperature and oil sensing, all at a remarkably low equipment cost and without compromise on reliability.


"We looked in the past at retrofit but it wasn't affordable, however ONYX InSight brought a new value proposition to the table and combined with their track record of quality engineering with BP, it was an easy decision to move ahead with adopting this technology."

Alistair Warwick, VP, BP Wind



BP Wind Turbines under ONYX InSight Monitoring:

- | | |
|-----------------------------------|-----------------------------------|
| 1 Cedar Creek I, 63 GE 1.6 SLE | 6 Sherbino II, 58 Clipper C96 |
| 2 Cedar Creek II, 59 Nordex N90 | 7 Silver Star, 24 Clipper C96 |
| 3 Flat Ridge I, 20 Clipper C96 | 8 Fowler Ridge I, 40 Clipper C96 |
| 4 Titan, 10 Clipper C89 | 9 Fowler Ridge II, 133 GE 1.5 SLE |
| 5 Trinity Hills I, 90 Clipper C96 | 10 Mehoopany, 88 GE 1.68 XLE |

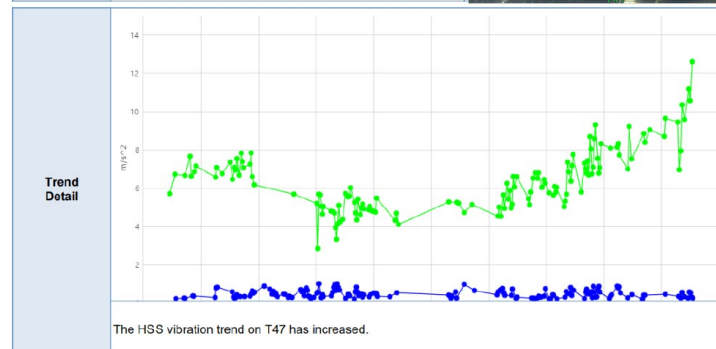
Exception Alarm	Turbine ID	Component	High Speed Stage	Gearbox	Progressed
	T047				
Detected	1/30/2018	Inspected	2/13/2018		
Diagnosis	HSS-A Bearing Fault				
Notes/Inspection Results	Spalling was observed on the HSS-A inner race.				
Recommended Action	Perform a follow-up inspection on the High Speed Stage bearings for signs of progression.				

Rapid Return on Investment

With the dramatic reduction in hardware costs, a detailed study of the return on investment for the implementation of ONYX predictive maintenance technology showed a significant return, with payback of hardware and installation in under 12 months. Value is generated to the BP Wind Energy business in four principle ways:

- ✕ Reduced repair costs from more efficient crane mobilization
- ✕ Better pricing on repairs through competitive bidding
- ✕ Reduced turbine downtime
- ✕ Reducing the probability of lower cost repairs moving to catastrophic failures

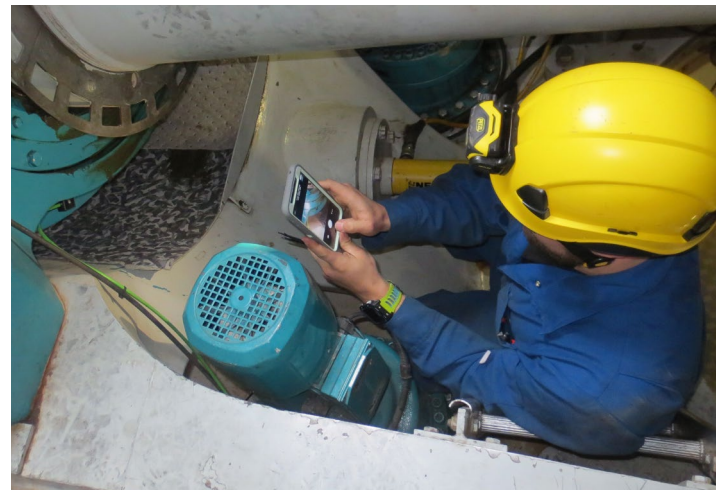
The driver of this value? Sophisticated technology providing a simple result - ONYX InSight provides lead times of 6-18 months for most major component failures.



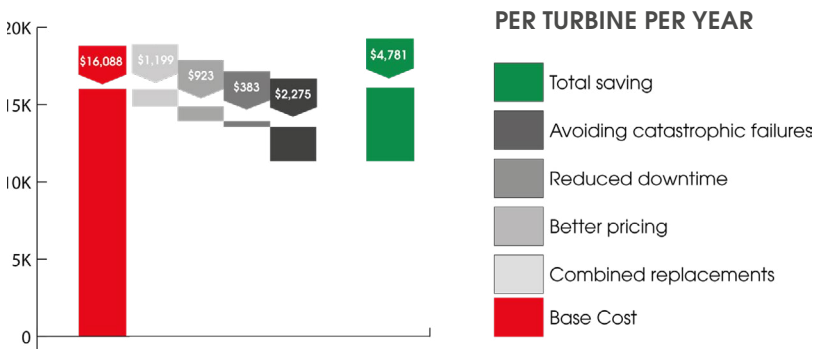
ECOCMS™ PROVIDED OVER 6 MONTHS ADVANCE NOTIFICATION FOR REPAIR OF HS BEARING ISSUE

“Investing in our predictive maintenance capabilities forms an important part of our commitment to leading-edge technologies that enhance the safety and reliability of our operations. ONYX InSight was able to offer a solution that can be readily retrofitted to the diverse range of technologies employed within our fleet.”

Alistair Warwick, VP, BP Wind Energy



EVERY STEP OF THE ECOCMS INSTALLATION IS DOCUMENTED BY USING ONYX INSIGHT'S OWN DIGITAL O&M SOFTWARE, FIELDPRO™, AS PART OF ROBUST QA/QC



Detailed ROI analysis revealed \$1,629,250 total annual savings (\$4,781 per turbine per year cost saving)

Most Valuable InSight

ONYX InSight's predictive analytics are now deployed at 10 BP wind farms covering 585 wind turbines, 1.2 GW, 5 turbine models, 10 gearbox models, with further expansion planned in 2019.

With identified annual savings of \$4,781 per turbine, a typical large fleet retrofit provides \$1.6M savings every year - up to 30% O&M cost reduction.



ECOCMS™ INSTALLATION UPTOWER, INCLUDING 24 VIBRATION SIGNALS, 8 TEMPERATURE SIGNALS, SPEED TRACKING, AND OIL DEBRIS SENSING

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