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## Enel Green Power predicts maintenance needs for sustainable hydropower operation with ABB Ability™ Asset Performance Management



This operator of 25.26GW of hydropower is partnering with ABB to transition 33 of its hydropower plants from an hours-based maintenance approach to a predictive and condition-based maintenance approach that uses actual equipment status to determine maintenance needs.

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01 A typical hydropower generation plant.

An increasingly competitive marketplace means an ever-demanding need to improve asset reliability so that production is always maximized. Cost pressures resulting from lower prices of fossil fuel energy are leading operators like Enel to improve business performance through reduced maintenance spend. Additionally, assets are aging, and operators are looking to maximize asset productivity before they replace equipment. Many new assets are more complex and require advanced technology to monitor and maintain. Moreover, an aging workforce is retiring and taking its wealth of knowledge with it. Businesses must find ways to preserve and protect this knowledge base. That's where ABB comes in.

Enel is a long-standing ABB customer familiar with ABB's commitment to innovation and operational excellence. Employing the expertise of the ABB Ability™ Collaborative Operations Center for power generation and water, the two companies partnered in 2018 to develop predictive and condition-based maintenance software that would move the hydropower plants to an advanced data-driven management model to improve sustainability of Enel's operations, reduce maintenance costs and transform its performance, reliability and energy efficiency.

### ABB Solution

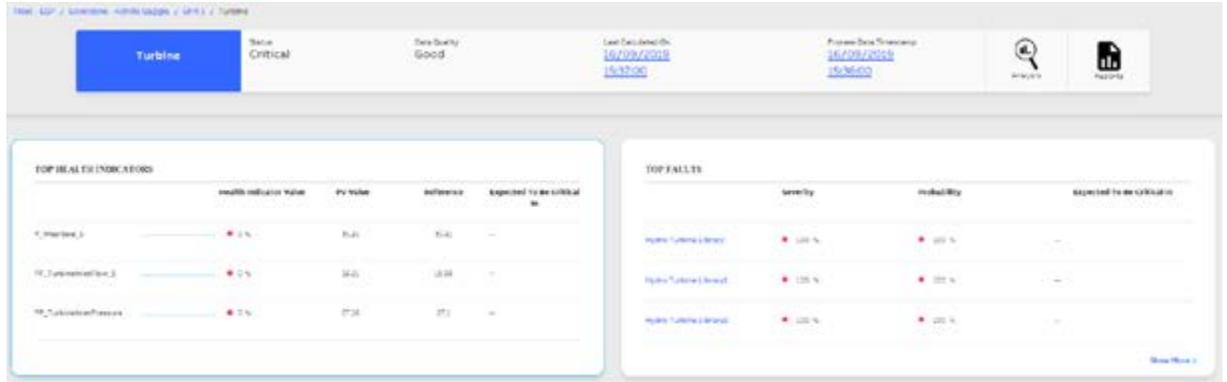
Market research firm Frost & Sullivan reports that energy businesses today spend more than 30% of their operating expenses on unplanned maintenance. This includes events such as equipment failure or equipment underperformance that lead to unplanned downtime and lower productivity. Operations practicing corrective or reactive maintenance are often faced with more of these undesirable events. ABB Ability™ Asset Performance Management (APM) is a tiered maintenance methodology that supports operators in the transition from corrective maintenance to condition-based and predictive maintenance. This allows the operations and maintenance staff at energy businesses to have higher visibility into equipment performance so they can better plan for equipment maintenance, replacement or repair.

In the Enel Green Power implementation of APM, the high amount of data gathered allows the benchmarking of four new Key Performance Indicators (KPIs) focusing on the risk management of an identified equipment fault.

## Four Risk Management Key Performance Indicators

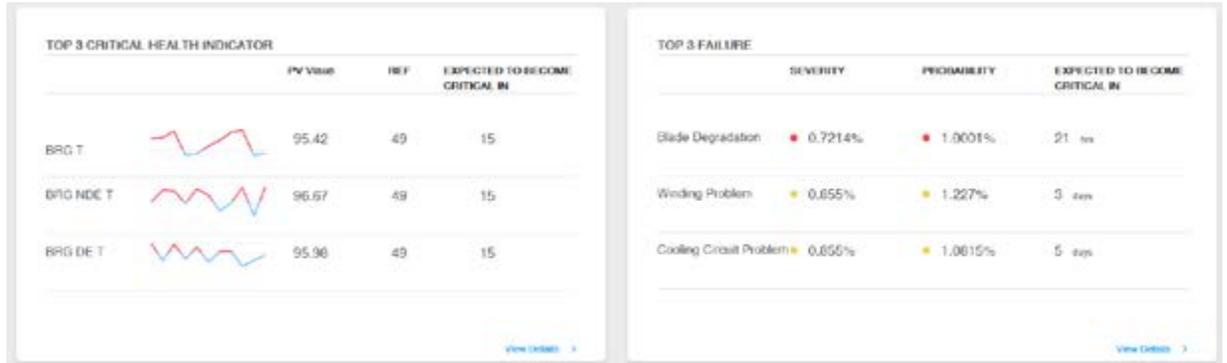
01 Key diagnostic indicator: the health status of a component.

The three most abnormal health and fault indicators.



01

02 Note, the time trend for each as shown here (earlier UI).



02

03 Clicking “show more” on the summary displays the bar chart, showing all the health indicators in barchart form.

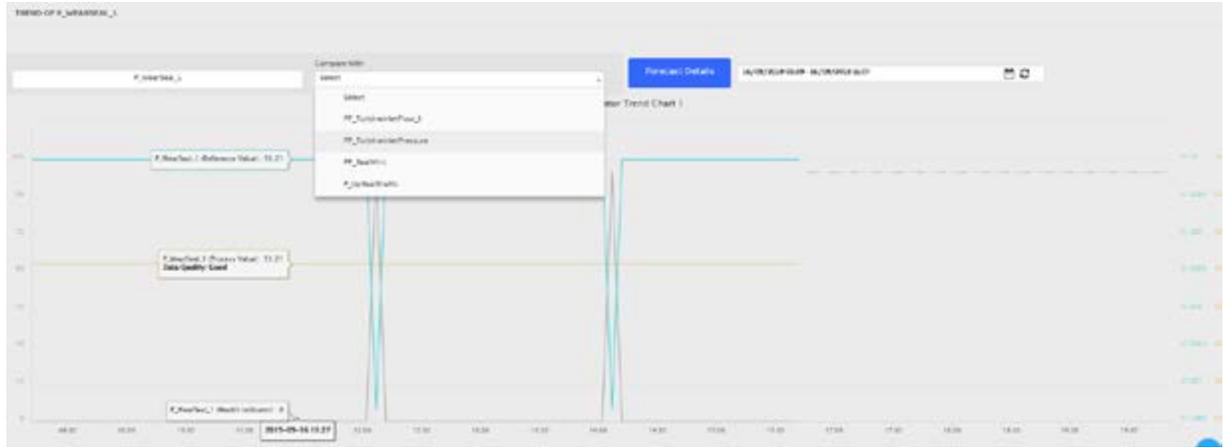


03

## Four Risk Management Key Performance Indicators

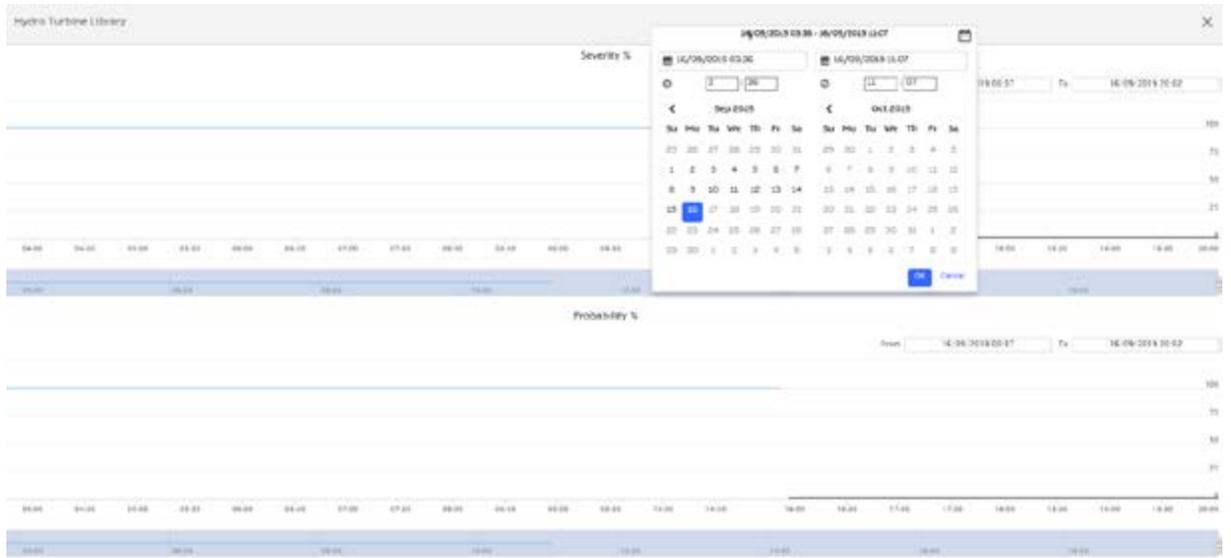
04 Key trend indicator: the remaining time until a critical threshold is reached.

Clicking on a bar (see 03) selects the value to be plotted on the analysis chart, the user may add a second signal and select the time period to be retrieved from the historian.



04

05 Clicking on the "chart" symbol displays a time trend for both indices. As with all the trend displays, the user selects the time period required as shown.



05

06 Fault presence probability: the probability for the occurrence of a fault.

Note that Severity and Probability refer to different means of calculating the fault predictor.

Fault	Severity %	Probability %	Expected to become critical in	Description	Recommendations
Hydro Turbine Library	100	100	-	-	-
Hydro Turbine Library	100	100	-	-	-
Hydro Turbine Library	100	100	-	-	-
Hydro Turbine Library	100	100	-	-	-
Hydro Turbine Library	100	44.44	-	-	-
Hydro Turbine Library	0	0	-	-	-

06

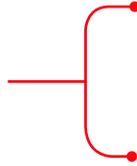
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## A collaborative partnership

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08 Enel Green Power has partnered with ABB to deliver innovative predictive maintenance solutions that will lower maintenance costs and transform the performance, reliability and energy efficiency of its hydropower plants throughout Italy.



**Sustainable hydro**  
Enel was seeking sustainable hydro operations to lower maintenance costs and transform performance, reliability and energy efficiency



**Working on conceptualization since 2018**



**Co-creation through proven pilot project**  
To develop and test predictive maintenance and advanced solutions on five plants in Italy and Spain

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## Project highlights



**33 hydroelectric plants**  
Of Enel Green Power's hydro fleet across Italy



**To shift operational models**  
Move from hours-based maintenance



**800 asset models**  
And deployment of ~800 digital asset models



**190,000 signals**  
Including analysis of over 190,000 signals



**To be more efficient and predictive**  
To predictive and condition-based maintenance



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## Gains for Enel



**1 Reducing unplanned failures and maintenance costs**



**2 Enabling more efficient planned maintenance practices**



**3 Increasing plant productivity**