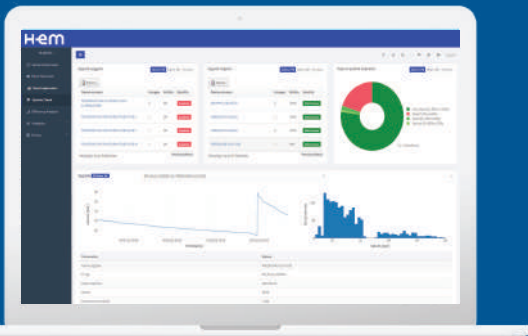# i-EM

## SUCCESS STORY

### Hydroplant Predictive Maintenance
# Enel Green Power

## H-EM
### HYDRO ENERGY MANAGEMENT



**Maximize the Potential of Hydroelectric Data**

### LOCATION

**Europe** | Italy, Campania

### KEY SOLUTION

**H-EM** Hydro Energy Management Plug in: **Predictive Maintenance**

### BENEFIT

Anomaly prediction on hydro power plant

## BACKGROUND

**Predictive maintenance techniques applied to hydropower plants**

In hydropower plants, planned periodic maintenance has been for a long time the main adopted maintenance method.

Predictive maintenance methods can provide more efficient monitoring services, advanced fault prognosis, prediction of incipient faults and prescriptive maintenance tools.

Benefits of this includes, among other things, preventing faults from occurring, avoiding unnecessary replacements of components, more efficient criteria for scheduled maintenance.

## CHALLENGE

**Real-Time application of the predictive maintenance to an EGP plant**

- Acquire in real-time a large amount of data from the plant
- Process the data with advanced machine learning models aimed to failure anticipation
- Provide synthetic and effective information to the operators through a web dashboard
- Models auto-tuning from operators' feedbacks

### Failure anticipation on the EGP hydropower plant

Our predictive maintenance solution proposes as output an interactive web platform (eMaintenance 2.0) where the operators can monitor the results coming from the data analytics models related to the functioning of the plant components and share comments between other colleagues.

Here we propose a case study referred to the application of the solution to a pumped-storage power plant owned by EGP with a nominal power of 1000MW located in Italy in the Province of Caserta. The dataset available from this plant consists of about 720 analog signals.

These signals are collected from several components such as penstocks, turbines, generators, and transformers. During the real-time phase of this case study, an anomalous behavior was reported by the model built to analyze the temperatures of a generator.

At the time of the anomaly notification, temperatures values did not yet exceed the warning thresholds of the condition-monitoring systems already operative in the plant.

After receiving the warning alert, the plant operators checked the component and confirmed the event as a relevant anomaly.

They acknowledged that this was a serious problem, since a further degradation could have eventually led to the stop of the generation unit. For this reason, timely actions were taken: operators restored the nominal and correct behavior of the component.

This approach has been successfully tested on several cases, and our solution is now active on more than 700 EGP hydro-power plants worldwide.

## BUSINESS IMPACT

**Different approaches to predict component deviations from nominal behaviour and specific fault class with different time horizon.**

- Anticipated notification of the anomaly prevented the stopping of the generation unit
- The saved costs related to the predictive notification were estimated in the range between 25 k€ and 100 k€
- Thanks to the provided information, the anomaly was restored with a reduced time spent to search the faulty
- component
- Scalable solution, easily applicable to a large fleet of power plants

## CUSTOMER QUOTE

We received benefits from i-EM monitoring platform and form their statistical analysis and after a first application on 5 plants in Italy, we decided to expand this digitalization on other hydro plants worldwide.

Monica D'Aco - Head of Hydro Innovation
**Enel Green Power**

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Find more at **i-em.eu**