

## SUCCESS STORY

# Big Data and Predictive Maintenance in PV Enel Green Power



### EXECUTIVE SUMMARY



#### LOCATION

Europe | Italy, Romania,  
Greece



#### BENEFIT

5%+ Increase in Return on Investment



#### KEY SOLUTION

s-EM  
Predictive maintenance

## BACKGROUND

Change the maintenance approach and get the best value from solar assets data

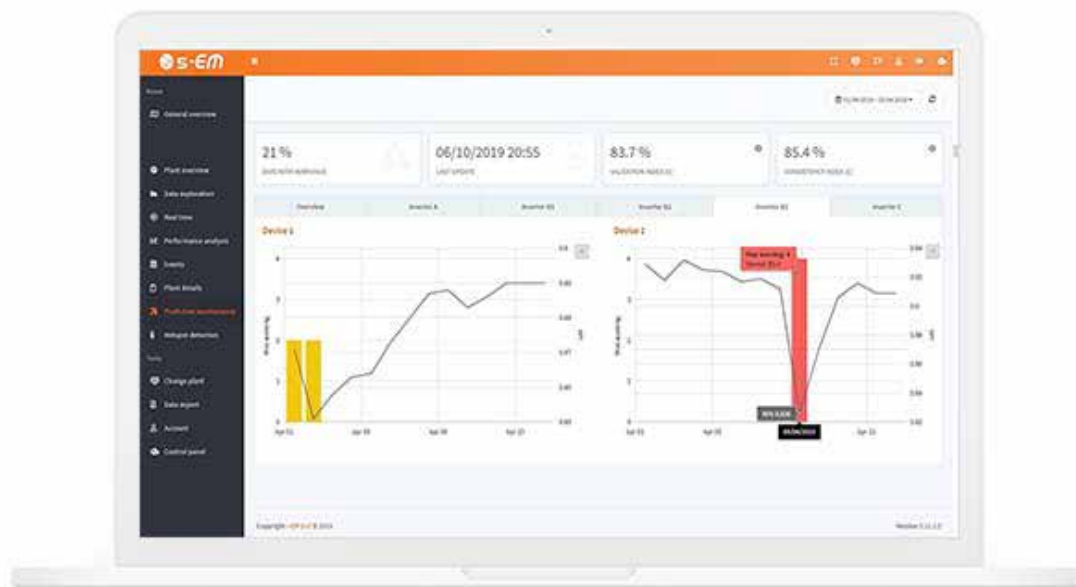
O&M activities are undertaken by the O&M contractor, which generally shares its tasks with the technical Asset Manager. The plant components maintenance is typically the one with greater costs. Due to the age of current solar plants (the first installed around 10-15 years ago), arise the need of a proper maintenance, to not reduce the plant performances. Several kinds of maintenance strategies can be followed. Preventive maintenance, that includes regular inspection on the plant. Reactive strategy, undertaking a corrective action only when a failure occurs (usually more expensive). Unlike preventive and reactive strategies, the predictive maintenance approach optimizes simultaneously the downtime periods, the lost production, and the total cost of maintenance activities.

## CHALLENGES

i-EM combines the experience in the PV technical domain with data science expertise to provide an accurate predictive model

- ❗ To gather a huge amount of data related to both electrical and environmental signal.
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- ❗ To face data quality issues and validation data lack (no maintenance logbook available).
- ❗ To have data-drive approach in O&M activities.





## SOLUTION

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

i-EM provided different Predictive Maintenance models, designed for different target solar components: PV module, string of PV panels, inverter, or the whole plant. The process starts by performing a quality check on data, and then applying cleaning and pre-processing methods followed by imputation techniques. Once this reliable dataset is on stage, predictive maintenance analysis is performed based on machine learning methods on PV-plants. The goal is to predict incoming failures and avoid critical problems. The models are characterized simultaneously by an increasing level of details provided and by a shorter prediction horizon: prediction of generic faults and machine status, prediction of severity category of the incoming event and prediction of specific faults. The KPI trends, the warning and all the signals are shown on s-EM platform with an easy visualization.

“In the Predictive Maintenance, Machine Learning is a winning approach only if there is a balance between the various skills: the experience of i-EM data analysis and that of industry experts (e.g., O&M operators), to extract value and knowledge from information.”

Head of Construction Technical Support  
Enel Green Power

## BUSINESS IMPACT

- ✓ Reduction of plant downtime
- ✓ Optimization of energy production
- ✓ Optimization of assets financial
- ✓ Reduction of O&M costs

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