Digitalization: Reducing LCOE at your PV Assets

Data analytics for increasing the performance of PV plants

11 November 2020

Global technology provider

More efficient and profitable renewable energy plants

+ 45 Gigawatts

GLENNMONT PARTNERS	sonnedix	EDF	Naturgy	enel Green Power	acciona	RED ELÉCTRICA DE ESPAÑA
saetayield	FRV	GRUPOMEXICO	IBERDROLA	edp	enel	VIESGO
genneia	elawan energy	AES	finerge	Southern Company		Brookfield

Renewables

Trading

Grid Integration

Data analytics for increasing the performance of PV plants

01 Need for early detection of problems

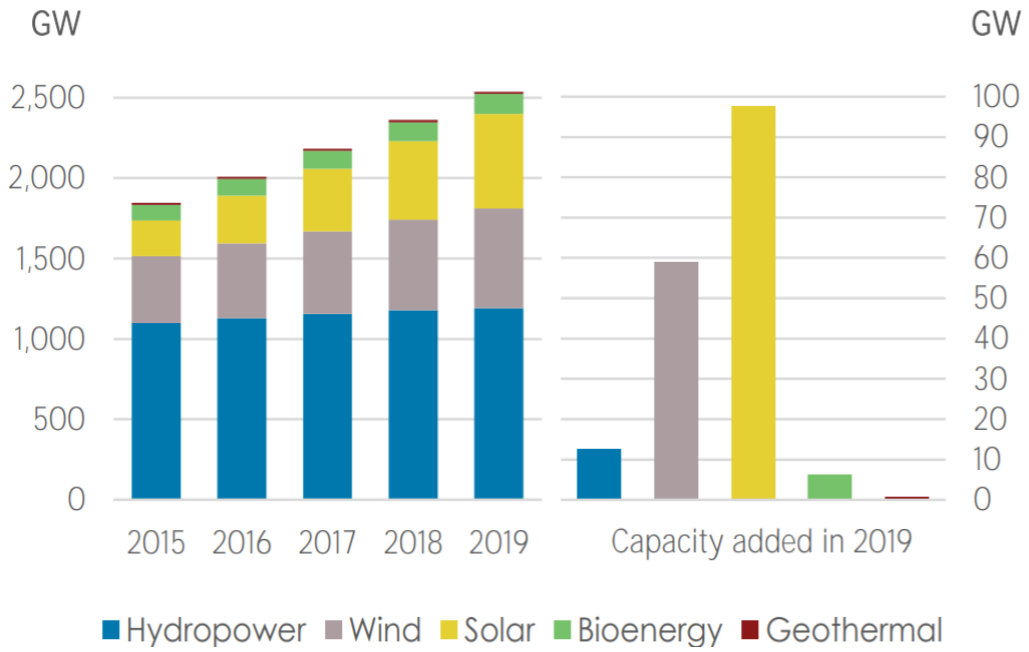
02 Advanced SCADA data analysis

03 Main contribution of data analysis to PV

04 Conclusions

Renewable generation is growing fast

Renewable power capacity growth



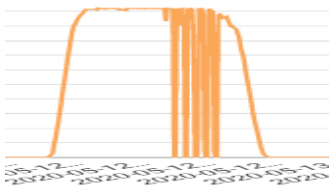
IRENA

- **PV generation is growing**: 98 GW (+20%)
- Portfolios and plants are **larger and more complex**
- Control Centers provides **huge amounts of data** but the are **operation-oriented** tools
- Need to **reduce operational costs**, avoiding underperformance and failures

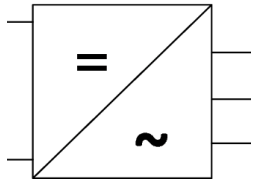
So, how to detect problems at PV plants?

Looking for O&M and operational excellence

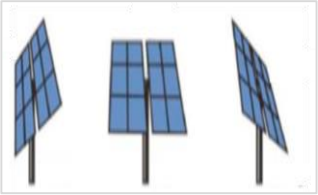
Energy production in PV plants can be affected by several factors and specific problems …



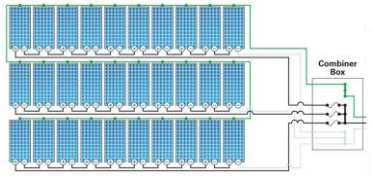
Inverter shutdown



Inverter efficiency



Trackers blockages

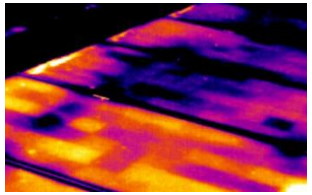


String disconnection

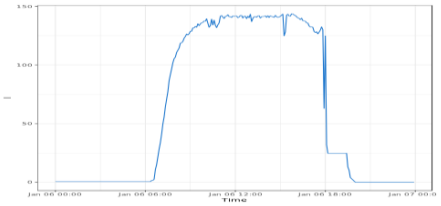
…

Soiling

Shadings



Degradation PID

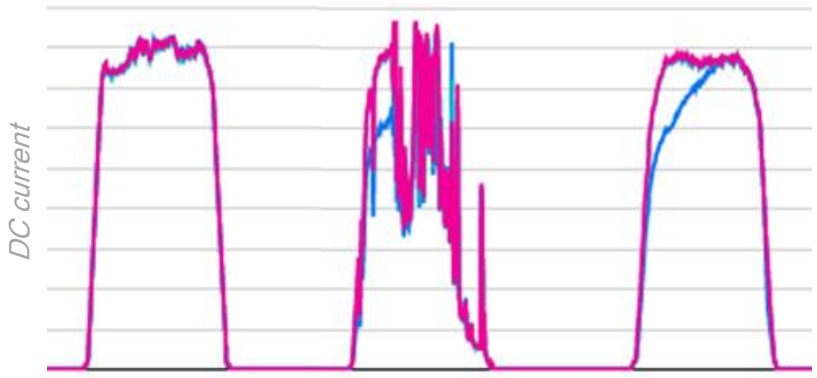


Clipping

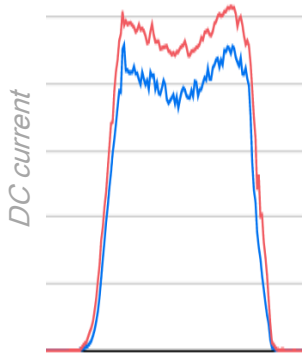
Sometimes these problems go unnoticed with **~5% losses during weeks…**

The good news …

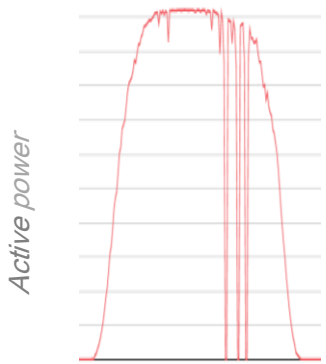
Most of these problems present certain patterns, as if they had "signatures“ in the SCADA signals



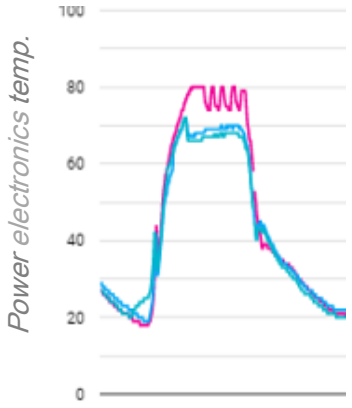
Trackers blockages



String disconnection



Inverter shutdown



Overheating

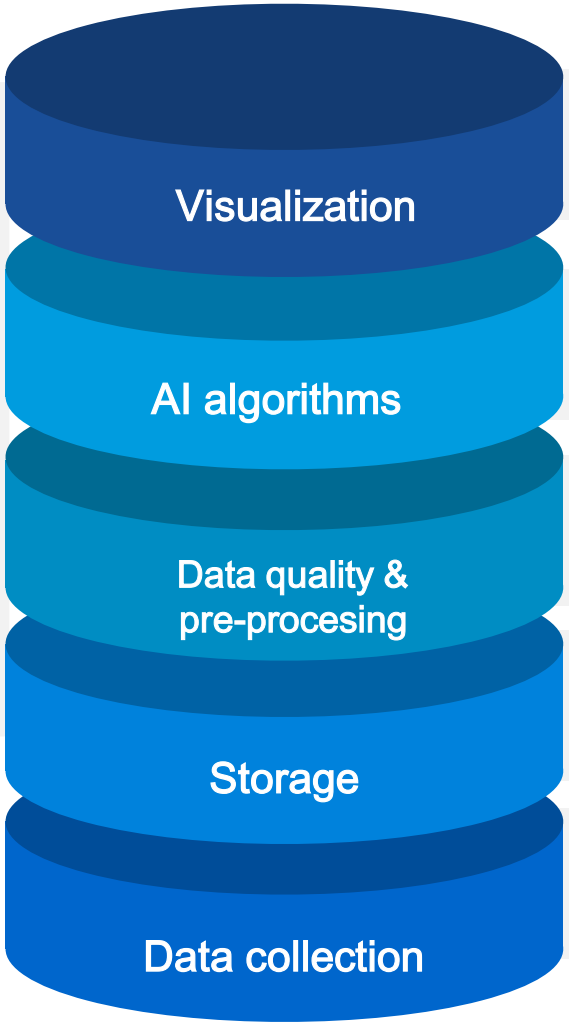
This analysis can be carried out automatically through AI-based advanced algorithms …

… **simplifying the tasks of the technical assets managers**

What do we need?

Modular infrastructure

A set of different layers for **transforming data into insights**



User navigation interface and results display

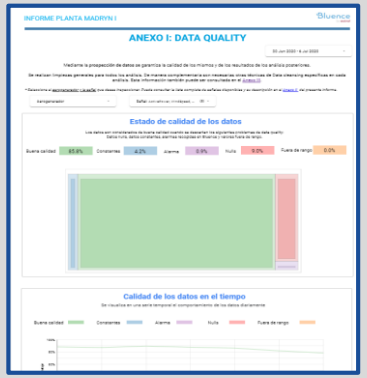
System intelligence for the analysis and diagnosis of the plant.

System intelligence for the processing and treatment of information prior to analysis.

BigData repository

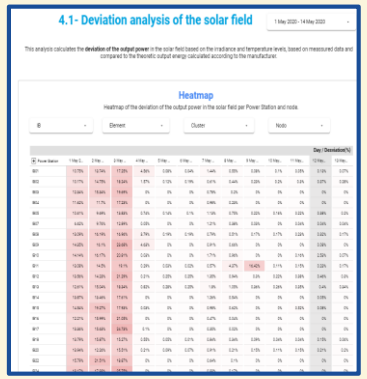
Data extraction from Scada and sensors

PV data analysis in layers

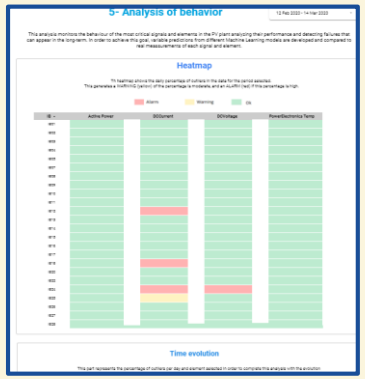


ETL & Data quality

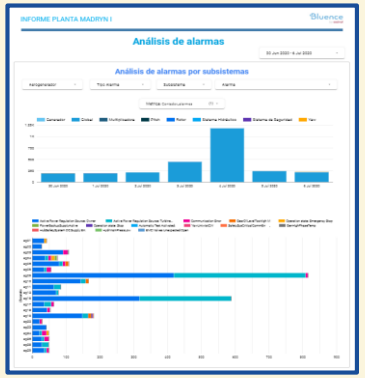
Layer 0



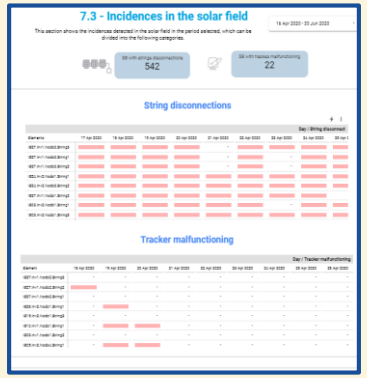
Deviation analysis



Patterns & Outliers analysis

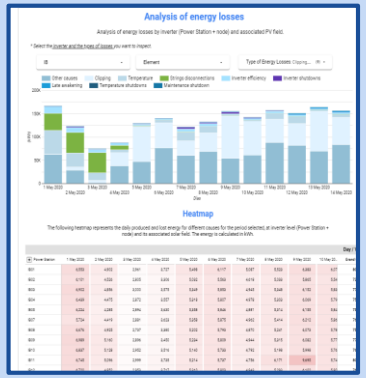


Alarm analysis



Solar field and inverters analysis

Layer 1



Energy Losses Analysis

Layer 2

Plant dashboard

Recommendation engine

Layer 3

Main contribution of data analysis to PV

Objective:
downtime reduction, avoiding failures and increasing performance

Performance analysis watchdog

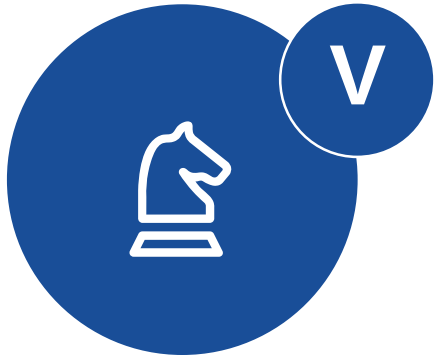
- Energy losses quantification by root cause
- Deviation at inverters and the solar field
- Early detection of changes in behaviour

Early failure detection and recommendations

- Specific problem detection: string, trackers, soiling
- Identifies out-of-normality situations and patterns of failures
- Predicted vs. real measurements
- Recommends actions

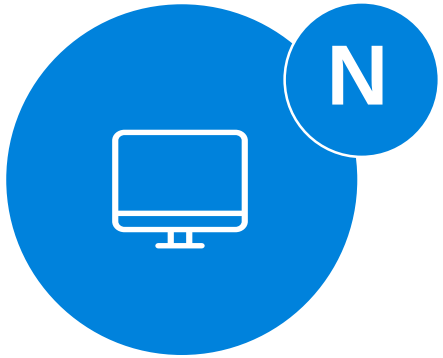
isotrol

Advanced analysis of Scada data through Machine Learning



Advantages

- Increases plant performance
- Early detection of problems
- No additional investments in sensors

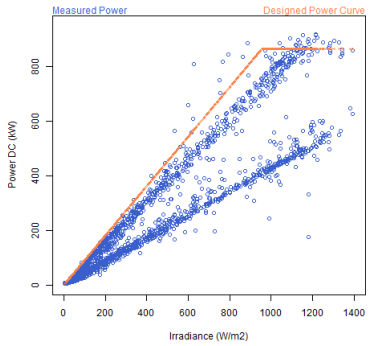


What do I need?

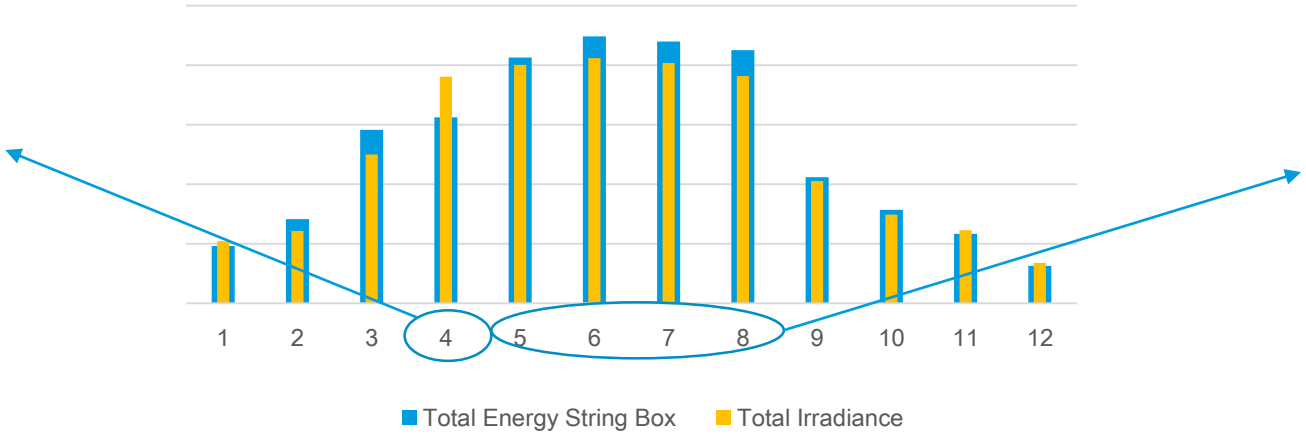
- BigData infrastructure
- ETL and datacleasing processes
- Analytical capabilities and experience

Impact on profitability

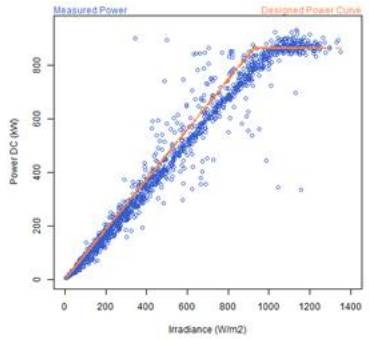
Underperformance



Resource Vs Production



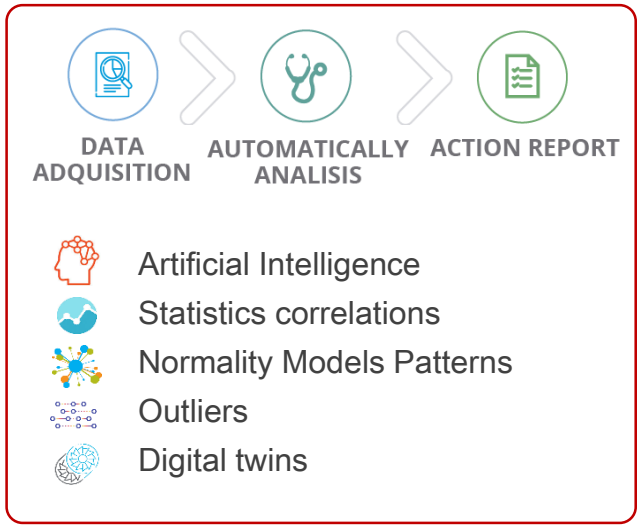
Optimal production



	Production (GWh)	Total Incomes	Increase Revenues	% Increase Operational excellence
Before	16,1	€ 1.870.146	-	-
APD proposal	16,2	€ 1.940.485	€ 70.339	4%

Going beyond…

These data analytics can be combined with drones inspections



… So the O&M and inspection processes can be optimized

Key aspects

Data analysis for early detection of performance problems

01 Increasing PV plant performance and profitability

02 Early detection of problems

03 With data & analytical tools

04 Rely on experience

jgfranquelo@isotrol.com

www.isotrol.com