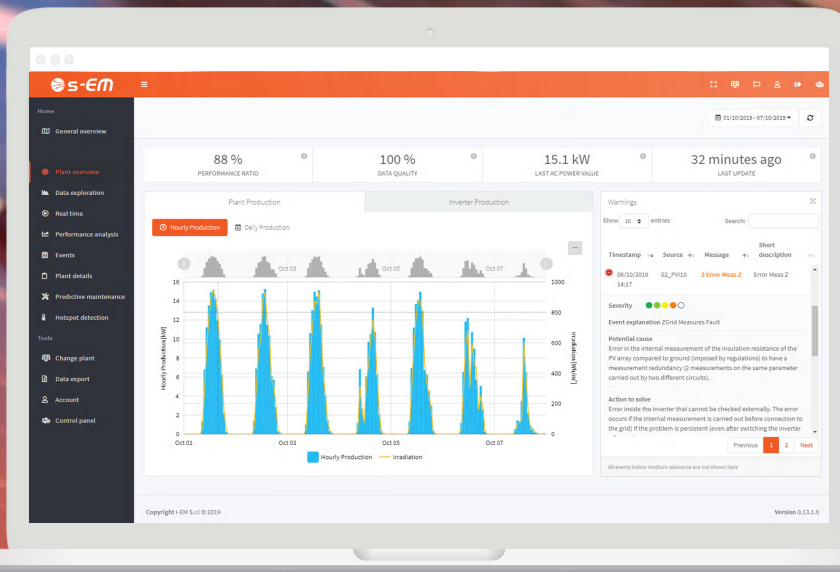




S-EM

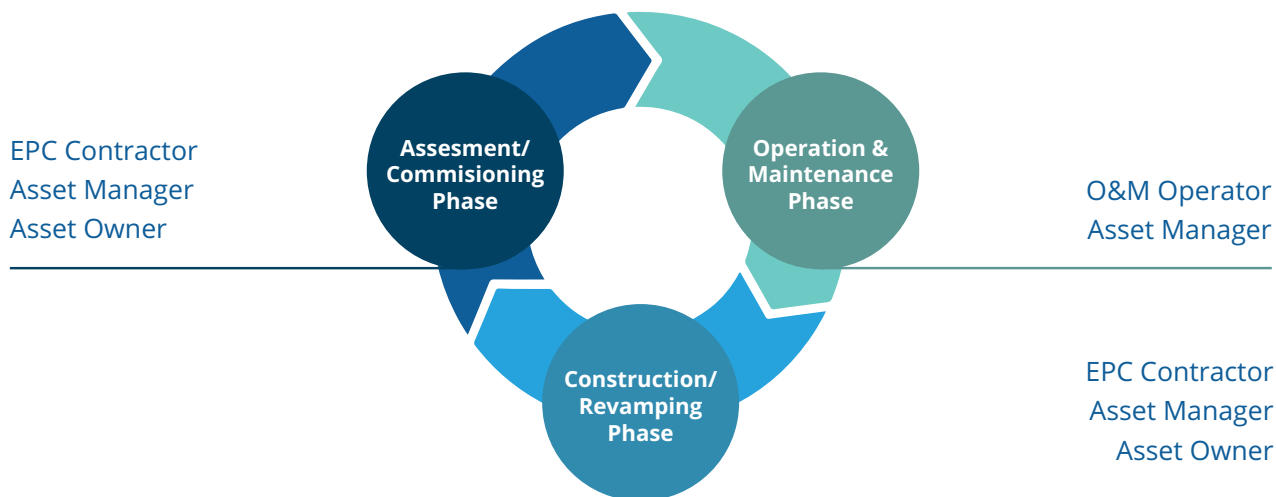
Solar Energy Management



GET THE BEST VALUE FROM YOUR SOLAR ASSETS DATA

The holistic solar asset life-cycle interoperable solution

s-EM maximizes **performances** and maintenance activities, increasing energy yield and decreasing operational costs



Interoperable and
Multi-User



Universal Acquisition
System



Reliable KPIs



Proprietary Technology
Independent



Solar Monitoring
Best Practices Mark
solarbestpractices.com


i-EM is a holder of the
Solar Monitoring Best Practices Mark



IEA
PVPS

i-EM follows **IEA best practices for monitoring and performance** (Report IEA-PVPS T13-03:2014)

Global Presence



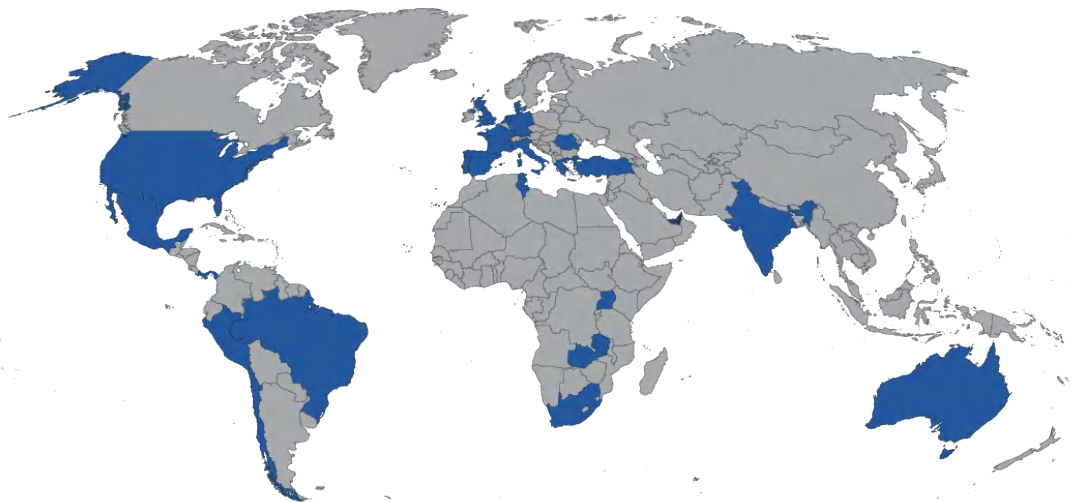
500+
SOLAR PLANTS



5+GW
TOTAL
INSTALLED POWER



 **20+**
NATIONS



Proudly Working with



Benefits for Solar Assets Business Players



EPC Contractor



- Supervision and control the construction of the plant
 - Compliance assessment with the as-built data set
 - Monitoring of the work from remote
-



O&M Service Provider



- Reduction of plant downtime
 - Reduction of energy losses
 - Optimization of energy production
 - Corrective, Preventive and Predictive Maintenance Activities
-



Asset Manager



- Ensure Optimal Profitability: energy sales, energy production, O&M Activities
 - Suggest financial optimization, balance of costs, risks and performance
 - Maximise value for asset owner
-



Energy Trader



- Optimization of the selling of energy thanks to accurate renewable energies production forecast
 - Reduce imbalance costs and penalties
-

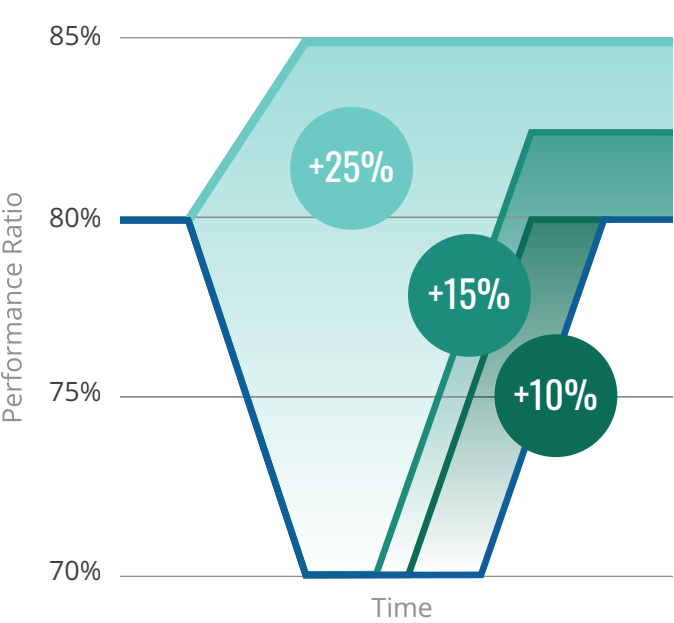


Asset Owner



- Ensure optimal profitability
- Maximize value of assets
- Supervise Asset Manager activities

s-EM Benefits



Standard Monitoring

Improve PV Plant monitoring
Technical energy losses savings **5% -10%**
Increase in energy yield up to **10%**

Advanced Diagnostics

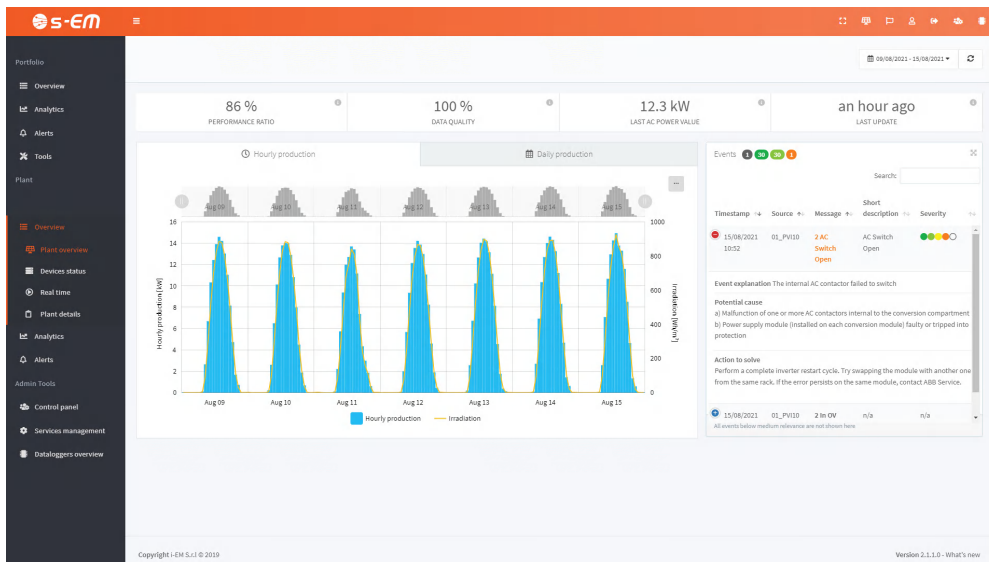
Reduce Acknowledge Time
Technical Energy losses savings **20%-50%**
Increase in energy yield up to **15%**

Predictive Maintenance

Anticipate Faults and improve O&M Activities
Technical Energy losses savings **60%-80%**
Increase in energy yield up to **25%**

Global Partnership





Standard Monitoring

Reliable and accurate management for single plant and portfolio

Our standard monitoring system is a cloud-based platform which enables solar asset managers, solar asset owners and O&M operators to use all the value of PV plants data assets. The multi-level access provides different kind of information with reference to the different role of the user.

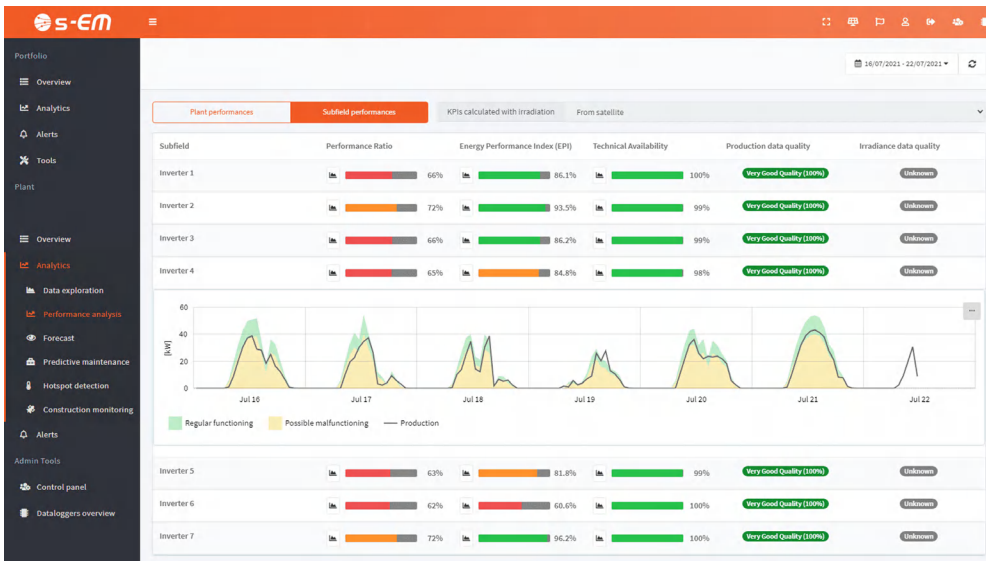
The platform follows the philosophy of business intelligence combined with advanced analytics; easily analyse real-time status of solar plants, providing reliable and accurate values and KPIs for solar plant portfolio management.

FEATURES

- Centralized Management of PV portfolio
- Real-time underperformance alerts
- Automatic alerts configuration
- Ticketing system and automatic reporting

BENEFITS

- Increase of energy yield
- Reduction of plant downtime
- Reduction of energy losses
- Reduction of O&M costs



Advanced Diagnostics

Cutting-edge advanced analytics to monitor PV plants

Empowered by Artificial Intelligence, the advanced diagnostic system ensured reducing acknowledge time of faults giving exact information of components affected and precise identification of issues root cause (shading, covering, thermal problem, faulty MPPT, inverter and string underperformance).

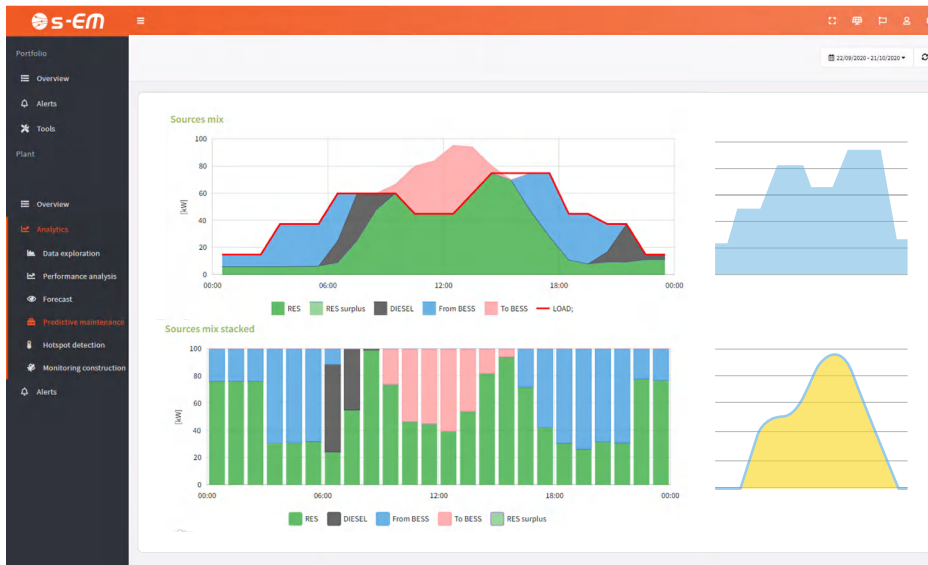
Data Quality assessment is essential to ensure reliable analysis. I-EM data quality assessment models allow asset managers and O&M operators to get reliable KPIs.

FEATURES

- Automatic Fault recognition
- Root Cause Identification
- Data Quality Assessment
- Ticketing system with O&M calendar

BENEFITS

- Reduction of plant downtime
- Reduction of energy losses
- Optimization of energy production
- Optimization of assets' financials



i-EM has led and now contribute to the 3.2 IEA activity on “Regional Solar Power Forecasting”

Solar Plant Power Nowcast and Forecast

Get precise information from minutes ahead up to days ahead

Numeric weather prediction, satellite image and real-time measurement are used as inputs of an ensemble framework of Machine Learning algorithms in order to produce solar power forecast from minutes ahead up to days ahead.

The service is highly flexible and reliable to ensure high-value benefits for energy producers, system operators and energy traders. Outputs can be delivered through any format and visualizes on a user friendly intelligent dashboard.

FEATURES

- Different time and spatial resolution
- Multiple daily updates
- Flexible output format and delivery area
- Plant, portfolio or regional solar power forecast

BENEFITS

- Improve plant management efficiency
- Reduce imbalance costs and penalties
- Ensure market and authorities requirements compliance



Self-consumption Management

Optimize the use of your solar power system

Nowcast and forecast PV plant production data are used in combination with real-time data to maximise the self-consumption, optimising the usage of storage system and the EV charging if present. This allow to define a strategy to minimize the energy exchanges with the grid during the current and the next day.

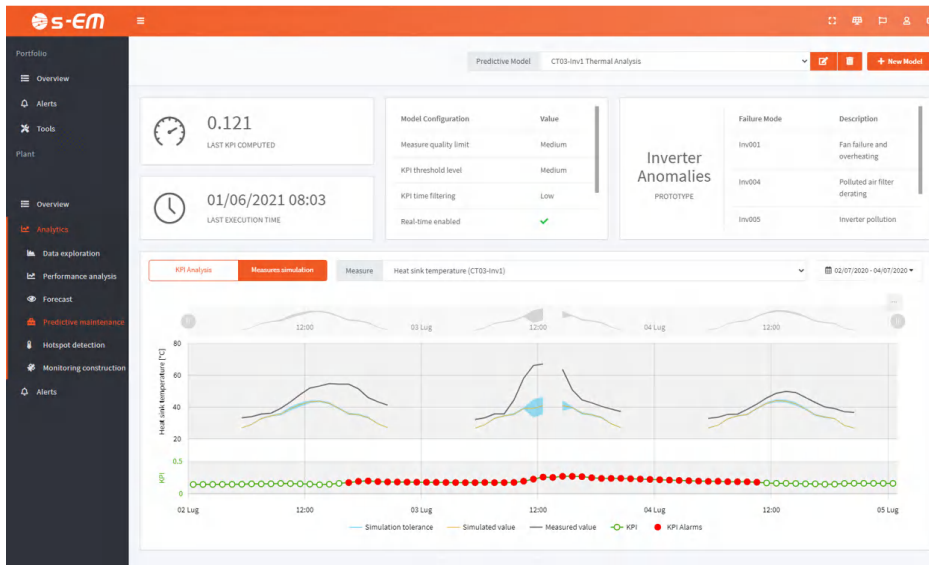
The mobile App allows the easy visualization of the values and parameters of the battery, such as the state of charge (SOC), the cycles of charging/disgorging, etc., providing advises for the best energy usage.

FEATURES

- Visualization of the energy flow
- Monitor and manage the system components behaviour
- Expected outcomes forecast based on usage options
- Advices on energy usage

BENEFITS

- Optimizing the usage of energy
- Minimize peak energy costs
- Reducing grid energy use
- Increasing of battery life



First solar publication on predictive in 2017
 “Predictive Maintenance in Photovoltaic plants with a Big Data Approach”



PV Tech Cover Story:
 Big Data and Predictive Analytics, the future of solar O&M

Predictive Maintenance

Change your maintenance approach and give value to your data

This tool is able to predict (or early detect) inverter faults status before they actually occur, allowing O&M operators and field technicians to take actions to avoid loss production period, increasing solar assets return on investment.

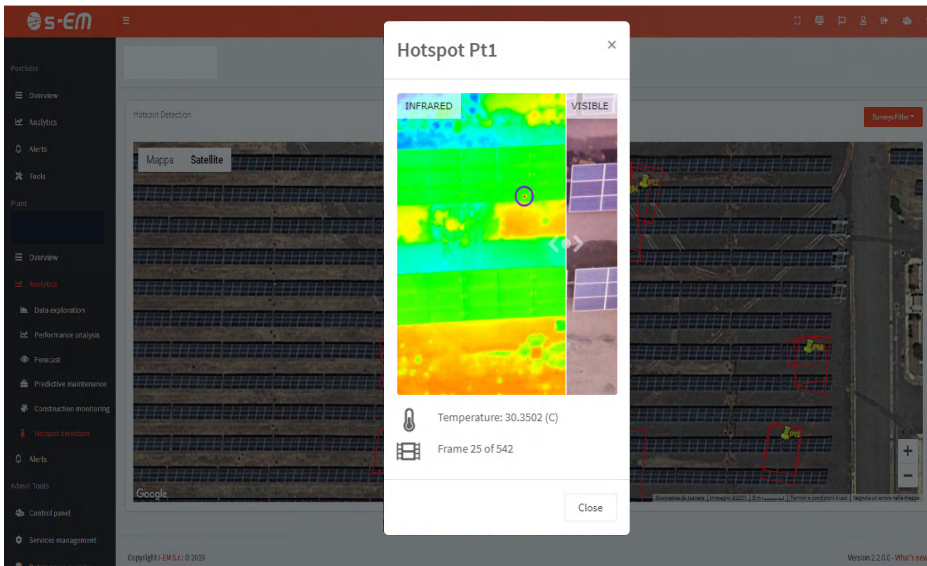
The system leverages an ensemble of best performing Machine Learning algorithms, to detect unhealthy status of PV plant inverters. The big data i-EM’s IT infrastructure allows to ingest and manipulate large and heterogeneous sets of data.

FEATURES

- Easy visualization of ML algorithms outcomes
- KPIs trend to understand warning evolution
- Identification of critical signals
- Analytics model self creation (Analytics as a Service)

BENEFITS

- Increase the lifetime of components
- Reduce plant downtime
- Reduce technical energy losses
- Optimization of O&M activities



Drone Data Management

Hot Spot Detection and supervision of PV plant construction process

The combination of IR and visible images/video is used to automatically detect hotspots and other typical problems of rooftop or ground installation (dirt, delamination, etc.) and to provide accurate detection and count the number of panels, poles, trackers and cabin units.

All the information are georeferenced and reported on the cloud-based platform to allow a clear overview of the PV plant. The is twofold: support procurement stage in the acceptance phase and support O&M teams during plant operations.

FEATURES

- Detection and counting of panels, poles trackers and cabin units
- Automatic detection of hotspots
- User-friendly visualization of the information
- Georeferenced output

BENEFITS

- Optimize the acceptance process
- Optimize the O&M activities
- Improve plant performances



Solar Sensor Check

Get accurate solar radiation measurement

Irradiance data gathered from satellite imagery are used for the automatic and real-time sensor condition based check-up, by detecting sensor failures and possible configuration issues.

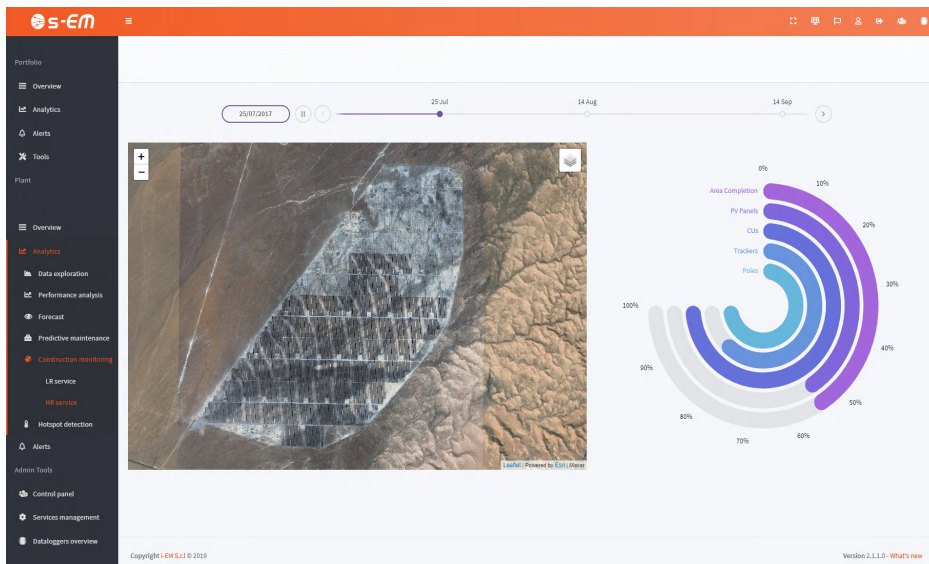
Corrected irradiance sensor measurements dataset generation, exploiting satellite data (sensor statistical recalibration). Reliable and accurate long-term PV DC effects assessment, correlating the sensor measurements and the satellite irradiance data.

FEATURES

- Automatic real-time remote sensor condition-based check-up
- Sensor statistical remote recalibration
- PV plant time-dependent drifting deviation assessment from nominal behavior

BENEFITS

- Reliable evaluation of KPIs (PR, EPI etc.)
- Increases PV plant performance assessment reliability
- Save time and cost for O&M resources
- Advanced diagnostics of PV plant



Publication in 2018 "A DSS Based on EO Exploitation for Renewable Energy Plants Management"

Satellite-based Plant Construction Monitoring

Supervise remotely your PV plant construction process

Remote supervision of the solar plants construction progress. While LR (~10m at ground) images aims the detection of the areas changed, the HR (0.3-0.9m at ground) service provides periodical information on construction process KPIs statistics for the main relevant building phases.

The image processing software exploits the combination of successive images supplying information about pole, trackers, PV panels trackers, PV panels and cabin units installed as well construction process percentage.

FEATURES

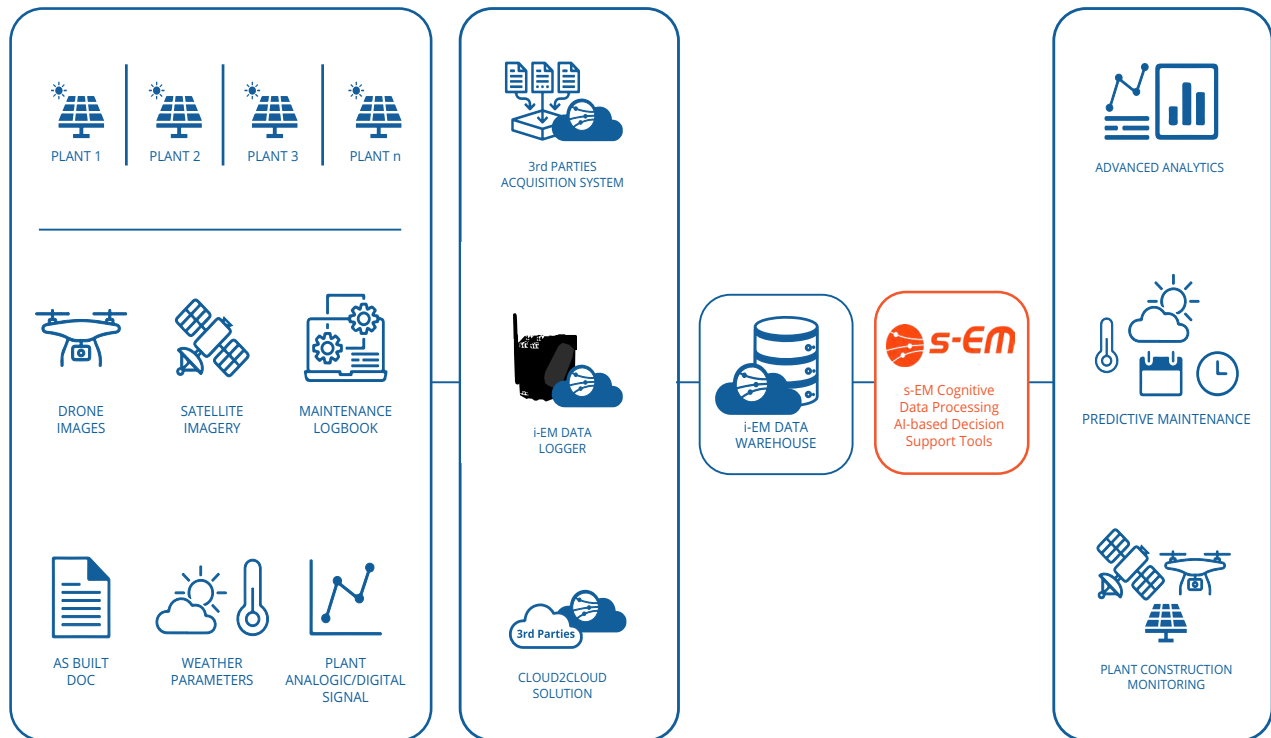
- Automatic processing of LR & HR images
- Area completion percentage and trend
- Detection of areas changed between two images acquisition
- User-friendly interactive visualization

BENEFITS

- Costs reduction for plant construction management
- Costs reduction in the management of plant documentation
- Monitoring of the work from remote

s-EM: the independent, open and modular platform

s-EM is a **user multi-interface and multi-source data Software as a Service (SaaS)** solution ready to be integrated in any solar asset management portfolio scenario.



s-EM is compliant with the international standard in **Data Protection** and **Cybersecurity**: European General Data Protection Regulation (**GDPR**), **ISO 27001** and **SOC2** standards.

Data Acquisition System

- Long-lasting highly-robust system and complete Data Acquisition System for the acquisition of electrical parameters from inverters, strings and meteo-data in the field.
- Storage up to thousands of variables, and upload every 5-15 minutes on i-EM cloud.



i-EM is proud to integrate SENECA hardware for Solar Energy Management



Compatibility

i-EM configures the datalogger with the standards of different inverter manufacturers.

New protocols can be added on request with short development times.





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i-EM is certified according to

ISO9001:2015 Quality Management System (QMS) international standard.

i-EM S.r.l. is a Single-Member Company owned by Flyby S.r.l.



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