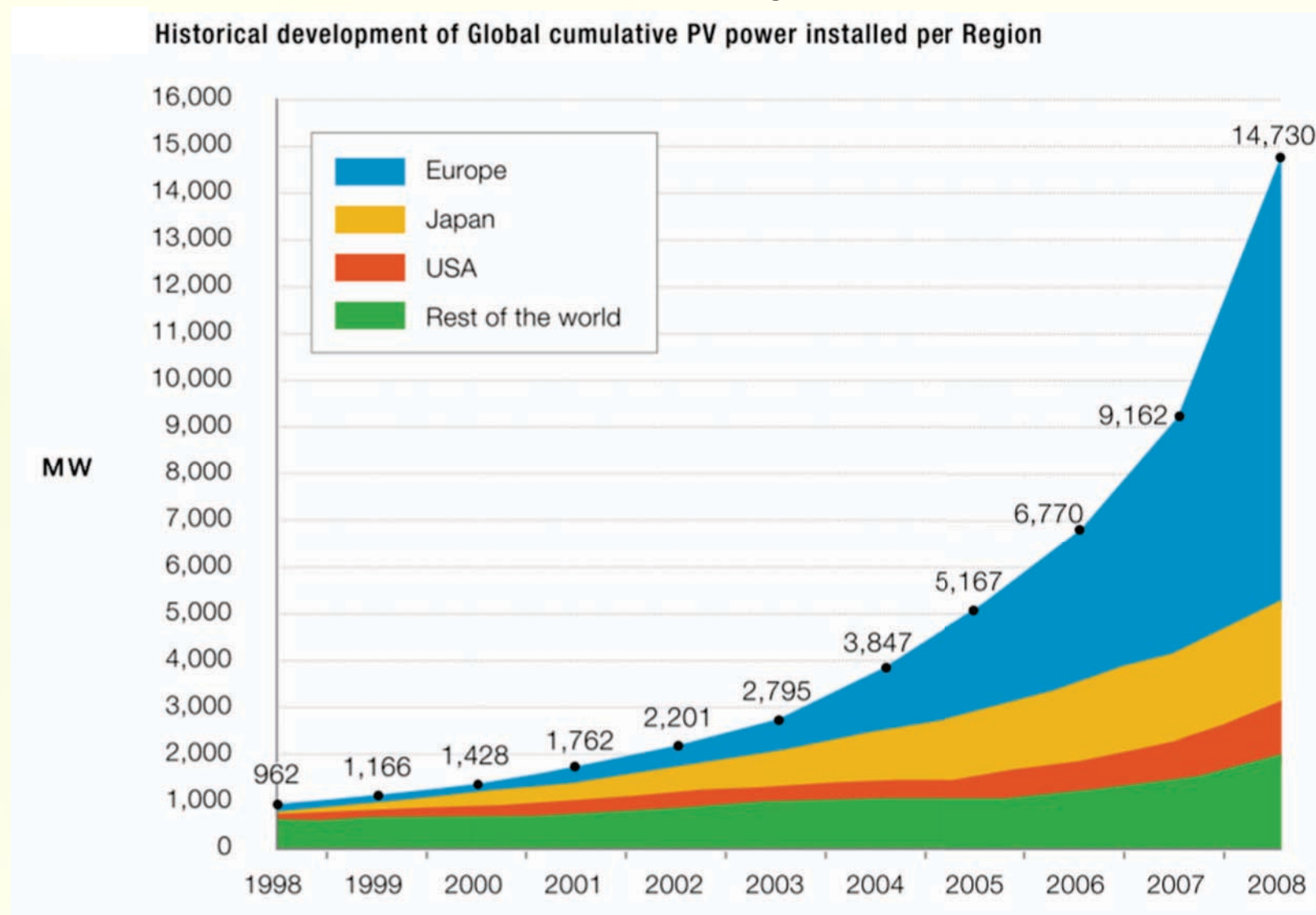


inAccess Networks

IT for Renewable energy sources management

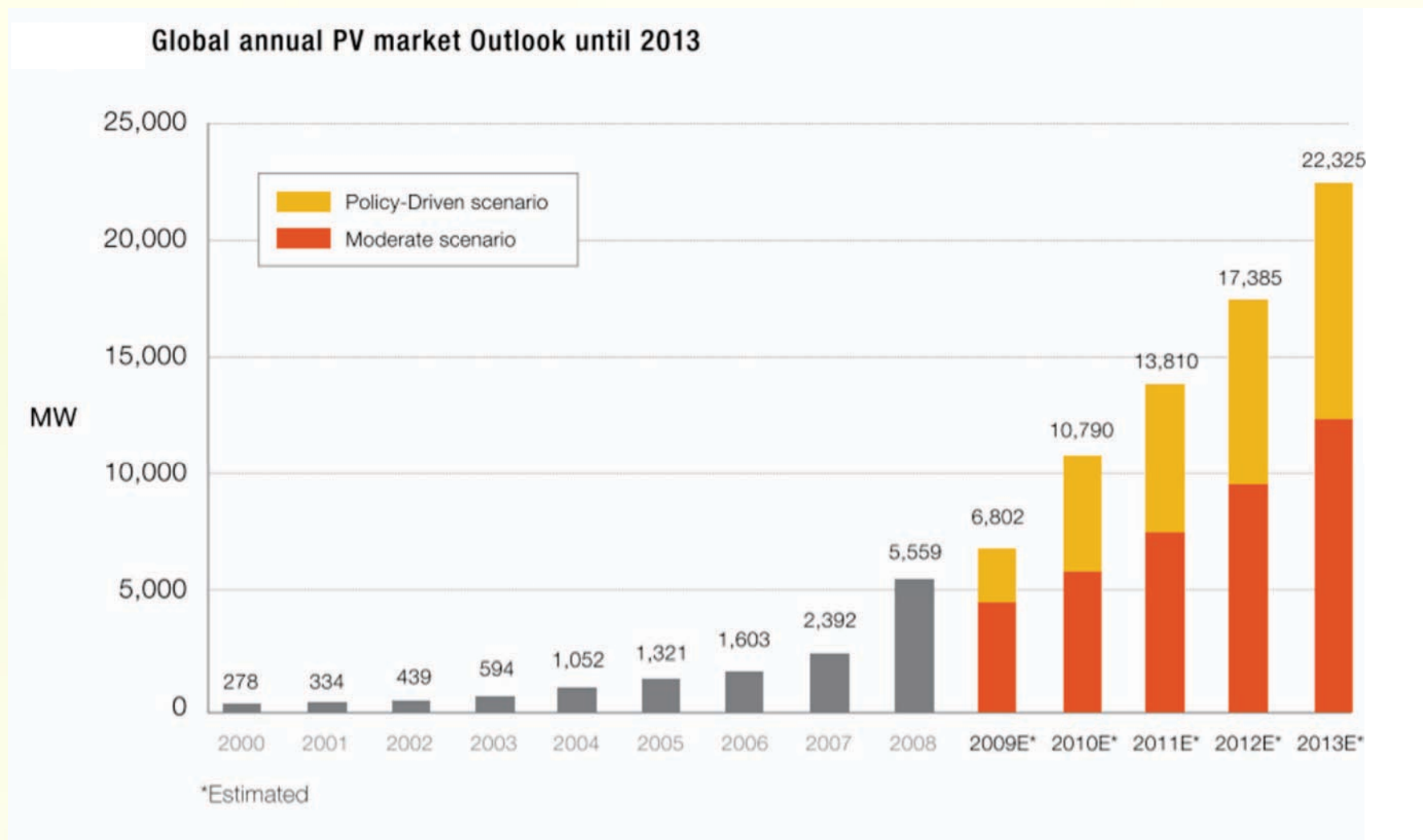
May 2010

PV market overview - History



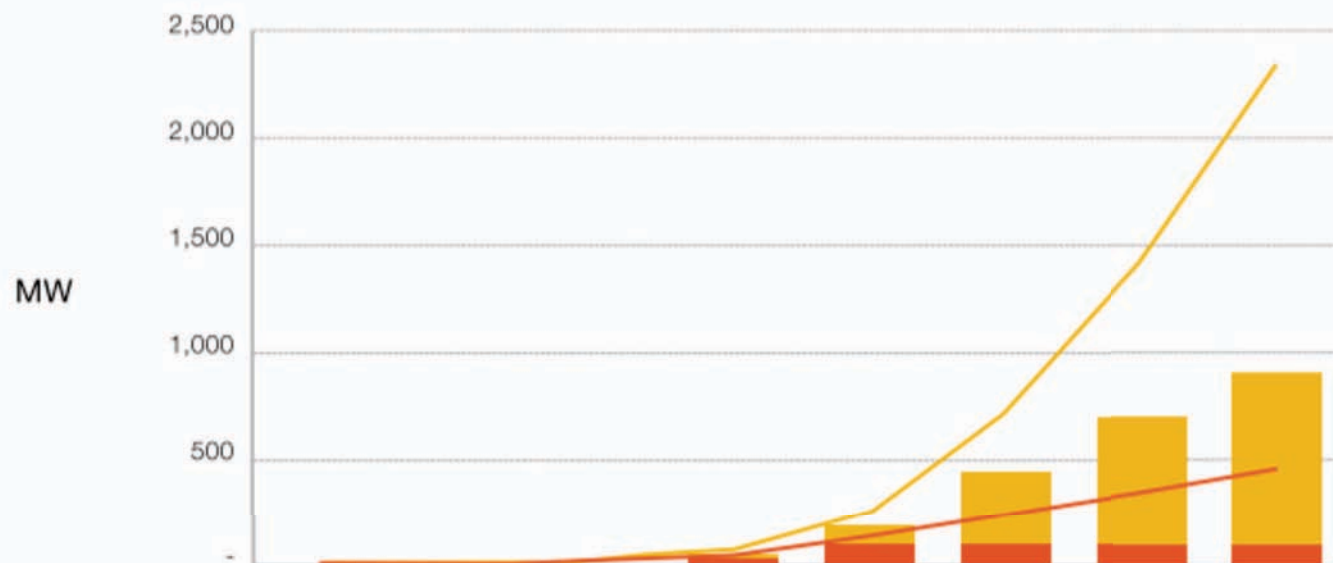
*Source: EPIA

PV market overview – Future



*Source: EPIA

PV market in Greece

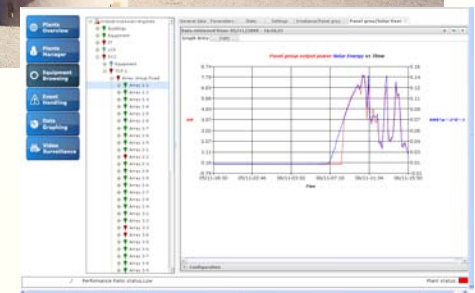
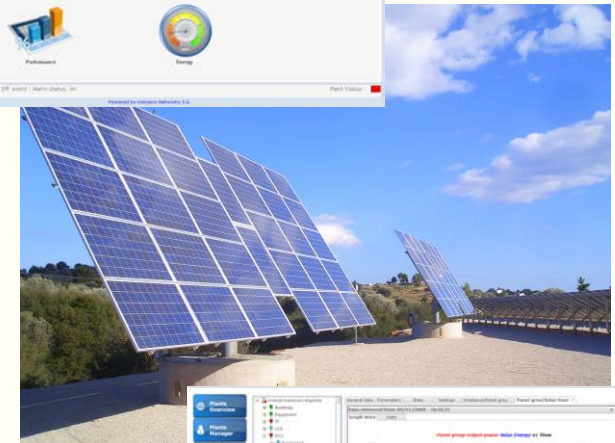


		2006	2007	2008	2009E	2010E	2011E	2012E	2013E
Annual market (MW)	Moderate scenario	1	2	11	35	100	100	100	100
	Policy-Driven scenario				52	200	450	700	900
Projected cumulative PV power installed (MW)	Moderate scenario	7	9	20	55	155	255	355	455
	Policy-Driven scenario				72	272	722	1,422	2,322

*Source: EPIA

The need for IT in RES sector

- Remote monitoring
 - Solar parks are usually in open fields and unmanned
- Centralized management
 - Geographically distributed solar parks
- Performance Evaluation
- Immediate detection of failures and performance degradation



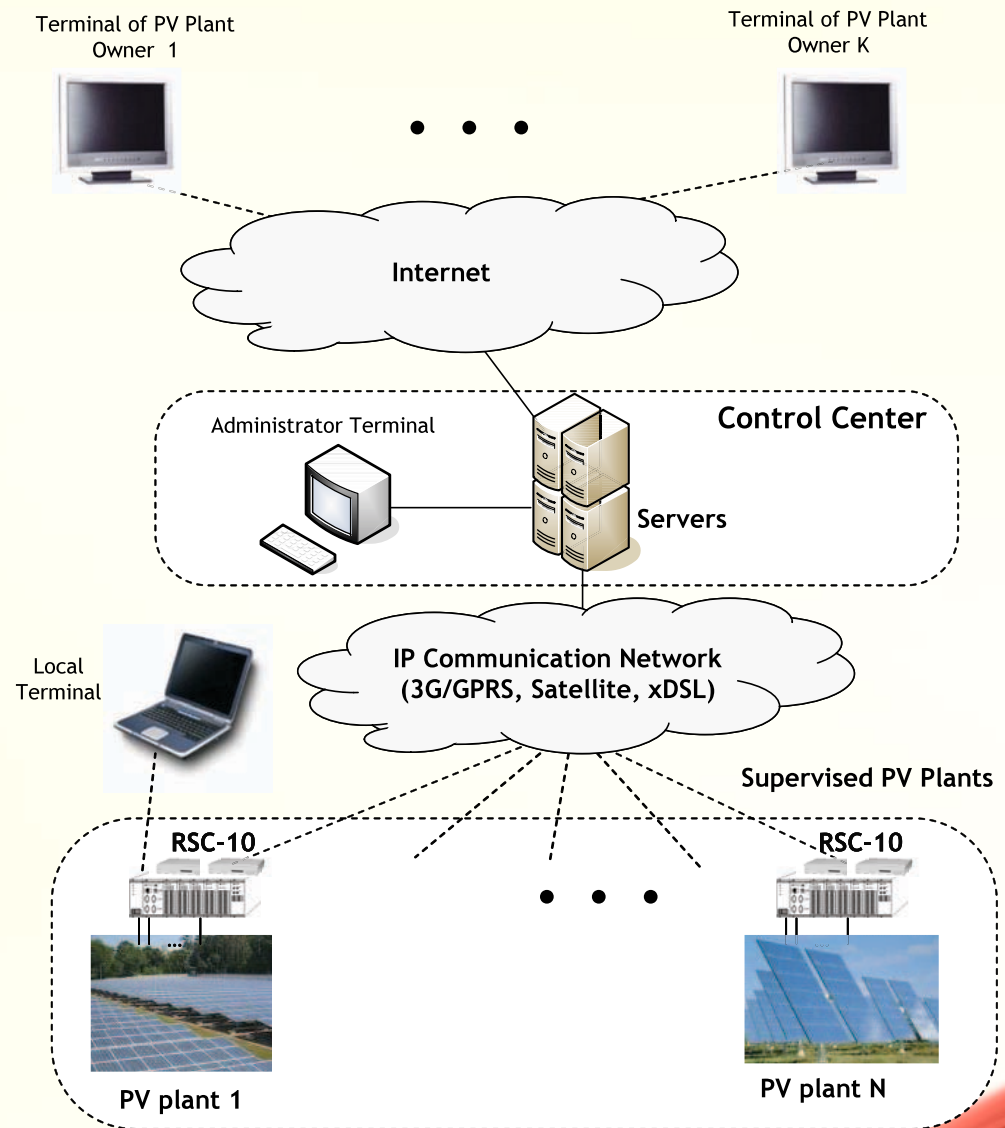
Integrated Facility Management for Solar Parks

- Integrated solution for monitoring, control and management of Solar Parks
- Features
 - Production & Grid interconnection monitoring
 - On line Performance measurements according to standards
 - Alarm detection
 - SMS/email notification
 - Security and access control
 - CCTV integration with Live Video
 - Integrated reports



System Architecture

- Solar Park Subsystem: all peripheral monitoring and supervising systems (controller, sensors, cameras etc.) installed at each PV Site
- Control Centre (CC): operator platform for managing all PV Sites



System Benefits

Production monitoring	– Readily detects failures and performance degradation to minimize equipment/park downtime or underperformance and to maximize profit – Records the energy finally sold to the utility & the actual revenues – Provides on-line performance measurements
Grid inter-connection monitoring	– Identifies problems originating from the utility provider – Monitors the output power quality characteristics
Security & Safety	– Secures the solar park perimeter and shelters – Allows the entrance to certain solar park facilities only to accredited personnel and monitors their presence – Readily detects fire and flood conditions in the solar park shelters or pilars

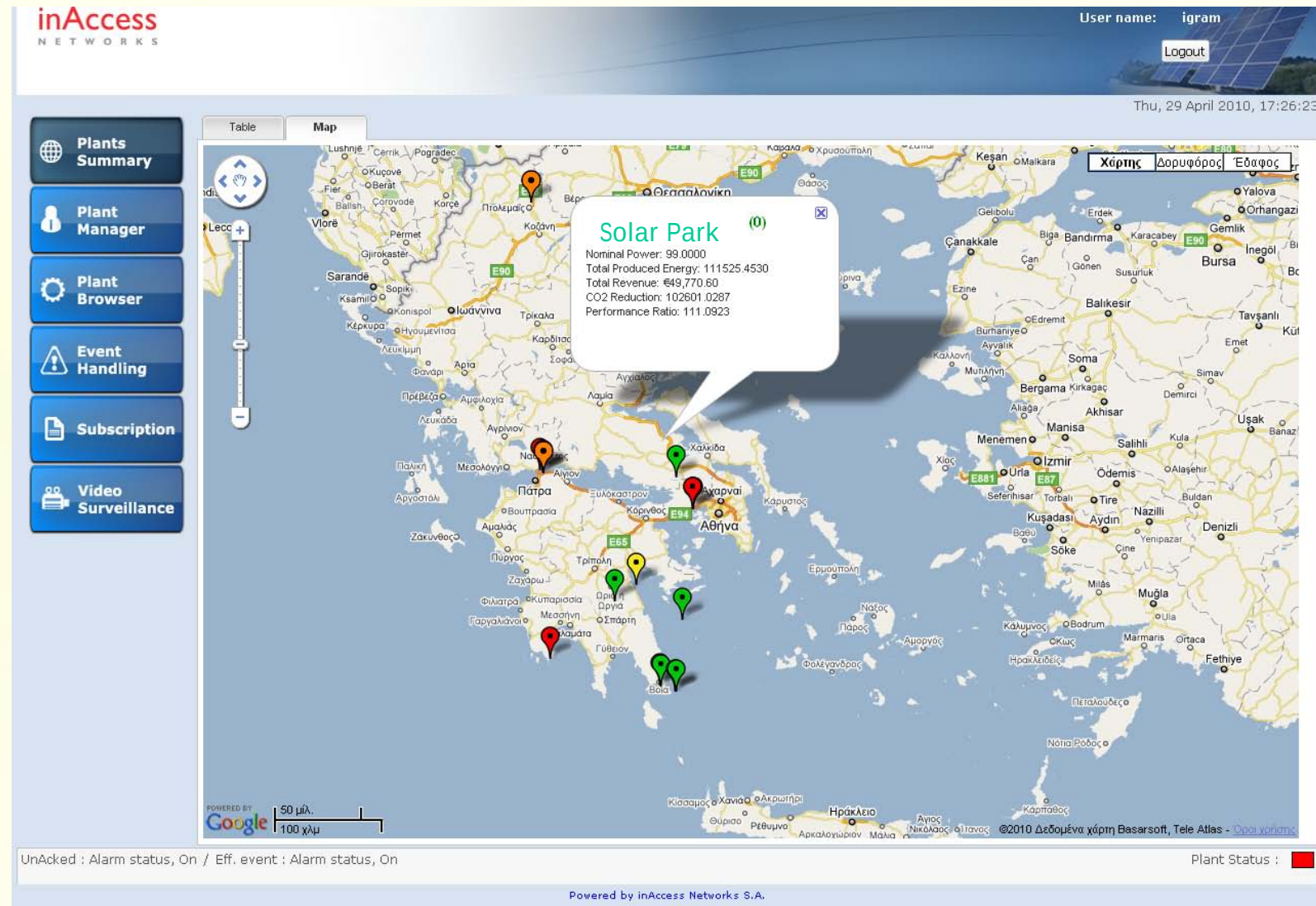
Vendor Independent

Support of solar park equipment from multiple vendors:

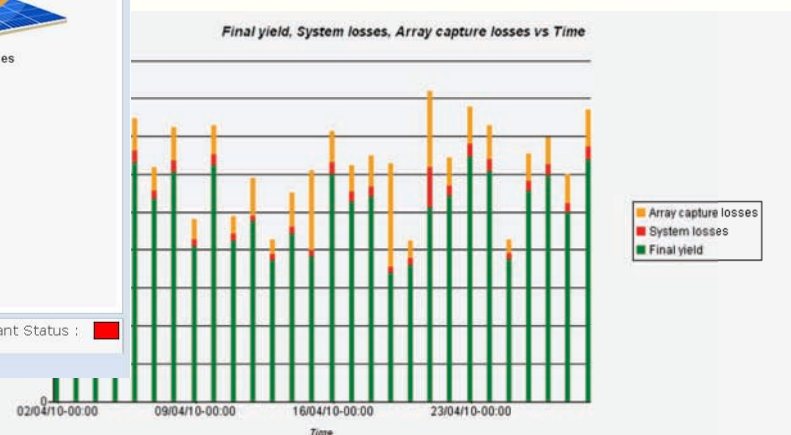
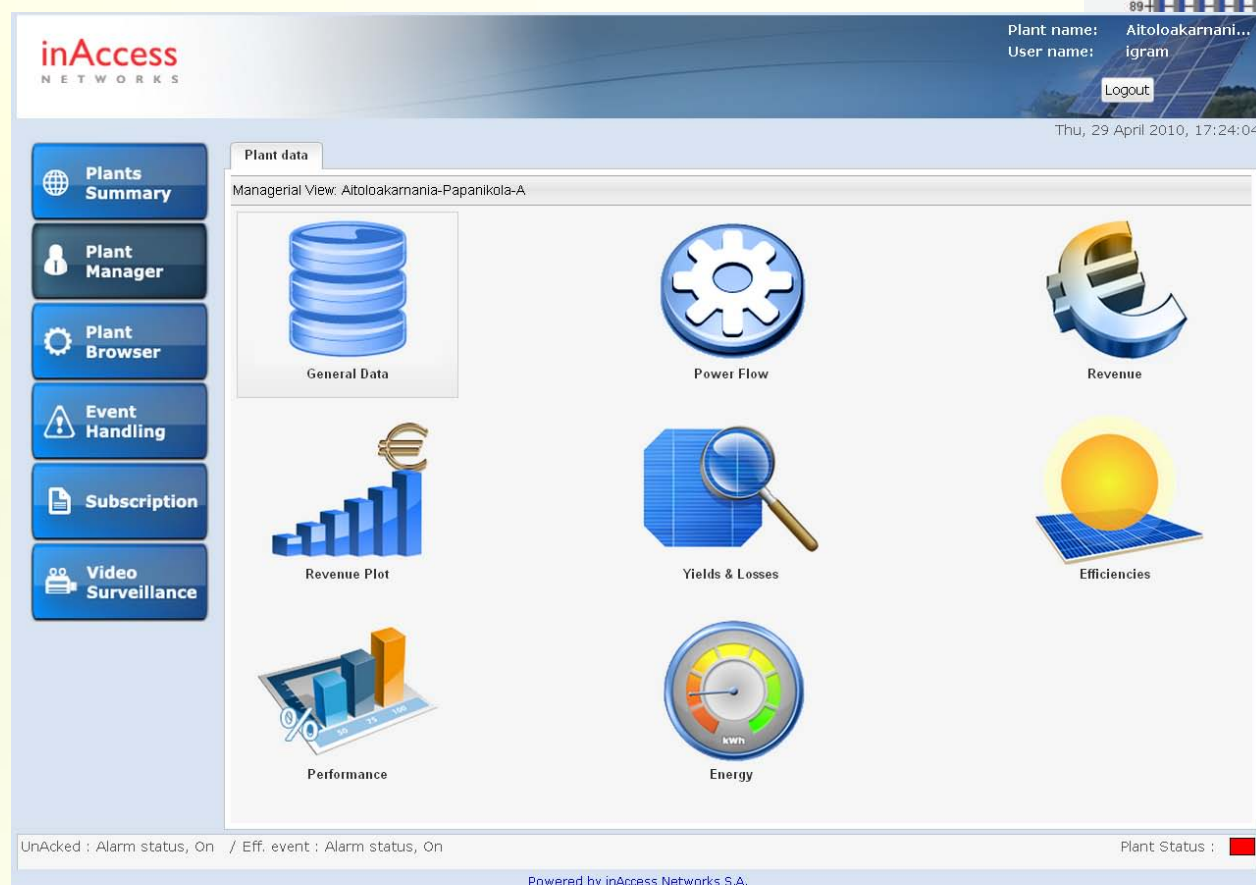
- Inverters
- Power Meters
- Protection Devices
- Meteorological devices
- Various Sensors
- Other E/M Equipment



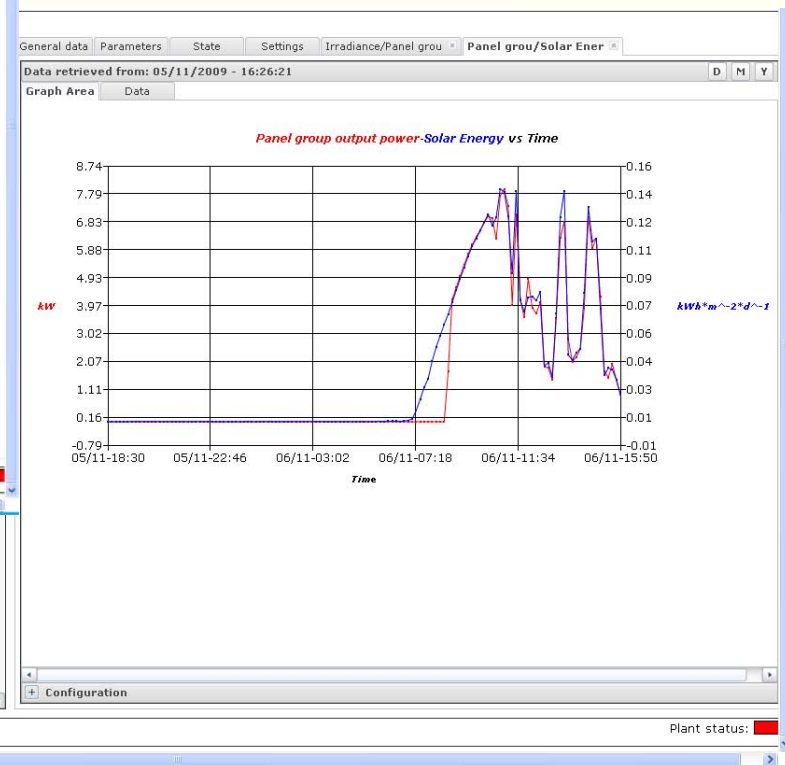
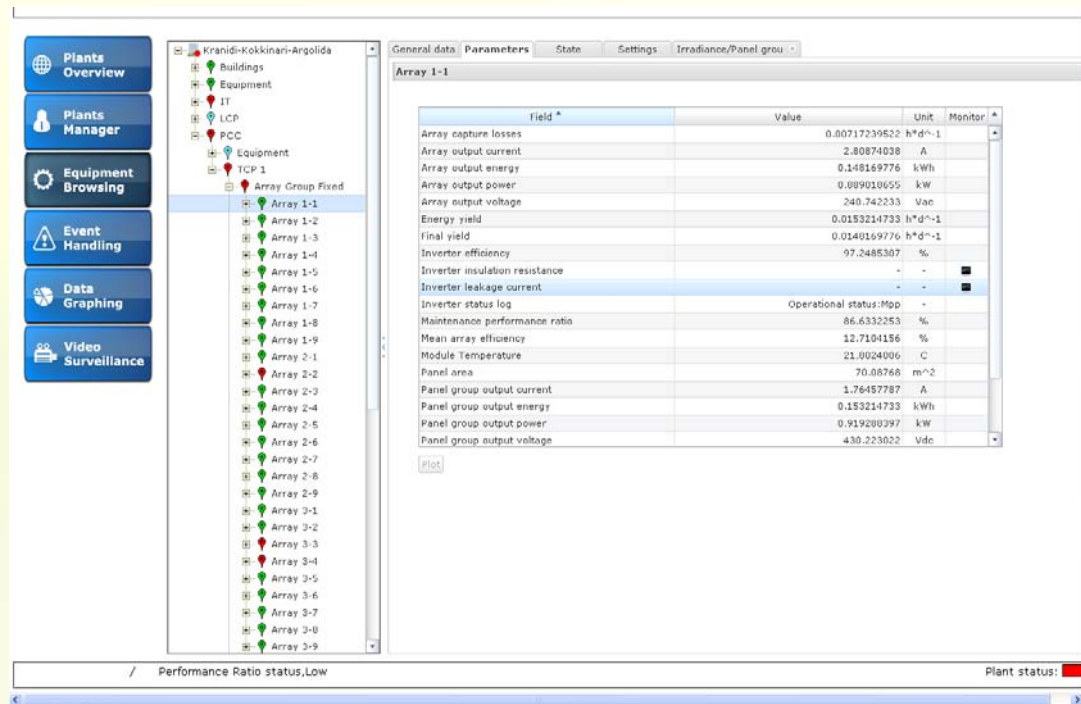
Centralized Management



Solar Park Overview



Performance Measurements (IEC 61724)



Alarm detection – SMS /email notification

The screenshot displays the inAccess NETWORKS software interface. On the left, a sidebar contains navigation buttons: Plants Overview, Plants Manager, Equipment Browsing, Event Handling, Data Graphing, and Video Surveillance. The main area shows a tree view of the plant hierarchy for 'Kranidi-Kokkinari-Argolida', with 'Array 2-2' selected. A table of parameters for 'Array 2-2' is displayed, showing various performance metrics. An orange callout points to 'Array 2-2' in the tree, stating 'ALARM: Problem in part of a string'. A blue callout points to the 'Maintenance performance ratio' row in the table, stating 'Low Performance Ratio (62%)'. Another blue callout points to the 'Operational status:Mpp' row, stating 'Description of problem'. At the bottom, a status bar shows 'Performance Ratio status,Low' and 'Plant status:' with a red indicator.

Field	Value	Unit	Monitor
Array capture losses	0.0115066076	h*d^-1	
Array output current	1.96207249	A	
Array output energy	0.0753086258	kWh	
Array output power	0.451851755	kW	
Array output voltage	242.066238	Vac	
Energy yield	0.0135542661	h*d^-1	
Final yield	0.00854840278	h*d^-1	
Inverter efficiency	97.1060969	%	
Inverter insulation resistance	-	-	
Inverter leakage current	-	-	
Inverter status log	Operational status:Mpp		
Maintenance performance ratio	62.3992513	%	
Mean array efficiency	9.16835025	%	
Module Temperature	21.8024006	C	
Panel area	70.08768	m^2	
Panel group output current	2.32788134	A	
Panel group output energy	0.0831250102	kWh	
Panel group output power	0.813255966	kW	
Panel group output voltage	443.765991	Vdc	

ALARM:
Problem in part of a string

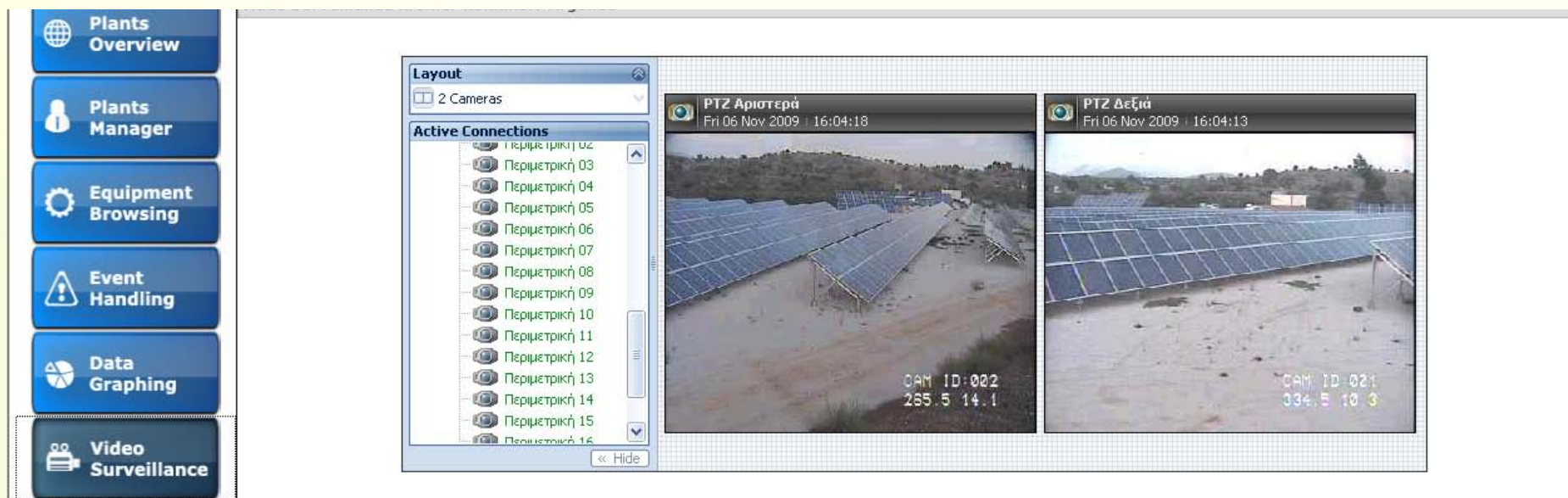
Low Performance Ratio (62%)

Description of problem

Performance Ratio status,Low

Plant status:

Security & surveillance



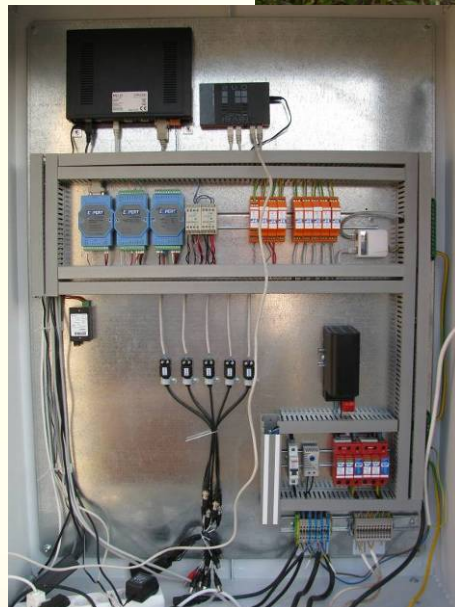
Reference Projects

- in operation since 1/2008, Several parks of 100KW – 4.3 MW, 15 MWp in total
- >60% GR market share in large solar parks (from 500KW to several MWp)
- Grid-connected 4.3 MWp PV Park in Florina, Greece
- Grid-connected 2 MWp PV Park in Arcadia, Greece
- Grid-connected 2 MWp PV Park in Argolida, Greece
- Grid-connected 1.25 MWp PV Park in Viotia, Greece
- Grid-connected 2 MWp PV Park in Viotia, Greece

Installation example - Typical Park (2MW)



Installation example - Small Park (100 kW)



Thank you !