INDUSTRY: POWER, ENERGY

9REN Group

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"Wonderware is a flexible technology which enables reliable monitoring of any production energy source that we can offer. It gives us the guarantee of maximum installations control and also allows us to improve the facilities performance ratio of installed structures."

Francisco Alija,
Monitoring and Control Manager,
9REN

Wonderware Guarantees Efficiency and Improves Renewable Energy Generation Plant's Production for 9REN

by Wonderware Spain

Goals

- Improve performance and ensure full operation of the company's renewable energy generation installations to increase their production levels;
- Reduce on-site maintenance costs, minimizing supervision.

Challenges

- It was necessary to develop and implement a single control system to supervise 2 types of installations; photovoltaic facilities and low temperature solar thermal installations, which both have different operational dynamics;
- The monitoring installations were geographically dispersed throughout Spain and abroad with all the challenges that implies: complex communications protocols for data transmission, different time-zones, etc.

Solutions and Products

- Wonderware InTouch HMI;
- Wonderware System Platform.

Results

- Through a unique control centre in Madrid, access is granted to operating and performance information of each of the company's installations;
- The new control technology infrastructure supports the expansion of the existing solar energy generation installations as well as responding to the monitoring demands of other generation sources such as eolic energy or thermoelectric energy.

Madrid, Spain – Renewable energy is one of the fields in which Spain is taking initiative at a global level and 9REN is a clear example of the country's leading position in the material. Founded after the First Reserve Corporation's - a multinational specialist in energy market investments - takeover of Spanish Gamesa Solar and Italian Ener3, 9REN is a company dedicated to the design and development of turnkey solar energy - photovoltaic and low temperature thermal - and also offers management and maintenance services for these kind of infrastructures, guaranteeing top performance of their client's investment.

With a team of 130 professionals, 9REN manages power facilities 100MW photovoltaic plants in both Spain and Italy, they have installed 22 photovoltaics on the roofs of small, medium and large companies which reach 1.6MW, they have deployed more than 175.000 m2 of thermal solar panels in Spain and monitor, from the control centre, 568 photovoltaic installations. Also, they currently offer eolic energy installations making them a global partner of specialist renewable energy generation sources. Their constant striving for innovation has made the company consider its infrastructure control as a strategic core for the improvement of the profitability of its installations.

One Step Further Than Energy Production Management

Despite having an important deployment of solar energy generation infrastructures, 9REN controlled its installations by means of a tailor-made, web-based system. *"We had 2 control architectures, one for thermal energy and one for photovoltaic energy, which did not monitor uniformly. It was clear that the existing systems were not a safe bet for the future of the company as they did not allow for growth in new installations. They were limited and if we wanted to extend our energy generation capacity, they were not going to respond to our needs,"* explains Francisco Alija, Monitoring and Control Manager for 9REN.

At the beginning of 2008 a new monitoring system was implemented which was to fulfil very specific requirements, as he explains, *"We were looking for a control infrastructure which could guarantee full expansion capacity with no kind of limitation and would be flexible in such a way that the thermal, photovoltaic, new eolic generation or even thermoelectric energy installations - that were being developed - could all be included"*. Alija points out that the new control architecture also had to respond to the distribution issues of the installations: *"A central monitoring of plants dispersed throughout the world, with all the time zone and communication problems that implies, was necessary"*.

Wonderware was the chosen technology as it could respond to all of these demands. As Francisco Alija continues, *"the decision to use Wonderware was a clear, strategic bet for 9REN which will follow the company through future growth"*.

Central Control for a Scattered Generation Network

Once the challenges for the new monitoring and control infrastructure were laid down, new, more ambitious targets were defined to make the most of the new Wonderware based infrastructure technology. *"On the one hand we wanted to improve the profitability and availability of our generation installations to be able to produce a greater quantity of energy and on the other hand, we hoped to reduce maintenance costs by limiting on site control,"* comments Alija.

The project started as a single pilot implementation in a low temperature thermal generation solar infrastructure in Tarragona, Spain and a photovoltic farm in Los Hinojosos (Cuenca, Spain) in order to develop a unified control architecture in both installations, test and correct operational deviations and from then on, to replicate and develop it for the other 9REN sites throughout the world.

Photovoltaic plant.

"The most important thing was to ensure there strong foundations for the infrastructure as our goal was to use Wonderware for every new project we carried out", explains Francisco Alija. The installation was done while running and developed parallel to the existing control system without making any modifications to the hardware systems: *"Given the scattered nature of 9REN's installations and the diversity of existing systems, it was very costly and difficult to make the changes. This is why one of the requirements for the new software chosen was to be able to adapt to existing structures without needing to make corrections in each generation plant"*.

The developed technology infrastructure was laid out as a layered, modular system which guarantees maximum security levels for data management. *"Below we have the communications level, above, the objects level and lastly, the analysis and visualization level where we ensure complete system stability,"* explains Alija. The reliability of the communications, which is a big problem in the renewable energies sector due to the scattered and remote locality of the generation structures, was solved by working with the DNP3.0 protocol which guarantees the seamless transmission of the information.

Managed by Wonderware System Platform, 5 different servers ensure maximum control of all the installations: two of them act as redundant object servers - one controls the Spanish plants and the other the Italian ones- a third server is for historic information and runs with Wonderware Historian Server (part of Wonderware System Platform), the forth one offers visualisation options through Wonderware InTouch HMI (Human Machine Interface) - functionalities that have been entirely separated from the running of objects - and lastly, one that runs on Wonderware Information Server (part of the Wonderware System Platform) which uploads the data for deployment and profitability analysis of the different controlled installations.

The communications problems of the object servers have been resolved using OPC architecture making it possible for the system to connect with any device with standard protocol. As 9REN underlines, the control architecture developed is the same for both the thermal plants as the photovoltaic ones and is managed in a single control centre in Madrid regardless of whether the installation is in Spain or abroad. *"We have tried to standardize development so that internally, as far as Wonderware technology goes, there are no differences between structures facilitating the deployment of the technology. When it comes to visualization, the filters help us to upload the information relevant to each user"*.

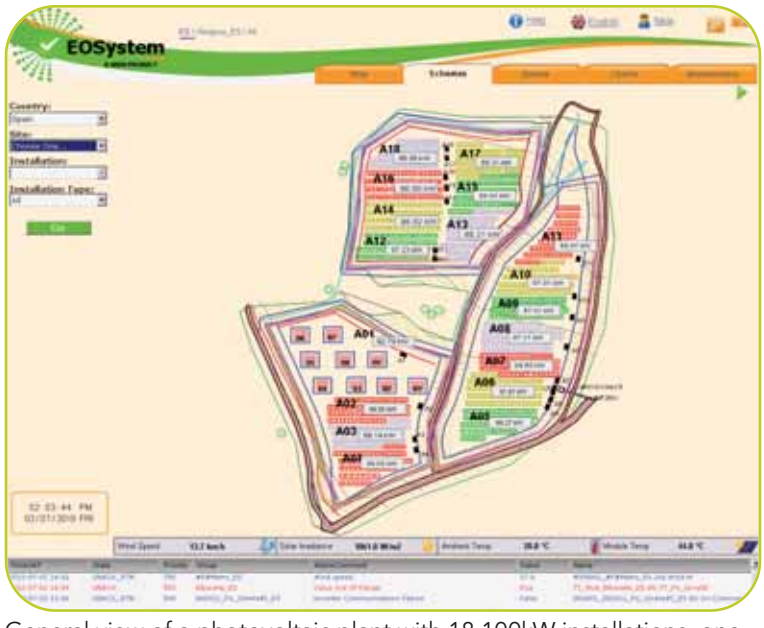
GIS system (Geographic Information System) for navigation between different installations.

In this sense, Wonderware enables 9REN to assure different types of users, be it the teleoperational team - responsible for the continuing operation of the plants- or maintenance- which strives for the right level of profitability of the plants- have the specific information they need to perform their job. The first have access to the data in real-time to ensure that the installations are always running and the latter can access data reports to check if the installations are working to full capacity and if not, correct deviations.

Total Visualization and Full Growth Capacity

After the initial implementation, Wonderware technology is now deployed in all 9REN's photovoltaic plants in Spain and Italy - which together generate around 425 MWh a day- and in 30 low temperature thermal generation installations in Spain, representing 6.000 m^2.

"Now with Wonderware, we have full expansion and growth capacity for our business, we monitor 100MW but would have no problems supervising 500MW or whatever was necessary, with



General view of a photovoltaic plant with 18 100kW installations, one with solar trackers.

completely reliable information" explains Francisco Alija. From a development aspect, Wonderware's capacity to re-use objects, lowering future installation supervision costs, also stands out.
As far as the energy generation optimization of 9REN monitored structures is concerned, Wonderware has enabled improvement of operations personnel productivity and the reduction of plant unavailability. In Alija's own words, *"thanks to the great amount and availability of information Wonderware offers us, it will no longer be necessary to have operators in each installation, undeniably optimizing personnel costs"*.

Despite the fact that the significant profitability improvement is yet to be evaluated, awaiting a greater quantity of historic information to make real comparisons, Francisco Alija points out that Wonderware has contributed to the energy production optimization in 9REN's installations as it allows analysis of real events in each part of the process and their deviation correction.

For the future, 9REN is planning to connect all their new installations to the Wonderware control architecture: *"From the start we were certain of our choice of Wonderware would be a strategic bet for the future. We decided to use their technology, it has measured up to and exceeded our expectations, making us hope to be able to continue growing jointly"*, concludes Francisco Alija.

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