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*Francisco Alija  
Monitoring and Control Manager  
9REN Group*

## **Invensys Helps 9REN Group Energy Monitor its Extensive Network of Renewable Energy Generation Plants**

### **Goals**

- The company needed to increase the production levels of its renewable energy generation installations in Europe
- 9REN wanted to reduce its field operations maintenance costs by minimizing manual supervision of plant operations

### **Challenges**

- Geographic dispersion of the company's power generation sites throughout Spain and Italy demanded a centralized approach to system monitoring across differing time zones and weather patterns.
- 9REN required a solution that could easily scale with the projected installation of new renewable energy facilities in new regions

### **Solutions and Products**

- ArchestrA® System Platform
- InFusion™ Enterprise Control System
- Wonderware® InTouch® HMI

### **Results**

- Monitoring technology that provides instantaneous information from all photovoltaic plant installations has considerably reduced the cost of 9REN's field operations
- 9REN improved company profitability and power availability from its renewable energy plants, and reduced maintenance costs by limiting the need for on-site control

**Madrid, Spain** – Eventually the world will shift its energy dependency from fossil fuels to renewable sources of power. As the price of crude oil and natural gas continues to rise with global demand, geopolitical instability and the approach of peak oil, new ventures are leveraging inexhaustible sun and wind power to offer clean and renewable energy alternatives for lighting our homes and powering business.

9REN Group designs, develops, builds and operates renewable turnkey power plants using photovoltaics, solar thermal energy and wind. Established in 2008 with the merger of Gamesa Solar, now known as 9REN España, and the Italian company Ener3, 9REN is on a mission to capitalize on the power of the sun. In addition to photovoltaic plants, the company has built 183 solar thermal plants as well as mini-wind installations.

The Spanish company operates 568 photovoltaic installations, mainly in Spain, and Italy. 9REN also is involved in the operation and upgrading of third-party plants and the expansion of its own assets through investments in company-owned plants. In total, 9REN currently generates more than 99,000 megawatt hours of electrical power every year and, based on its global growth objectives, that number is expected to rise with each morning sun.

To manage and monitor its photovoltaic plant facilities, 9REN created EOSystem, a solution built on the ArcestrA System Platform and part of the InFusion Enterprise Control System from Invensys Operations Management. EOSystem is a real-time monitoring technology that provides instantaneous information from all photovoltaic installations operated by 9REN throughout Europe and the Middle East. As a result, 9REN has considerably reduced the cost of its field operations.

### **Invensys Delivers the Total Picture of Power Production**

InFusion is the Invensys delivery mechanism for enterprise control, and consists of the hardware and software components necessary to provide a true aggregated view of information across an organization, enabling a robust foundation for collaboration between people, processes and systems. The InFusion system embraces all aspects

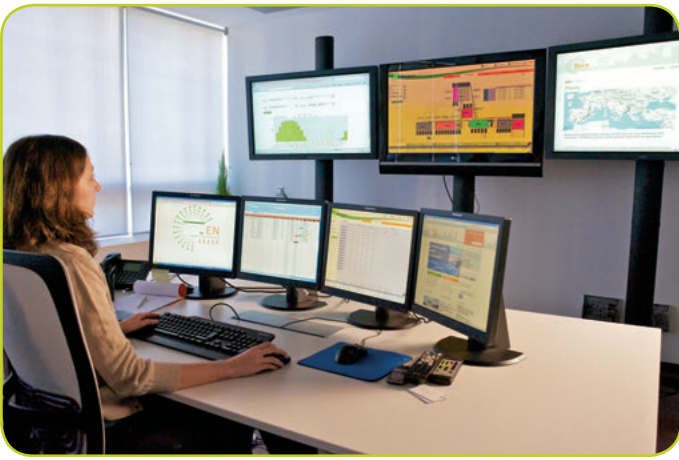
of operational excellence, solving complex business challenges that include scalability, connectivity, synchronization and accelerated value.

ArcestrA System Platform provides a single, scalable software solution for all the SCADA, supervisory HMI and MES needs for monitoring 9REN's renewable power-generating installations. ArcestrA System Platform also provides a simple upgrade path for easily adding new software and hardware to the system from any third-party vendor. By including an industrialized application server, a powerful historian server and an easy-to-use information server, ArcestrA System Platform easily tackles demanding, precision-driven real-time power generation activities. 9REN leveraged the ArcestrA System Platform to save time by creating standardized, reusable templates, which resulted in reduced training time and lower costs. A side benefit of System Platform was its ability to help power plant managers achieve higher levels of consistency and quality across its entire "grid" of photovoltaic and wind installations.

Employing five servers, ArcestrA System Platform controls all of 9REN's installations. Two servers act as redundant object servers with one controlling the plants in Spain and the other controlling operations in Italy. A third server is for historic information and operates the historian database. The historian is a high-performance real-time database for power generation information and is designed to collect a wide variety of plant data, at full resolution and very high data rates. Delivery of this vital information ensures that decision-makers at all levels have the information needed to take steps needed to ensure maximum operational efficiency.

Another server provides visualization via Wonderware InTouch HMI. Wonderware InTouch HMI software empowers 9REN to quickly and easily develop custom graphical views of its real-time power generation processes. As an open and extensible HMI with high-end graphical capabilities, the software provides the power and flexibility needed for advanced application design with connectivity to a broad range of systems and devices.

With the help of Invensys, the EOSystem has delivered tangible benefits for 9REN. For example, while the 6-megawatt photovoltaic plant in Bella, Italy generates electrical power, the EOSystem transmits valuable



information via satellite to 9REN's Madrid office. The plant, located in southern Italy near Rome, consists of an extensive array of 30,000 solar panels with 12 inverters to convert the DC-generated solar panel electricity into the AC power required to run homes and businesses. The solar power facility has extensive monitoring tools to measure generated energy in real time and stations to record local weather conditions, enabling managers to anticipate reduced power generation due to cloudy or inclement weather.

### **Standardization & Flexible Design Reduces Costs**

The ArchestrA System platform enables EOSystem to provide effective collaboration tools that enable standardization, reduced engineering time and cost savings. The EOSystem uses exclusive objects designed by 9REN to create an original product. Moreover, 9REN engineers have standardized the objects, so the company can re-use them in order to accelerate the system design process.

"The ArchestrA System Platform lets us access all our installations in real time," said Antonio Palacios Higuera, services technical manager for 9REN. "Because of this, we only require one person to control the operation of all of the 568 plants, regardless of location. We also have achieved a significant cost reduction in time per designer and project."

### **In the Solar Energy Business, Everything Scales Upward**

Prior to the Invensys solution, 9REN managed its solar energy generation plants via a proprietary, Web-based system which did not fully meet its need to monitor both thermal and photovoltaic

energy resource infrastructures. As a result, the new Invensys monitoring solution was implemented with very specific requirements. The company needed a control infrastructure which could guarantee full expansion capacity with no scalability limitations. The technology also needed to be flexible in order to support the company's wide range of energy production sources including photovoltaic, solar thermal and wind generation installations. In addition, the new control architecture had to respond to the power distribution issues unique to each installation.

"Monitoring systems are the key to success for a photovoltaic installation," said Francisco Alija, monitoring and control manager, 9REN Group. "In the past we used a lot of different monitoring systems. That meant a lot of different hardware and software to be installed at our monitoring stations. What we really needed was only one very powerful monitoring system, and this is what we achieved with the Invensys solution."

From a single control center, 9REN can effectively monitor the operations infrastructure at each facility ensuring the continued profitability of its strategic assets. Plus with the increasing levels of solar production as more plants go online, the company has relied on Invensys to provide the technical expertise to effectively manage and expand the control of its plant monitoring systems.

### **Leading Edge Technology Offers Performance and Reliability**

9REN managers recognized that a key means for improving solar plant performance was tied to maintaining a continuing focus on updating the control and monitoring technology infrastructure. Performance is achieved in the solution design with every technology update. Reliability depends on using products that have an industry track record and can leverage the availability and performance of the system. During the initial vendor review phase, Invensys showcased the wide industry recognition and scope of its manufacturing technology solutions.

"9REN has improved the availability of this system using the very reliable solution from Invensys," said Carlo Zuccaro, manager of the technology and innovation department at 9REN Group. "If you want to offer the

market a better solution, you need to use an up-to-date monitoring system. Invensys gave us this capability.”

9REN’s vision for its position in the photovoltaic marketplace is to minimize its environmental footprint and maximize community relations. The company installs solar panel arrays on rooftops as well as ground-based installations, with an eye on ways to lower the cost of installation and blend in with the existing terrain. For example, for a ground-based solar array project near Rome, careful planning has enabled 9REN to install the photovoltaic panel arrays with minimal visual disruption to the surrounding agricultural landscape. The company encourages local communities to use the land near its projects so that the industrial activities of its photovoltaic installations can harmoniously coexist with local environs.

Going further, in the Puglia region of Italy 9REN hired the unemployed from the local community and trained the new workers on installing and maintaining photovoltaic solar panel arrays, thus building a new labor force for the renewable energy industry. For educational outreach, the company arranges for local schools to tour solar installations so that students can gain greater knowledge of renewable energy options.

## Renewable Energy Empowers Success

The Invensys project implementation initiated with a single photovoltaic installation in Spain. Once the system was validated, it was quickly replicated to all other 9REN power generation sites. The Invensys installation was conducted in tandem with the prior control system and without the need to modify hardware systems. This layered, modular system approach guaranteed maximum security levels for data management.

“Given the scattered nature of 9REN’s installations and the diversity of existing systems, it would have been very costly and difficult to make changes in real time using the prior system,” Alija said. “This is why Invensys solutions were chosen, because they could adapt to existing software applications without needing to make corrections at each generation plant.”



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The implementation of Invensys technology has resulted in a significant improvement in the development of performance monitoring reports, reducing the time it takes to produce the reports from one month to two days. These significant process improvements earned the company the Invensys 2010 Invensys OPEN award for Asset Excellence. The OPEN competition recognizes companies for their innovative use of Invensys solutions that generate significant business results and operations improvements.

“9REN wanted to improve its profitability and power availability of generation installations enabling the company to produce a greater quantity of energy,” Alija said. “But we also hoped to reduce maintenance costs by limiting on-site control which the Invensys solution was designed to provide.”

The use of Invensys solutions also has enabled 9REN to increase event recognition by 50 percent and boost the solar tracking capabilities of the photovoltaic systems by 5 percent.

“With Invensys solutions, 9REN has the opportunity to leverage the full expansion and growth capacity available in our business,” Alija said. “Thanks to the significant amount and availability of information provided by the Invensys solution, 9REN is now able to streamline management of its various installations, undeniably optimizing personnel costs. From the start 9REN was certain of its selection of Invensys as a key component of its overall operations expansion strategy. It has measured up and exceeded our expectations.”

The volatility of the global fossil fuel marketplace is creating opportunities for companies to tap new technologies that offer a clean, sustainable source of energy. 9REN is one company that has assumed a market leadership position, developing strategies to boost renewable energy production and expanding facilities that help reduce consumer and business demand for oil and natural gas. 9REN is betting on the sun and it’s a wager, no doubt, with a bright future.