Industry: Power, Energy

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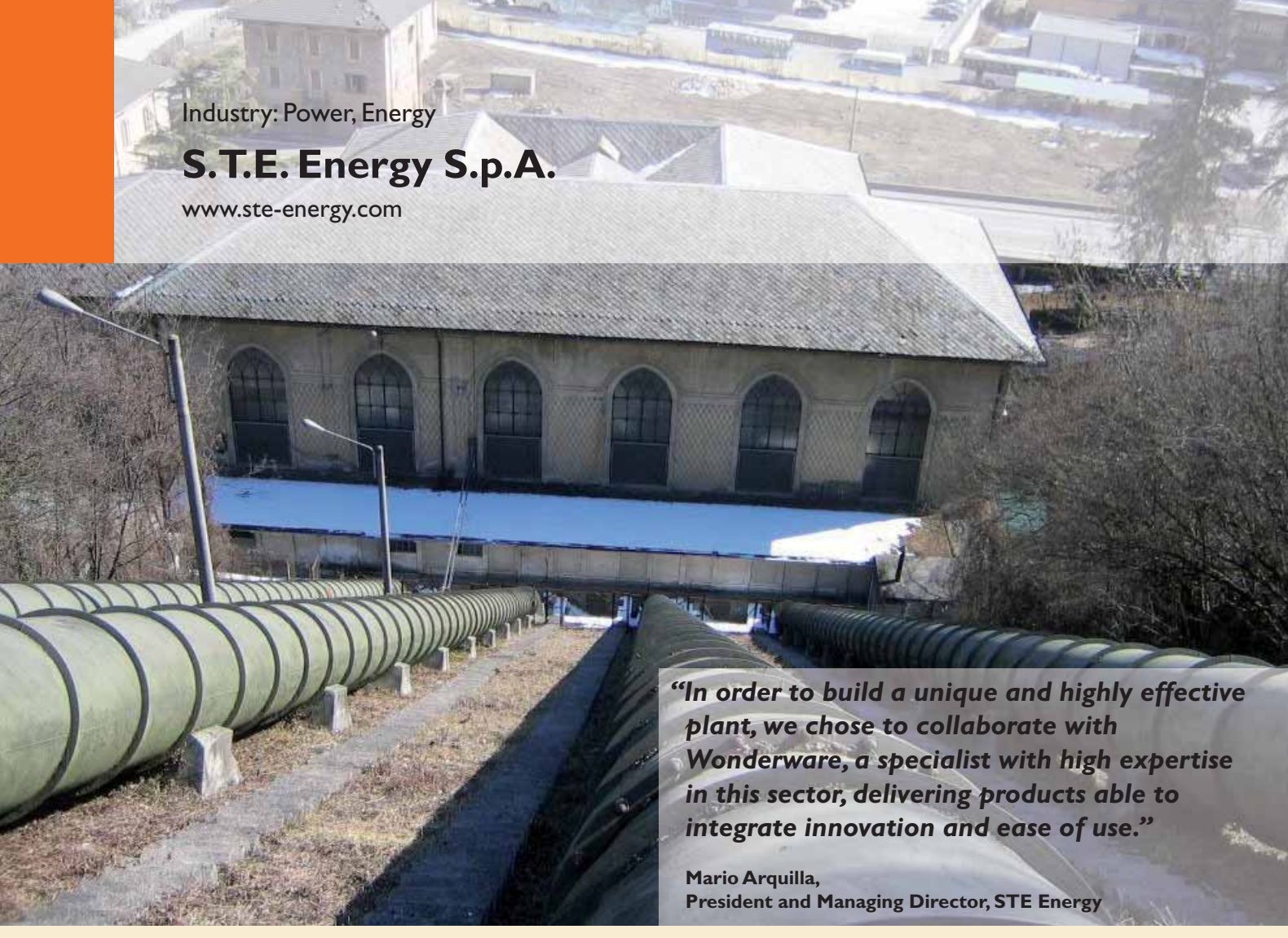

"In order to build a unique and highly effective plant, we chose to collaborate with Wonderware, a specialist with high expertise in this sector, delivering products able to integrate innovation and ease of use."

Mario Arquilla,
President and Managing Director, STE Energy

Different Plants, Single Control
Centralized management and control over intake works and hydroelectric dams enable reduced costs, increased efficiency and optimized production

by Wonderware Italy

Goals:

- Ensure quality, performance and efficiency of hydropower plants.

Challenges:

- Environmentally friendly plants;
- Minimized operating costs.

Wonderware Solution:

- ActiveFactory software;
- InTouch HMI;
- Wonderware System Platform.

Results:

- Maximized energy generation;
- Reduced maintenance costs thanks to preventive and scheduled maintenance.

Padua, Italy – With more than two hundred systems implemented over the past years in Italy and abroad, and with its branch offices located in various countries, STE Energy today is one of the major operators in the field of energy and plant engineering.

STE Energy was established in 1995 in Padua, Italy. It develops, designs, builds and manages energy production plants, especially the hydropower type and electrical and thermotechnical systems, as a general contractor. It also builds wind, solar and biomass cogeneration systems and electric energy production, transport and distribution plants all around the world.

Quality, performance and efficiency are the key factors in energy generation. Companies in this market constantly seek for solutions enabling to optimize production, by leveraging the latest technologies on the market and always keeping environmental issues into consideration.
In this scenario, traditional hydropower plants, which in recent times were neglected in favour of apparently more efficient methodologies, are back in use and now developed according to innovative principles. STE Energy, based in Padua, specializes in this activity and deploys innovative hydropower plants on a global scale.

"In order to be competitive on the international market," explains Mario Arquilla, President and CEO, STE Energy, *"it is necessary to offer solutions enabling to optimize the whole production process, providing measurable and demonstrable results. For this reason we chose to apply modern automation technologies even to hydropower plants, especially for production control and monitoring."*

Leveraging Every Single Drop

Traditional hydropower plants were based on big dams having high environmental impact and effective only if deployed on high discharge rivers. On the contrary, the current vision prefers run-of-river power stations, able to leverage even the smallest drops. This way it is possible to reduce development times, minimize environmental impact and, most of all, ensure high efficiency levels. The sum of the energy produced by different dams in succession is higher than the one produced by a single big plant. Power companys need to take into account administation costs in their total budget. Having dedicated operators in every single plant implies considerable costs, contrasting with the need to minimize expenses. Furthermore, some plants are situated in almost unreachable places, and determine high costs for moving operators.

Figure 1: Inside hydropower view with a close-up of the alternator.

In the light of such requirements, STE Energy engineers chose to leverage a similar control technology as in the field of industrial automation: collecting all data locally from the different power plants and centralizing them in a single control point, where activities are automatically managed and supervised by specialized engineers. *'Telemetry logic'*, explains Arquilla, *"provides producers with a highly efficient control system, delivering real-time*

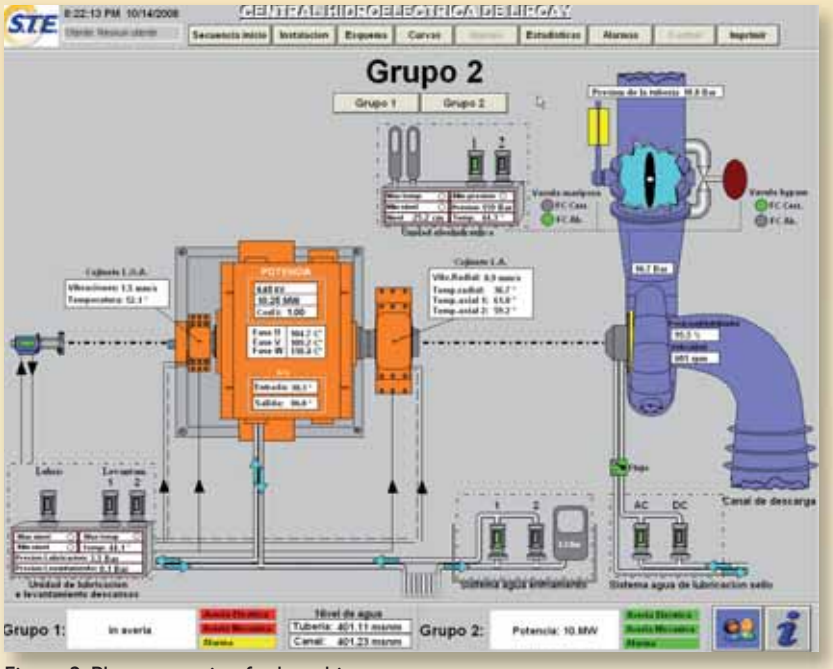

Figure 2: Plant synoptic of teh turbine - generator group.

operating data of every single component in the hydropower plants. In this way engineers can intervene accurately and timely to solve problems, avoiding unuseful interventions and optimizing activities. This opportunity is particularly useful in daily management and allows to optimize operator activities. In order to differentiate from the competition, we were seeking innovative technologies to provide our customers with a real competitive advantage. Finally, we evaluated the benefits offered by the MES technology, knowing that only a perfect knowledge of production processes could allow us to optimize our activity".

STE Energy chose to collaborate with Wonderware, market leader in real-time operations management software. *"In order to build a unique and highly effective plant,"* continues Arquilla, *"we chose to collaborate with Wonderware, a specialist with high expertise in this sector, delivering products able to integrate innovation and ease of use."*

Preventing Failures

The choice of investing in such an innovative technology is determined by the fact that STE Energy also takes care of maintenance activities. Perfect maintenance of power infrastructures, which need to work without interruptions, requires high competence levels both in practical activities, and in preventive actions. Operating only upon customers' request, in fact, means always working in *'emergency'* conditions, since interruptions in power production cause loss of income. STE Energy therefore chose to implement preventive and scheduled maintenance: *"a similar method,"* explains Arquilla, *"has been adopted in the most innovative manufacturing companies and this is why we chose to apply it to our market."*

All data collected in the control rooms of the single plants are sent to STE Energy headquarters in Padua and saved in real time in the Wonderware Historian database, then constantly monitored through specific Wonderware applications. These smart solutions enable to immediatley detect any decrease in performance and the presence of unusual conditions thanks to cross-comparisons of data. *"In the most banal of cases,"* continues Arquilla, *"on equal discharge dams present a reduction in power generation. In this case, the supervisory system, which was programmed to optimize system efficiency, sends an alarm notification. The engineers can analyze the single values collected by the local monitoring systems thanks to the extremely intuitive graphic capabilities based on the HMI and SCADA systems, we developed by leveraging Wonderware InTouch HMI capabilities."*

This operating method allows STE Energy to undertake preventive actions, so that STE Energy experts are able to notify to local engineers the presence of unusual conditions, also indicating suitable intervention to restore the optimal situation.

Simple One Click Historization

All data which are collected and stored by Wonderware Historian allow you to know all the statistical and analytic data of specific streams and dams.

Wonderware solutions allow to leverage such a huge amount of data in the best possible way, in order to optimize production activities. It is possible to know a river's dispatch throughout the year, according to specific weather and environmental

conditions, in order to plan specific maintenance activities and to satisfy the demand in the different periods of the year.

Furthermore, engineers are constantly informed about the amount of electricity produced according to weather and environmental conditions and the events that occurred with time. It is possible to immediately detect inefficiency causes, distinguishing problems connected with different kinds of failures.

Always connected

Leveraging industrial technologies for civil and geographically distributed works determined the need to exploit all the available telecommunications technologies. Data collected in the single dams must in fact be sent to the control room in real-time. And this could be a complex task, especially if there are no telecommunications networks. From this standpoint, Wonderware integrated solutions are the best solution to interface with any communications technology.
This means that, in case there is no traditional telephone network, data can be exchanged via mobile phones, satellite or radiofrequency communications, thanks to the scalability of Wonderware management systems which, at an early stage, had been implemented only in the new plants. This way the project could start with low initial investment and pilot functions, then progressively expanding the control system according to the excellent results that were obtained.

The constant monitoring of the activities in the hydroelectric plants enabled to optimize the efficiency, but also delivered an useful tool for the operators in the different control rooms.

Operators are constantly informed about performance and real-time production of the single power plants, thanks to common handheld computers, with the possibility to analyze single values and historical data in detail.

Energy looking into the future

The availability of such an amount of data, which are automatically and efficiently processed, enabled STE Energy engineers to improve projects for new power plants. In the development stage, engineers can leverage a database containing all the data coming from dozens of plants on a global scale. *"The information, processed by Wonderware analysis tools, enables to understand the factors which allow maximizing efficiency and reducing maintenance costs – with the purpose of progressively improving plants, making them more and more efficient and reliable,"* concludes President Arquilla.

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