FLYGT
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Villoresi Case study

Building an Invisible and Soundless Power Plant in Italy

Using an irrigation canal network for generating power with Xylem's Flygt hydroturbines, the City is able to create a sustainable resource for the community while maintaining tourism and its benefits to the local economy.

Scope

The Villoresi Channel, located north of Milan, was designed with the main purpose of agricultural irrigation while providing water to the city of Milan. The paths running along the canal were also used for recreational purposes and cross through some of the most beautiful natural parks in Lombardy. Later, European mandates were instituted requiring the reduction of water consumption by 30% adversely impacting a region which benefits greatly from agriculture and farming income. Alessandro Folli, Chairman of the Consortium of Reclamation Ticino Villoresi, recognized that the channel had become not only a tourist attraction, but that it also performed water management tasks while contributing as an important source of power. As a result of these findings, a transformation of this canal into a multifunctional resource was set in motion with the goal to ensure the river would continue to be a sustainable resource economically as well as to provide a reliable water irrigation supply for farmers.

Folli's original intuition, under guidance of the Consortium, was to utilize the water of Villoresi canal to produce electricity by installing power plants. The thought was to design/build five hydroelectric plants capable of producing 10 GWh, which equates to energy production for roughly six hundred apartments.

With the installation of these power plants came various challenges including:

- Construction on an obstructed landscape.
- Construction that could only be done during winter months to enable ease of maintenance and cleaning tasks.
- Building a modern power plant inside a historical building with no modifications allowed to the architectural structure of the building.
- Regulations by the Italian Administration of Historical Buildings regarding allowable noise level and visual appearance.
- Installing turbines in a residential area, utilizing the original penstock / tailrace structure.

Solution

It was determined that submersible technology would be ideal for these requirements. Based upon Xylem's extensive experience with the design and installation of submersible equipment, engineers Mario Fossati, Fulvio Bernabei and Davida Bavera, among other external consultants, requested Xylem's expert assistance with this project.

Installation of the hydraulic unit in the power station.

Assembling the generator to the hydraulic unit in one step, without any need of bearing or shaft alignment.

Customer: Design and build invisible and soundless hydro power plant
Challenge: Flygt submersible hydroturbines combined with decades of expertise
Solution: EL7500 Flygt hydroturbines with bronze-aluminum blades

"Among the offers on the table, the most complete submission was from Xylem, a multinational specialist handling and treating water. This is a choice", explains Lazzarini, "not dictated by just economic aspects, but above all from the experience and expertise of the team."

"Beyond submersible equipment, Xylem provided a team of technicians specializing in physical installation as well as supporting the development of software dedicated to the management of the plant itself."

In favor of the Xylem solutions, Engineer Bavera points out that the submersible electric generators were much less labor intensive to install due to their compact design. The units were laid on pre-assembled stands with three-phase asynchronous generators cooled by surrounding liquid. These features were beneficial in reducing the size of the hydroelectric power plant.

The PLC system will monitor the channel water levels upstream of the penstock; the automatic blade angle adjustment system will help maintain continuous power production, adjusting to the channel water level changes.

"The equipment performance is great," explains Bavera, "Xylem supported us through our specialized installation, providing experienced technicians. Upon completion of the project, we received congratulations from the owners who appreciated the professionalism of the staff involved."

Results

With the support of the Xylem team, the Consorzio Est Ticino Villoresi now has an integrated SCADA system in each of the new turbine plants with constant monitoring and remote operation. Reports are made available in real time eliminating the need for periodic inspections.

Folli concludes, "Thanks to the international state-of-the-art facilities and the collaborative relationship with Xylem, we have been able to complete a project with an ROI in a much shorter time than usual with no visual impacts to our aesthetic region. Our submerged power stations have become a another point of attraction for those who walk the banks of the Canal."

Flygt El 7650 unit with adjsutable bronze blades between 4° ~ 32° inside the outlet cone.

Quick an easily installed Flygt submersible hydroturbine - invisible and silent for a reliable and efficient operation.

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