# Water Treatment Plant Achieves Rapid PLC Modernization with Minimal Downtime

## RESULTS

- Replacement of each PLC in less than a day allowed continuous plant operation
- No need for signals rewiring or software rewriting saved project time and cost
- True hot stand-by redundancy eliminates system failure risk
- Controllers coordinate via multicast EGD, simplifying management of failures

## APPLICATION

Modernize and upgrade control automation system.

## CUSTOMER

System integrator Sigma Italia for the CAP Group, operator of the Peschiera Borromeo municipal wastewater treatment plant in Milan, Italy.

## CHALLENGE

Faced with aging and hard-to-source technology, the CAP Group, which operates the Peschiera Borromeo wastewater treatment plant in Milan, needed to upgrade the control system for its second treatment line. The line has the capacity to treat the wastewater for 250,000 people, but the GE Fanuc 90-30 Series PLCs (programmable logic controllers) employed were being discontinued and the CAP Group wanted to implement a modern plant-wide Ethernet-based data communications network to meet expanding system requirements. The complex BioFOR biological filtration and oxygenated reactor technology used in the system required extensive automation and prompted the need for an advanced control system. While the requirement for more modern control technology was pressing, the critical functionality of the water treatment plant meant that any replacement had to be achieved without extensive plant shutdown. In addition, the new technology needed to be compatible with the existing equipment and processes, and much easier to maintain than the previous system.

***"The Emerson PACSystems™ RX3i controllers helped to simplify and successfully modernize the automation system and made it ready for future integration, modification or enlargement, without significant downtime."***

**Riccardo Azzoni**
Automation Engineer
Sigma Italia

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## SOLUTION

CAP Group selected Sigma Italia to provide the automation system and Sigma chose Emerson PACSystems RX3i controllers for the upgrade. The controllers provide modern functionality to help improve operational performance but can also be quickly and easily implemented in GE Fanuc 90-30 applications since the hardware is fully backward compatible in form and fit. This compatibility enabled gradual replacement of existing PLCs, rather than one major replacement of all devices at the same time, which would have required a long, line-wide outage.

Each PLC replacement took less than a day to complete and caused minimal disturbance to the other PLCs, which remained operational. No signals rewiring was required due to the I/O compatibility, and very little effort was needed to port the code to the new platform, which meant there was no need for software rewriting, saving considerable project time and cost.

The new automation solution provides true hot-standby redundancy automatically managed by the controllers without resorting to manual intervention. This allows plant operators to focus on tasks directly related to the treatment process. The new CPUs provide both a real-time operating system and a Linux environment, which allows new web HMI functionality and edge-based control and speeds up the convergence with management and IT systems. OPC-UA Server functionality is also available.

At the plant network level, the PACSystems RX3i controllers can coordinate with each other via multicast EGD (Ethernet Global Data). This eliminates the need to design single point-to-point links between each pair of controllers and simplifies failure management. The new controllers also interface with third-party devices, acting as Modbus/TCP clients.

With the replacement and setup easily completed, additional enhancements are also being implemented including new PROFINET-based remote I/O panels and the equipping of each unit with monitoring and predictive analysis software using an edge controller that operates close to the physical process.

**Riccardo Azzoni, automation engineer, Sigma Italia, stated:** ***"The cost of the project was much lower than a competing proposal, which would have required longer downtime and resulted in more uncertainties regarding site management, both of which would have been unacceptable for such an important part of the city's water management infrastructure."***

## RESOURCES

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