



SITUATION ANALYSIS: Automation in the Water and Wastewater Industries

Are You Ready?

Fact: The water and wastewater industries are operating in an increasingly challenging environment, one in which competing priorities and pressures are stretching resources to the limit.

First and foremost is the demand for clean water, which is driven by population growth and movement. In fact, it has been estimated that to meet the needs of the United States alone, more than 1,000 new treatment facilities will need to be built, extending treatment capacity by more than 5,000 million gallons per day (MGD).

At the same time, municipalities across the United States are finding it necessary to expend significant resources to rebuild aging – and failing – infrastructure and modernize existing water and wastewater treatment facilities. In fact, the EPA's latest Drinking Water Infrastructure Needs Survey and Assessment calls for an investment of \$277 billion over the next 20 years for drinking water infrastructure rehabilitation and updates. On the wastewater side, cities and water districts are undertaking Combined Sewer Overflow (CSO) upgrades that will, in some cases, require capital expenditures in the hundreds of millions of dollars each.

Are you ready?

There are challenges on the human side, too. Downsizing has cut staff and other resources below practical levels to the point that there is more outsourcing, even for previously routine internal activities. In this

environment, plant managers must be prepared to do more with less.

Are you ready?

But that's not all. Security measures that ensure the safety of the nation's water supply continue to be another top priority. Title IV of the Bioterrorism Act (Public Health Security and Bioterrorism Preparedness and Response Act) of 2002 stipulates that each community water system conduct a vulnerability assessment of its system to a terrorist attack or other intentional act that disrupts the supply of drinking water, and prepare/revise and maintain an emergency response plan. While much security work has focused on physical security – fences and perimeter security, guards, security procedures and intrusion detection, for example, efforts pertaining to contaminant detection and abatement, system hacking, and data integrity and verification have taken on an increased urgency.

Are you ready?

Now, factor in increasingly complex environmental and financial regulations. On the environmental side, the Clean Water Act, originally passed by Congress in 1972, has evolved over the years as the EPA's Office of Wastewater Management added programs and policies that promote compliance with the Act. Noteworthy examples include the National Pollutant Discharge Elimination System (NPDES) permitting program and the Combined Sewer Overflow (CSO) Policy.

There have also been major changes in financial reporting requirements in recent years. For example, GASB No. 34 (Government Accounting Standards Board Statement No. 34, “Basic Financial Statements – and Management’s Discussion and Analysis – for State and Local Governments) requires governments to define the value of all assets and report depreciation and other expenses. As many municipalities invest public funds to automate their treatment facilities, water distribution systems and wastewater collection systems, management of those facility assets becomes an important element of compliance to this regulation.

Furthermore, the Sarbanes-Oxley Act, which was enacted by Congress in 2002 in response to corporate accounting scandals, seeks to protect investors by requiring greater transparency and accountability. While this is primarily an IT (Information Technology) issue now, it will eventually impact automation systems which are used to validate operational data that is critical for investor-owned utilities.

Clearly, the time is now for organizations to carefully evaluate their options based on a strategic vision for where automation technology will be going in the future. With this in mind, it’s important to consider that the operational, regulatory, environmental and economic issues facing the water and wastewater industry will continue to evolve, and the ability to nimbly respond to the ever-changing landscape will be more important than ever moving forward. Laying the right foundation is crucial: The successful planner is one who considers this and then prepares accordingly.

So ... are you ready?

We Are!

Fact: Only Emerson Process Management offers a broad portfolio of automation, analytical and optimization solutions, combined with consultant services,

comprehensive project management, field service and technical support, that helps organizations navigate today’s complex water environment. We understand the issues facing the water and wastewater industries and know that efficiently and expertly managing water and wastewater treatment processes and systems plays an important role in enabling municipalities and investor-owned utilities to effectively address these many challenges and, consequently, best serve their communities.

Emerson’s PlantWeb® digital plant architecture leverages the Ovation® expert control system as well as the Ovation® SCADA platform which is fully integrated with Emerson’s leading ControlWave® remote terminal unit (RTU) technology. The PlantWeb® architecture also incorporates the company’s AMS™ Suite of predictive maintenance software, intelligent field devices, valve automation and asset optimization solutions. The end result is a single seamless system that integrates real-time process and equipment information with transaction-based enterprise business systems.

Adopting the PlantWeb integrated architecture translates into a number of advantages for municipalities and investor-owned utilities facing mounting industry pressures.

From an environmental standpoint, the tighter overall control and process visibility made possible by the integrated control architecture can translate into improved management of treatment processes. For example, the control system can constantly adjust chemical deployment based on flow levels and critical process measurements, resulting in better control over the amounts of chemicals used in a treatment process.

As part of the PlantWeb approach, Emerson’s Ovation system enables municipalities to take proactive steps to minimize the impact of impending wet weather events, which can wreak havoc on water and wastewater systems. Combined

Sewer Systems can overflow untreated sewage into waterways during heavy rains, posing health, environmental, and regulatory consequences. Integrating weather monitoring capabilities into the Ovation system enables municipalities to take proactive steps to minimize the impact of impending wet weather events. Ovation system alarms notify operators of approaching rain, enabling them to initiate wet weather containment measures, such as inflatable dams, basins or tunnels, to temporarily divert/hold excess water and eliminate or minimize undesirable overflows.

Emerson plays a role in securing vital water and wastewater infrastructure at every level. The Ovation system's embedded security features enable customers to proactively address cyber security issues, such as system hacking, and data integrity and verification. We also help customers address cyber security concerns through special services such as system security assessments as well as our Ovation Security Center. The Ovation Security Center's centrally located console streamlines management of the following security applications:

- Security event collection and threat identification
- Patch deployment and audit
- Malware detection and prevention
- Event log storage and reporting
- Intrusion detection and prevention
- Data back-up and recovery
- Vulnerability assessment and management

The Ovation Security Center provides a centralized event collection, event correlation, and threat identification function for security-related events in an Ovation control system. Events that require plant personnel intervention are forwarded to a notification function, such as the Ovation alarm system, an e-mail or pager.

In addition to cyber security, the Ovation system can also augment a municipality's existing physical security efforts. Video

security monitoring, for example, can be integrated into the Ovation system to guard against potential sabotage at the plant and remote locations, such as pumping stations.

At the device level, Emerson offers on-line analysis systems, instruments, and sensors that help plants safeguard the water infrastructure. For example, Emerson's Model WQS multi-parameter electrochemical/optical water quality system is an online system that continuously measures several critical water quality variables – such as pH and ORP, conductivity, temperature, free chlorine and monochloramine, oxygen and turbidity – at strategic points in the treatment and distribution system. A change in these parameters can signal to the plant operator that a contaminant event has occurred so that appropriate action can be taken. This ETV-certified solution provides constant measurement of water quality, and detects deviations in expected values, a critical step toward ensuring safety and quality of water treatment and distribution systems.

Emerson also offers a wide range of other intelligent field devices, including Fisher[®] digital valves; Rosemount[®] pressure, level and temperature transmitters; Mobrey[®] ultrasonic and hydrostatic transmitters; Micro Motion[®] Coriolis flow and density meters; and Rosemount Analytical devices that provide continuous real-time health information to power AMS Suite predictive maintenance applications. Furthermore, CSI Machinery Health[™] Management solutions help users reduce machinery operating costs and maximize the life of pumps, motors and other rotating equipment.

While diverse, evolving financial and environmental regulations have one thing in common: they all call for access to operational data to fulfill reporting requirements. In organizations where financial and operational information resides on separate – and often incompatible – systems, it is difficult and time consuming to obtain the necessary combination of information required for reporting. Our PlantWeb architecture seamlessly

integrates information not only at the plant level but also on a district-wide basis, streamlining the reporting process for additional, measurable benefits.

Emerson's SmartProcess[®] plant optimization software offers additional opportunities for cost savings and operational efficiencies. SmartProcess modules incorporate fuzzy logic, neural networks and model-based predictive controls to improve the economics, safety and efficiency of water and wastewater treatment facilities. The SmartProcess Economic Optimizer optimizes water treatment and wastewater treatment processes to minimize costs, reduce equipment wear and tear, and balance tradeoffs, such as low and high flow. This solution can be applied to many key areas of operation within the plant and throughout the water system, including chemical usage (modeling chemical usage for acids and bases for process utilization to adjust the pH ensures the most efficient – and therefore cost effective – use of chemicals) and pump optimization (optimizing the timing and location of pump usage reduces equipment wear and tear, and minimizes electricity costs).

Additionally, the SmartProcess Global Performance Advisor monitors and benchmarks equipment performance against design specifications. This package provides operators of water and wastewater facilities with the ability to quickly identify, then address, problematic areas, which then translates into improved equipment performance and reduced operating costs.

In this era of increased accountability, it's no surprise that one of the factors that makes integrated control systems appealing to municipalities of all sizes is their use of widely recognized, commercially available

hardware, software, networking and communication interfaces. A major benefit of this open systems approach versus proprietary systems is that it allows organizations to easily and cost-effectively modify and expand the system without the risk of obsolescence. The open system design of today's cutting-edge technologies also allows for integration with existing higher-level business systems for a comprehensive view of the entire organization that, in turn, facilitates more informed decision making.

The Choice is Yours

It seems certain that the issues facing the water treatment industry will keep evolving. What is less certain is this: How prepared will you be to respond?

Implementing an integrated control architecture as part of a multi-year automation master plan enables municipalities to build on existing resources as circumstances dictate. For although the pressures in which the water and wastewater industries operate may be complex, the bottom line is simple: adopting an integrated monitoring and control approach improves the economics of water and wastewater organizations by delivering operational flexibility, improved reliability, increased operating efficiencies, the ability to meet operations and maintenance budgets, and maintain environmental and regulatory compliance.

The decisions you make now affect your ability to respond in the future.

Are you ready?