Water & Wastewater Solutions

Optimizing Your Water & Wastewater Operations for the Future
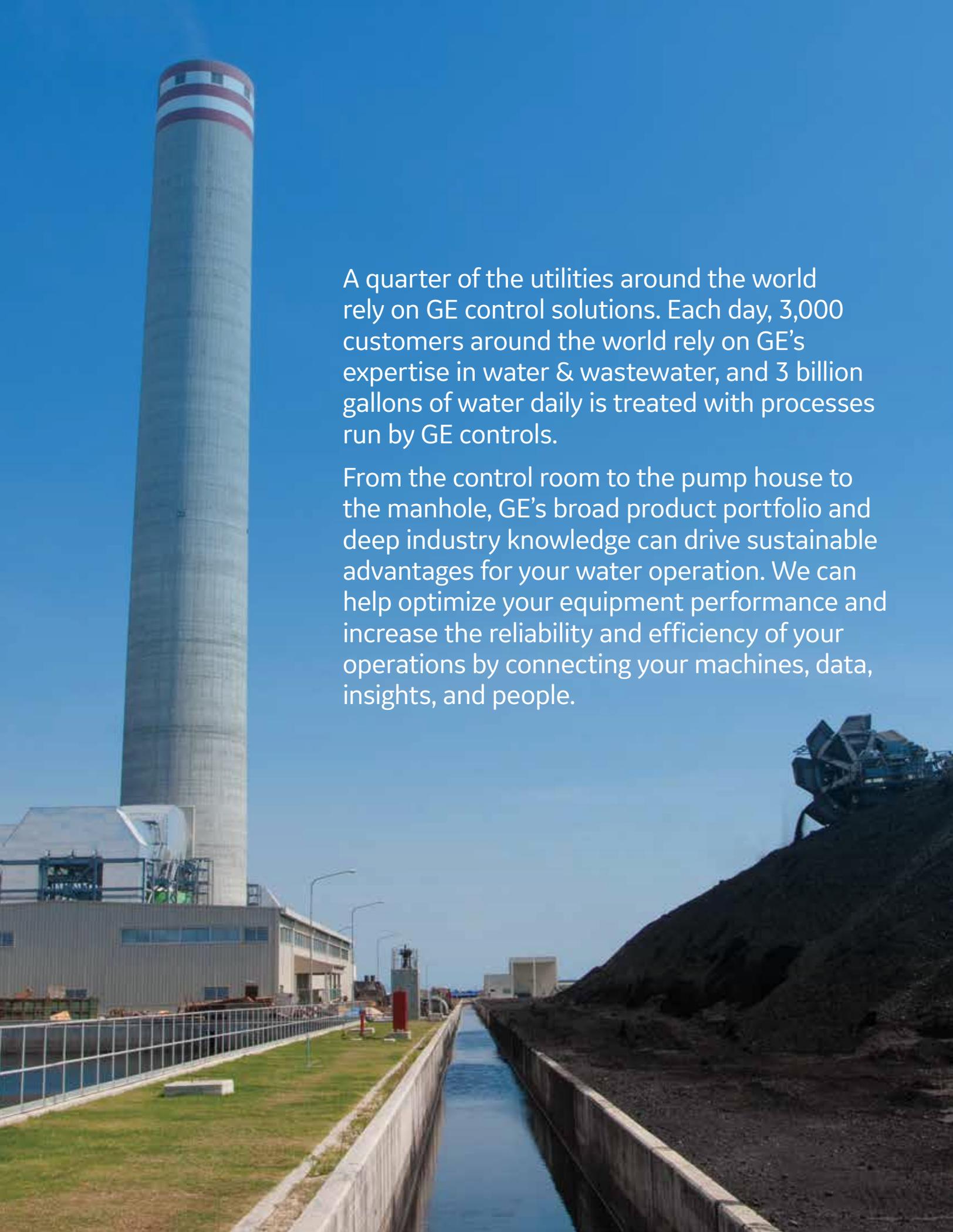
A quarter of the utilities around the world rely on GE control solutions. Each day, 3,000 customers around the world rely on GE's expertise in water & wastewater, and 3 billion gallons of water daily is treated with processes run by GE controls.

From the control room to the pump house to the manhole, GE's broad product portfolio and deep industry knowledge can drive sustainable advantages for your water operation. We can help optimize your equipment performance and increase the reliability and efficiency of your operations by connecting your machines, data, insights, and people.

Industrial Internet Control System for Water & Wastewater

Water is a scarce and valuable resource, and management of wastewater is coming under increased scrutiny. Water operations face increasing pressure to delivery more quality water with fewer resources in the face of higher costs, increasing regulations, and growing populations. Many operators are looking to maximize profitability while also meeting this growing demand with aging, disparate, and inefficient systems.

Water Today

As in all industries, data is increasingly important in the water industry. Information gaps lead to decreased water quality and operational inefficiencies.

- Overburdened operators rely on personal experience to perform difficult manual data collaboration tasks, which can introduce operational errors

- Changes in source water decreases treatment consistency with large process swings

- Manual records on aging assets create unpredictable downtime and service interruptions

- Lack of distribution water data encourages expensive over-treatment and allows quality to vary by customer location

Today, 4% of the U.S. energy grid is consumed by water treatment and conveyance. Improving operational efficiency can not only improve water quality, it can also reduce electricity consumption and costs.

Intelligent Water

Connected water and wastewater control solutions can lower operational risk and cost of water.

- Edge Apps leverage operator experience to analyze and optimize the process control under varying real-world conditions

- Outcome Optimized Controllers receive weather forecasts from the Cloud to better handle storm surges

- Historical data from the Cloud is analyzed from multiple sites and assets to determine the optimum operation and execute proactive maintenance, reducing downtime

- Field Agents monitor remote water quality allowing for inline distribution, reducing chemical use by nearly 20% and providing consistent water quality to all customers

- 30% energy reduction for pumping and process operations can be achieved with insights, provided by Cloud analytics, coupled with Edge Apps running on local controllers

Solutions to Meet Today's Challenges

To compete and win in today's changing water and wastewater market, you need smart, scalable, and connected solutions that reduce your costs and improve water quality for your customers.

GE knows that increasing profitability means improving efficiency, lowering training costs and applying the right products at the right point in your processes. All this must be done while improving the quality of water and carefully monitoring your operation. And, in today's environment, securing your operations is more important than ever.

Why GE?

GE has developed a control solution for Water and Wastewater treatment systems that truly optimizes output by providing continuous on-line monitoring and an automated feedback loop that allows operators to dynamically adapt processes to changing business objectives. GE's control solutions for the Industrial Edge combines network-integrated, outcome optimizing controllers and switches that can be accessed from anywhere and programmed to dynamically improve process operations based on both external and internal data.

- Reduce ownership costs and chemical usage
- Improve water quality and reporting with remote monitoring solutions
- Lower training costs
- Improve efficiency with portable applications
- Gather and consolidate disparate data
- Attract top talent with control systems programmed in modern languages

GE solutions feature:

- Rugged controllers and modular I/O designed to withstand harsh environments
- Field Agent or wireless radio options to connect your RTU station
- Predix-enabled connectivity with targeted edge apps to realize performance, productivity, and TCO improvements in municipal water and wastewater treatment plants
- Ability to scale from simplex unit control to high availability redundant systems all the way to process control solutions with a single portfolio of products with a single run-time and toolset
- Mix and match I/O solutions for the right environmental capabilities, the right performance, the right footprint at the right price every time
- Defense-in-Depth security to help protect from internal and external attack
- Achilles Certification for PACSystems RX3i controllers

Outcome Optimizing Control with IICS
Take your industrial control system to the next level

The Industrial Internet Control System (IICS) helps to improve your operational efficiency by providing the ability access and use data from your facilities to better understand patterns, trends, and disparities in your control systems. This helps to lower overall risk, total cost of ownership, maintenance expense, and unplanned downtime while increasing overall performance and productivity. Outcome Optimizing Controllers combine reliable and secure controls with data acquisition management in a single unit.

Choose to send and manage data on-premise or in the cloud with the flexibility to use convenient Predix*-enabled Embedded Field Agent technology or PACEdge, which enables specific Linux-based applications and access to your preferred cloud environment.

48% — Of customers said they have a talent gap for gathering and consolidating disparate data

70% — The % of industrial companies who believe it's important to adopt an Industrial Internet of Things Strategy the next over the next 5 years

80% — The average % of industrial companies who indicate big data analytics is the TOP priority for their company, or in the top 3

(Sources: Morgan Stanley Research; Global Capital Goods, "Insight: Cloud Control – The Future of Industrial Automation", March 15, 2016")

Unlock Hidden Value Through Controls

Optimize Asset & Process Performance

- Securely collect and integrate data across the plant
- Analyze data on-premise or in the cloud

Maximize Productivity

- Drop in complete, cyber-secure IIoT solutions or use our Linux-based platform to develop your own scripts and applications in a standard Linux environment
- Reduce maintenance cost through monitoring and diagnostics

New Revenue Opportunities for SIs and OEMs

- Develop new data-driven service offerings for end customers
- Maintain competitive advantage through continuous software-based innovation

Transform the Equipment Lifecyle

- Select the right on-ramp to the Industrial Internet for either greenfield or brownfield applications (no retrofit required)
- Eliminate the impact of component obsolescence through modular hardware, firmware, and software

Choose from Two Outcome Optimizing Control Options:

CPE400 + Embedded Field Agent *Predix Machine provides:*	CPL410 + PACEdge for Linux *PACEdge with Linux provides:*
Automated OPC UA Client for data collection from CPE400 PLC runtime	OPC UA Client for data collection from CPL410 PLC runtime
Hoover data collection and aggregation	SQL_Lite database for datacolleciton and aggregation
REST for secure cloud connectivity to PREDIX cloud	Webserver with HTTPS Support to connect to your preferred cloud
Predix enabled Edge Applications	Develop your own scripts and applications in a standard Linux environment
JAVA/C/C++ support for Predix Apps	C/C++/Python development environment for Edge Apps
Predix Edge Manager to deploy and manage your devices	Connect directly to your local storage solution or download standard tools to connect to your choice of cloud services.
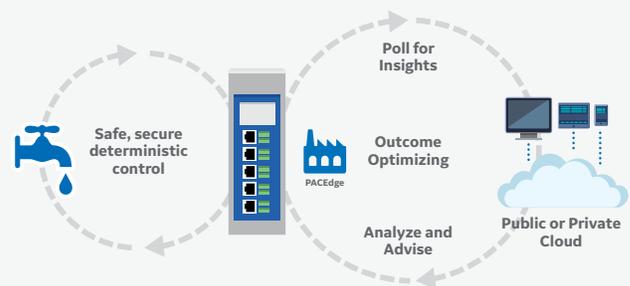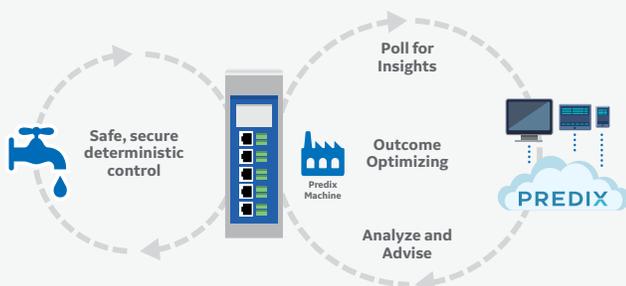
Open Communication Protocols

Open standards allow for equipment from multiple vendors to work together seamlessly for the end application. This ease of interoperability allows for systems to be combined, and reduces the skill level required to do so.

Development, deployment, and commissioning become easier

- Code can be reused with the ability to define standard objects and a fixed, yet flexible, API allows for rapid development and modifications.

- Metrics and historical data from disparate vendors and systems are integrated

Provisions are built-in for communications security

- Data and associated attributes are transferred collectively to reduce the likelihood of a data mix-up

- Common APIs reduce the likelihood of coding errors, reducing vulnerabilities in the application

Cyber Security

We understand the risk involved in securing our customers' assets and believe in a defense-in-depth architecture to help secure from the hardware layer up, guarding against potential cyber threats. Our PACSystems platform has earned Achilles and TRIMPS certifications. GE implements a secure design lifecycle, scrutinizing each components' hardware and software through testing and reviews.

At GE, we realize that the control system must be secure by design and should have a hardware root of trust as the foundation of all the security constructs in the control system. For our IICS portfolio, all our controllers now come with Trusted Platform module (TPM) technology that enables hardware root of trust. All boot firmware is signed by GE with the private key stored in the TPM module to ensure only GE signed firmware will run on the hardware. GE supplied patches are also signed for verification purposes prior to loading.

Achilles Level 2 Certification

RX3i has been industry-certified to meet rigorous standards for reliability and communications robustness. Its cyber-hardened platform is designed to help prevent cyber attacks, reducing operational risks.

Role-Based Access Control

Privileges assigned to users are based on pre-defined levels of authorization, enhancing system security. This provides layered user access, allowing only specific user access to critical competitive and customer data.

Secure User Authentication

Access to the controller is implemented using an authentication process that does not require passwords to be passed over the network. This helps prevent an attacker from eavesdropping and collecting credentials from the network that would provide unauthorized access to the controller.

Signed Firmware Updates

Signed firmware updates help ensure only core operating system software supplied by GE will run on the PLC and that it has not been tampered with since it left the factory. This prevents code that has been compromised from entering the controller, protecting system availability and valuable operation information.

Flexible Architectures to Fit Your Needs

Flexible and scalable solutions enable a range of existing infrastructure and applications to reap the benefits of our water solutions.

Small to Mid-Sized Applications

- Integrated water protocols for DNP3.0 and OPC-UA
- Flexible I/O to match application, environmental requirements, and budget
- Integrated Outcome Optimizing Controller in a very small footprint
- Integrated VFD and Industrial Switches with PROFINET redundancy and support
- Outcome Optimizing Control through PACEdge or Edge Insight
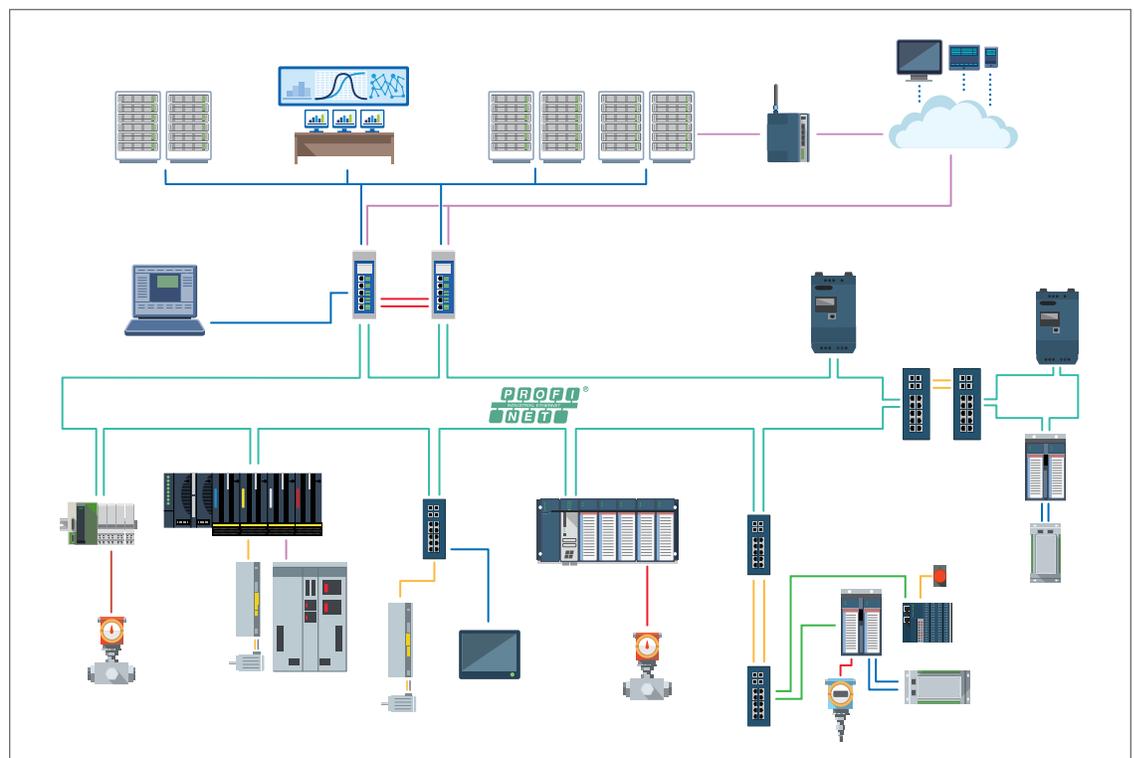
Large-sized Applications

- High-Performance PROFINET System Redundancy

- Outcome Optimizing Control through PACEdge or Edge Insight

- Capacity expandable, integrated water protocols for DNP3.0 and OPC-UA

- Integrated VFD and Industrial Switches with PROFINET redundancy and support

- Option for Sequence of Events (SoE), Power Synch and Measurement for power integration
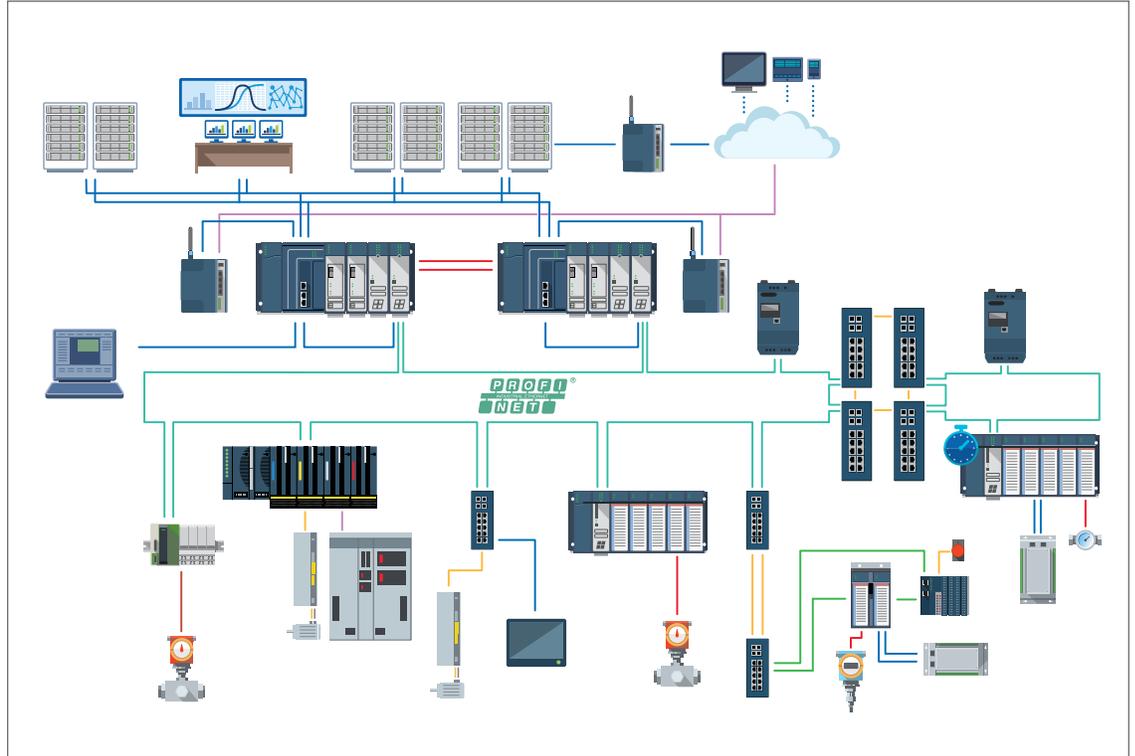

VFDs for Aeration Systems and Pump/Intake Stations

- Reduce energy consumption by 25% to 40% by automatic aeration on dissolved oxygen control. Can be as high as 50%*.

- Reduce system installation costs by up to 15%. Connects directly to PACSystem High-Availability controllers via PROFINET

- Reduce requisition and commissioning costs with a VFD configuration in PME via GSDML

- Monitor health, link, and power in real-time directly in WebHMI or with Edge Insight
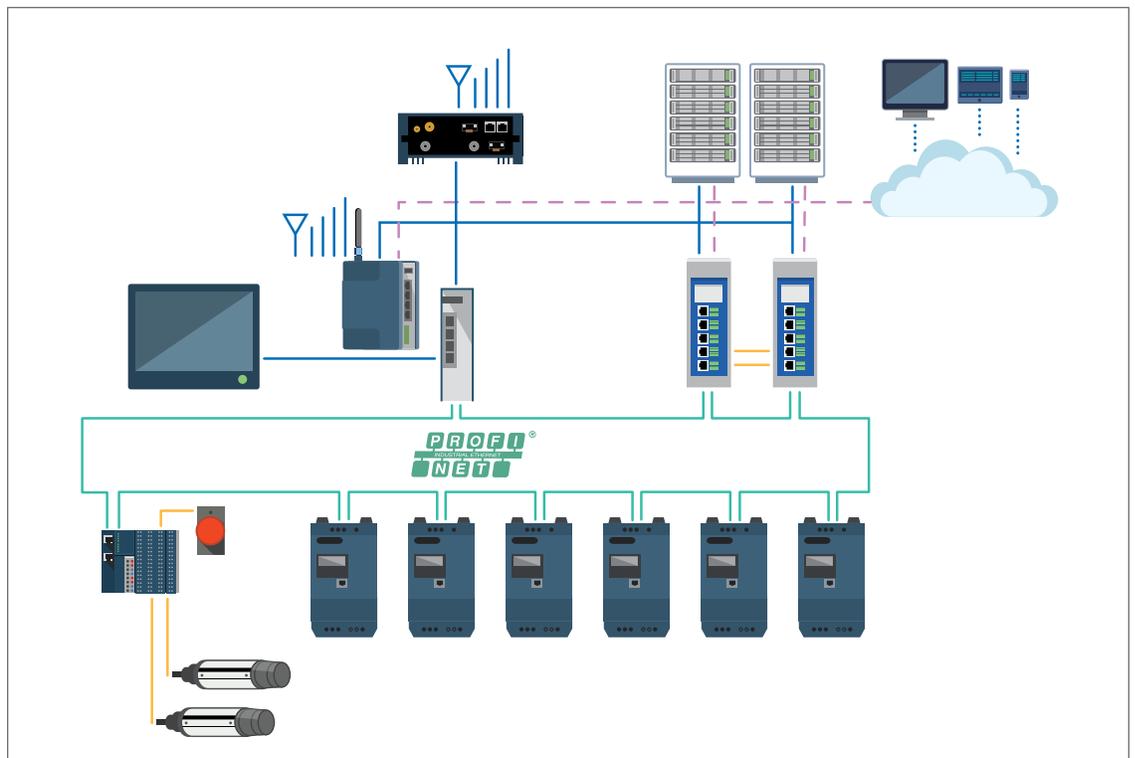
Low Cost RTU with Local HMI

- Flexible deployment where local computing power isn't critical
- QuickPanel+ for control and visualization
- Modbus/TCP or RTU for local I/O and device connectivity
- Web visualization through VNC, secure with Secomea
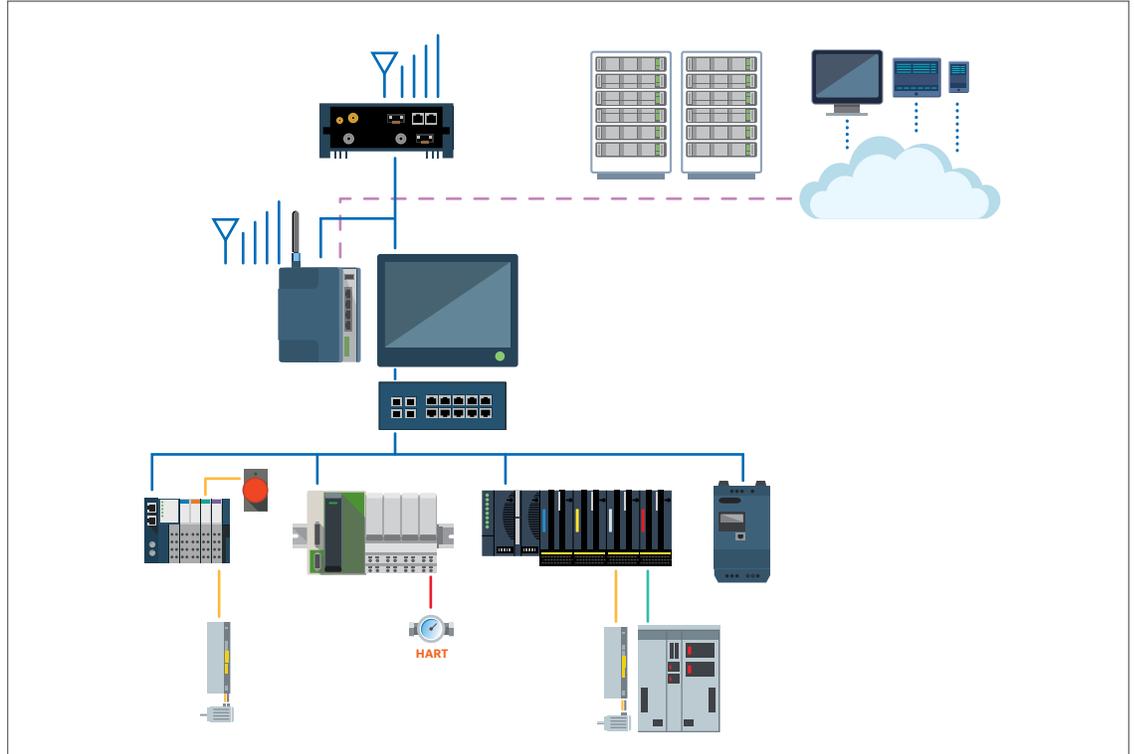
Plant OEM or Unit Controls

- Same PAC engine and I/O connectivity for peripheral controls as main unit controls
- Compact footprint, extended operating temperature range of -40°C to 70°C
- Ideal for pumping stations, in-plant unit controls or peripherals, lift stations, distribution monitoring, sewage ponds, etc.
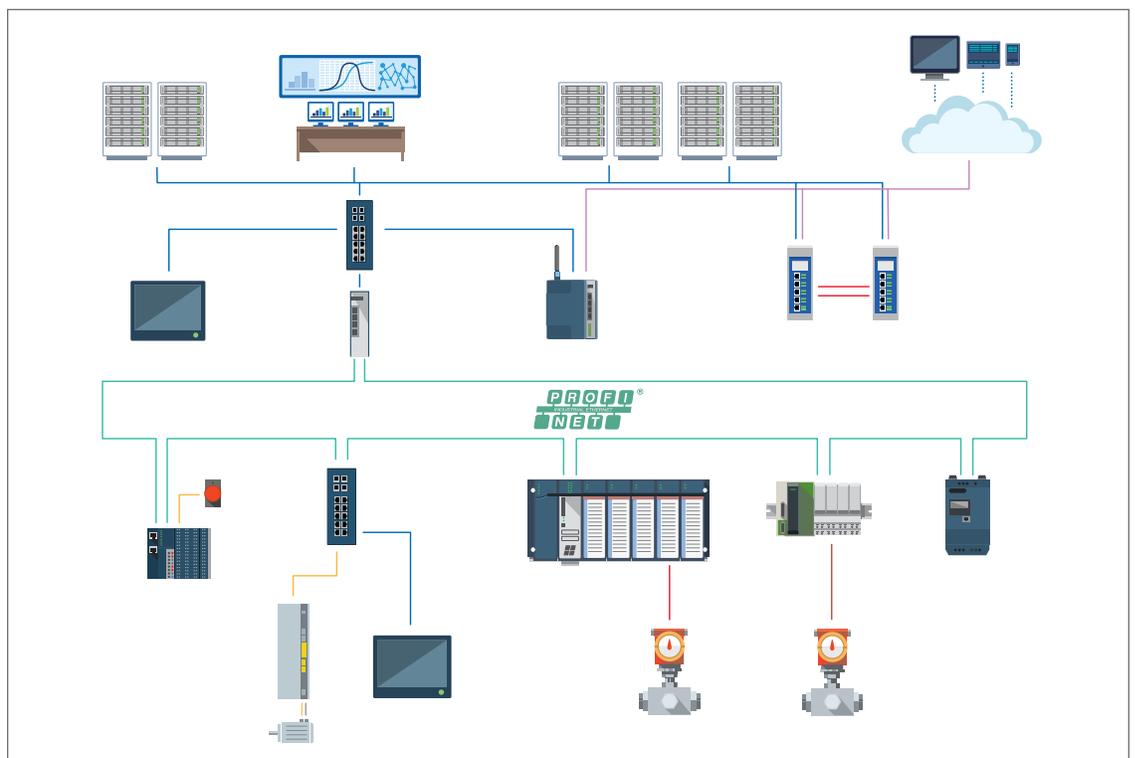
Customer Successes

GE customers have successfully deployed our flexible and scalable Water & Wastewater solutions around the globe.

Infrastructure Upgrade at Two Filtration Plants

United States

This major city utility upgraded their infrastructure while maintaining the existing program. Controls standardization significantly decreased the cost of spare parts, while smaller form factor allowed for greater capacity. The legacy programming was repurposed in the new system and company knowledge base was retained, significantly reducing training overhead. As a result, the customer realized $1.3 million in total savings.

Control System Upgrade

Italy

This customer upgraded their control system to increase availability and reliability. A second goal was to improve the purification process to better adapt to changing variables such as level of impurities in the water being processed.

GE implemented plant data collection to enable predictive calculations and optimized process efficiency. With better control of crucial parameters, such as river habitat regulations, the customer realized improved purification process and water quality. The new system contributed to a 30% energy savings.

Optimize Operations

South Korea

Customer needed insights into disparate systems managing multi-regional water supply, local water supply, and wastewater treatment facility, across 12 regions in South Korea with a goal of optimizing distribution and efficiency, minimizing environmental impacts, and reducing costs.

GE deployed Proficy HMI/SCADA – iFIX software to optimize automation and centralize integration. The new standardized system interfaces with the water treatment equipment management system, application computers, and real-time water management database servers to provide a seamless, integrated view of operations, empowering users with better analytics.

GE Power

Automation & Controls

2500 Austin Drive

Charlottesville, VA 22911

1-800-433-2682 or 1-434-978-5100

www.geautomation.com

05.18 GFA2169