# How to Solve Water Industry Challenges with Automation Technology and SCADA Solutions

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• 15 MIN READ


Today, more than ever, the water industry faces serious challenges with an extremely outdated infrastructure and a lack of emergency preparedness and future resiliency. The following list of challenges has been identified by the American Water Works Association (AWWA) from their latest, ***State of the Water Industry*** report, showing the industry's dire need for sustainable solutions to aid in protecting water quality and addressing its increased demand. The association's list of top 20 Issues Facing the Water Industry in 2021 are as follows:

1. Renewal and replacement of aging water and wastewater infrastructure
2. Financing for capital improvements
3. Long-term water supply availability

4. Emergency preparedness
5. Public understanding of the value of water systems and services
6. Watershed/source water protection
7. Public understanding of the value of water resources
8. Aging workforce/anticipated retirements
9. Compliance with current regulations
10. Groundwater management and overuse
11. Compliance with future regulations
12. Cybersecurity issues
13. Cost recovery (pricing water to accurately reflect the cost of service)
14. Talent attraction and retention
15. Asset management
16. Water conservation/efficiency
17. Drought or periodic water shortages
18. Improving customer, constituent, and community relationships
19. Data management
20. Water loss control

Now, that's quite a list, and it got me thinking about how we could go about solving these challenges. I'm an accomplished triathlete with several long-distance races under my belt. I can remember how I felt before my first Ironman triathlon race. You don't face a 2.4-mile swim, 113-mile bike ride, and a 26-mile full marathon back-to-back-to-back and not feel terrified with an intense feeling of dread. However, to truly understand what it was I would be experiencing and how to manage my first race, I sought some darn good advice from triathletes who had already completed the race. There's really nothing better than talking to people who have "been in the trenches" so to speak. Their experience and knowledge are invaluable.

And so, it is with any industry and its current challenges. If you want to know what's going on, what's new, and how to approach common challenges, ask the people who are on the ground dealing with the issues day in and day out for answers and insights. And that's what I did. To know about the current prevalent challenges the water industry is facing and how automation technology can help solve these, I asked our very own Andy Gribbin, ICONICS Business Development Manager. Andy talks to customers and partners in the water industry every day and knows firsthand what operational challenges they deal with and what they talk to him about. Here's what Andy had to say.

# In the Water Industry Trenches – an Interview with Andy Gribbin

**1. What is the first water industry challenge you want to talk about?**
One of the key challenges the industry is faced with today is the aging workforce and the transfer of their knowledge. When these highly experienced technicians, operators, and system managers leave, they take their substantial institutional and environmental knowledge with them. One solution to deal with this situation is to have a system in place that can document and formalize institutional knowledge through set standard operating procedures. Upfront planning and tools like ICONICS **GENESIS64** drive consistency in the way information is collected, displayed, and stored. As a result, new operators spend less time training and can start making an impact out in the field much sooner.

**2. Is there no way the older personnel can train new staff or is it that there's only so much experienced personnel can teach the newbies? Does the less experienced staff just need to "put in the time" as they say, to understand the work and to develop job instinct?**
Yes, you don't know what you know, so often you end up not explaining everything. Also, I think people tend to change jobs a lot more now. There's a lot of attrition and changeover, so people are facing training and the need for training much more often than they used to. In the past, people used to work most of their careers at one plant. Now, you see younger people moving around much more. Also, in the water industry, there are formalized ways of doing things. For example, if there are certain types of alarms or abnormalities occurring, personnel are required to respond to these in certain ways and in certain periods of time. That's why it is so important to put a system in place to formalize workflows to help the new incoming workforce learn their jobs. Such workflows are available within GENESIS64. You can automate and institutionalize that process knowledge, so when personnel need to address issues, they'll have a common problem-solving framework. And this will lead to more consistency. Operator-to-operator consistency is important in any environment; but for sure personnel in the water industry need to address issues systematically.

**3. So, we know that the aging workforce is a big challenge. What is another challenge the industry faces?**
The industry also faces an aging infrastructure. The control systems that were installed in the 90s and 2000s were actually built to last, so that's good. It's not uncommon to have 30-year-old Programmable Logical Controller (PLC) systems and Remote Terminal Units (RTUs) that still work fine and are reliable. However, today's equipment is a lot more

open in terms of various protocols and communications and is also often built on standard PC type of components. These are lower in cost but unfortunately, many times with that lower cost comes less reliability. A controller that can do many different things and is flexible may not be as reliable as something that's built to do one thing and do that one thing well for a very long time.

Nowadays, there is also a need for improved security - for upgraded security through the adoption of new network technology and security protocols that today are typically Ethernet-based. Maintaining an adequate security posture often requires relatively rapid technology migration at the SCADA layer of company systems. So, the question is: How do users navigate this need and rationalize it with older control systems? It drives the need to upgrade computers, operating systems, and versions of the available application software. At the same time, companies need to maintain the ability to communicate with legacy automation infrastructure. ICONICS and its system integration partners like Data Acuity can help advise customers on migration. We maintain a high degree of backward compatibility to help with this.

**4. Is there any resistance to the adoption of new technology and the related change in workflows?**

Yes. The owners and operators are influential and powerful in the organizations. When they complain, people listen. A lot of times, these people don’t want to see screen layouts change the way the animation is done. They don’t want to see that change even if improvement in the user experience (UX) design or workflow makes their jobs easier. Even if the change makes their work better, they can still be resistant. One way to approach this challenge is to have a change management process in place. Therefore, with such a process in place, you can systematically introduce acceptable changes that the operators buy into themselves. This is important during migrations. Upgrades get lots of input first and maintain key elements of what operators are used to seeing, but these also help them envision an improved experience they can eventually call their own.

**5. Are there any other challenges you can think of?**

Yes, keeping track of information about all the different assets is a big challenge. Traditionally SCADA systems have been organized around a flat tag database, which is simple. Every piece of information has a name and the data type that may have some alarm data associated with it and details about how it is logged. But there's no structure to it. So along with the re-engineering of systems that are driven based on technology, legacy systems have a need to be improved and updated with technology for security and other reasons. There should be a conscientious effort taken to apply a more object-

oriented approach to develop the system that uses the features that allow contextualization of information. So this way, the data is naturally tied to assets in the system.

And that's where a product like **ICONICS AssetWorX** comes in. In our system, we offer the ability to model the equipment and the assets that belong to an organization. For example, a municipality might have three different locations. And each location might have several buildings. And in each building, there could be several processes that are set up. And in each process, there's a set of equipment, and for each equipment, there are different subsystems of pumps, motors, valves, piping, and sensors. Within AssetWorX, a hierarchical model of all this equipment can be created to give context to all the assets in the system. And there's a lot of benefit to doing this in terms of organizing the information, especially when we look at our customers who are running 10,000 to 50,000 tag systems. It becomes extremely difficult to filter through and display or report on such a massive amount of data. If a report on a lift station out in the field is needed, how can 30 points that are related to that lift station be intuitively correlated such that the data within the report and the way in which it is presented is both meaningful and actionable? Rather than using naming conventions, AssetWorX is the answer.

## How Three Water & Wastewater Facilities Used Automation Technology Upgrades to Address System Challenges

Going back to getting a feel for how to better address current water industry challenges, it's always helpful and insightful to see how others do it. Below, I briefly cover three water facilities that used automation technology to upgrade their systems to address their own challenges. The results: improved operational efficiency, improved workflows, and improved resilience to cyber security attacks.

### Cucamonga Valley Water District

Headquartered in Rancho Cucamonga, California, the **Cucamonga Valley Water District (CVWD)** services a 47-square-mile area with approximately 200,000 people. This area includes Rancho Cucamonga, some areas of San Bernardino County and portions of Upland, Fontana, and Ontario. CVWD functions as a Special District, an independent unit of local government that serves the needs of its community. The

CVWD has approximately 48,000 water connections, 37,000 sewer connections, and an average daily demand of approximately 47 million gallons. A customer since 2008, the Cucamonga Valley Water District (CVWD) had initially adapted the ICONICS platform as part of a control system project to simultaneously retrofit an existing treatment facility and increase the functionality of its existing controls. The organization was looking for an HMI/SCADA solution that would easily integrate with the existing infrastructure and that was not processor-intensive, could deliver a mobile component for employees, and provide comprehensive reporting abilities.

After extensive evaluation of multiple platforms, the CVWD selected ICONICS GENESIS64 HMI/SCADA software to deliver a comprehensive package of graphics, trends, alarming, and notifications. The new features and tools have provided the opportunity for the CVWD to improve system performance of its supply, quality, and efficiency. GENESIS64 has provided the tools to guarantee safe and secure control related to water supply with seamless integration of new technology regardless of communication protocols. The district ensures the highest water quality with ICONICS' intuitive visualization, effective alarming, and the ability to analyze historical data. Additionally, efficient operation using the GENESIS64 product suite provides the CVWD with the ability to optimize system operations and to develop a system that is highly scalable with seamless integration of new process applications. (See the **Cucamonga Valley Water District Customer Success Story** for a more detailed explanation of this use case.)

## Lake Cities Municipal Utility Authority

**Lake Cities Municipal Utility Authority** (LCMUA) is located in Lake Dallas, Texas and provides superior drinking water, fire protection and pressure, and potable (drinking) water and sanitary sewer services to the Shady Shores, Lake Dallas, and Hickory Creek areas. LCMUA operates 21 lift stations, three elevated storage tanks, three ground storage tanks, ten pumps on the water side (with three altitude valves), and 46 sewer pumps on the wastewater side. As the authority had an aging infrastructure system, upgrading the system was one of the organization's biggest priorities. One option involved replacing their older SCADA system with a unified new HMI/SCADA solution that could handle Distributed Network Protocol (DNP3) communications and interface with existing Servelec Technologies Tbox combined PLC/RTU hardware installed at every lift station, pump station, and elevated storage tank in their system.

Lake Cities Municipal Utility Authority selected ICONICS GENESIS64 HMI/SCADA software with web-based real-time client stations; Hyper Historian high-speed, reliable, robust plant historian; MobileHMI data mobility suite; AlarmWorX64 Multimedia OPC

alarm management software; and ReportWorX enterprise reporting, charting, and analysis software. With GENESIS64, they achieved improved secure visualization of water and sewer levels, as well as monitoring and control of potable water and wastewater, elevation, PSI, intrusion pumps, pump monitors/controls, pump failure status, and temperature. The authority also benefited from the new alarms and notifications. With the new HMI/SCADA system, the Lake Cities Municipal Utility Authority met their needs for quality and maintenance within their water and wastewater system without any of the issues or data discrepancies they had experienced with their previous system. Moreover, ICONICS' WebHMI and MobileHMI software enabled them to monitor and control connected systems through "Any Glass", as many of the organization's operators utilize iPads in the field. The authority now considers their visualization to be "top notch", their alarming to be "solid", and their mobile clients to have a "very fast response time", all of which were vast improvements compared to their previous system. (See the **Lakes Cities Municipal Utilities Customer Success Story** for a more detailed explanation of this use case.)

## Madison Metropolitan Sewerage District

The **Madison Metropolitan Sewerage District** (MMSD) has been operating since February 1930, making it one of the oldest regional sewer utilities in the United States. Today, the MMSD serves Madison and the surrounding communities comprising 111,000 customers and covering a population of approximately 380,000 people. The district processes an average of 43 million gallons of wastewater per day and is responsible for wastewater collection and treatment and resource recovery. As a wastewater treatment facility, the Madison Metropolitan Sewerage District faces unique challenges. First, the cost of pumping is higher than most facilities due to its location and terrain. The facility's inability to rely on gravity like most plants means that all wastewater must be pumped both to the plant and away from the plant. Second, Wisconsin has more stringent phosphorus limits than most states which means more infrastructure is needed to treat the water. Lastly, the MMSD takes care of approximately 40 pumping stations owned by other municipalities or sanitary districts, all of which are scattered throughout the greater Madison area over terrain that has no cellular or Internet connection. The district must therefore rely on radio communication to get live data and information from those stations to monitor operations. Additionally, when issues arise, the district needs to send crews out to confirm that the stations are operating correctly.

When the district started looking for a new system to replace its obsolete system, the challenge was to choose a new SCADA system that could not only integrate the old system into the new system, but also be the best fit for the MMSD operations and

needs. The facility manages 5,000 assets with approximately 40,000 process tags, 6,000 alarms, and 5,000 historical points. The district chose the ICONICS platform deploying the GENESIS64 HMI SCADA Suite and Hyper Historian with asset-based configuration. Since the platform provides critical real-time information about operations, the facility's team can quickly react to solve problems and keep the facility running at the highest level possible. Furthermore, operators can easily access information like events, alarms, and records with operation and maintenance details, directly contributing to a more efficiently run facility. With its advanced level of customization, GENESIS64 allows the MMSD team to easily add and modify features of the system as needed and eases the one-man 24/7 operation with its capability to send different data streams in different directions. The MMSD has also increased operational efficiency by tying GENESIS64 to some external systems such as its Computerized Maintenance Management System (CMMS) that controls all work orders and work history. Operators can pull up a piece of equipment, look at its history, see what maintenance work has been done, who performed the work, if there are open jobs for it, and any other relevant information.

This capability saves time and provides updated, complete records of the system. In addition, the MMSD remote process control system is securely locked down with the combination of Citrix and the high level of security inherent within the ICONICS software. Operators can securely access the system from tablets, phones, thin clients, and computers, and supervisors can securely access the system from their homes to deal with issues more easily and efficiently. With the constant threat of cyber-attacks, this tight system security is critical for the MMSD's IT department and to the facility as a public utility. (See **Madison Metropolitan Sewerage District Customer Success Story** for a more detailed explanation of this use case.)

## Securing Public Health with the Highest Quality of Water

Water and wastewater facilities are tasked with securing the highest quality of water, one of the most crucial priorities related to public health. Many facilities face substantial challenges such as an aging infrastructure with disparate, obsolete systems, an aging and limited work force, limited budgets, growing demands, and more. You can choose to use technology to address your challenges. Technology like ICONICS software uses real-time data to optimize efficiency, improve response time, and reduce downtime which results in more efficient and cost-effective operations. As a result, you will be able to better manage and support your workforce by making your employees' lives and work easier. You will also be able to better serve your communities by providing the

water that they need and expect. It is now time to get the most out of your facilities and workforces and to prepare for the future.

## Learn from the Experts at ACE22

Join fellow “Water Sector Professionals” for The American Water Works Association **ACE22** World Premier Water Conference in San Antonio from June 12-15, 2022 and be sure to swing by the ICONICS booth 25106. You’ll have the chance to “come together and learn, connect and be inspired to solve today’s global water challenges.” And since the top water issues and challenges will be discussed, it’s the perfect chance to share and exchange information, ideas, best practices, and experiences.

Written By:
**Mary Anne Ballouz,**
Marketing Communications Writer

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