

# Application Note - Water/Wastewater Municipality

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Water/wastewater facilities have unique technical requirements. Most facilities have historical issues managers must constantly confront. Many were designed years or decades ago, prior to modern networking and automation technologies. However, over time, most plants receive upgrades or undergo modernization. Where RS232/422/485 serial communications were the industrial norm, now Ethernet and wireless communications dominate. Where DiveceNet, ControlNet and PROFIBUS were the norm, now [EtherCAT](#), [EtherNet/IP](#) and [PROFINET](#) and [WirelessHART](#) are gaining prominence.

Electrical automation products for the industrial control system (ICS) of water/wastewater environments are extensive. They include frequency inverters, power supplies, relays, sensors, telemetry instrumentation, servo/motion systems, cameras and video systems, PLCs, embedded controllers, remote I/O, starters, HMIs/operator terminals, PCs, SCADA systems, industrial data communication devices, enclosures, cabling and connectivity devices, and certainly components belonging to the Internet of Things grab-bag. How each of these components makes it into a water/wastewater facility varies. More often than not, the driving factors are plant design and engineering specifications.

## Specification Considerations

When a new potable water facility or a wastewater treatment plant is conceived, it is a major undertaking for a municipality. Before the design and construction can begin, there is an extensive application process involving extensive needs analyses, environmental impact studies, and public discourse and permitting processes. Water sources and treatments, effluent discharge, sludge disposal, energy consumption, water reuse, odor control, geographical and geological concerns, water storage, and facility life cycle all must be addressed to the approval of the stakeholders. When an existing water/wastewater facility or lift station needs to be upgraded, the scope and cost may not be a great as a new one, but a similar set of questions must be answered.

Early on, the municipality will contract with a design engineering firm. Large firms include [CH2M Hill](#), [Brown & Caldwell](#), [MWH Global](#), [Hazen and Sawyer](#), [AECOM](#), [Black & Veatch](#), [Carollo Engineers](#), [ARCADIS](#) or [CDM Smith](#). Regional firms include [Bowen Collins](#), [Hansen Allen & Luce](#), [Keller Associates](#), [McFadden Engineering](#), [Jones Edmunds](#) or [McKim & Creed](#). Their knowledge is invaluable as they help navigate the process – from concept through production.

When one of these firms designs a new facility or retrofits an existing one, the instrumentation, controls, SCADA and operator interfaces must be specified. On retrofits, the technical recommendations are more often based on the incumbent equipment and systems – why change what has been in place for years? In new or expanded facilities, the specifications tend to be along the lines of the usual manufacturers and brands. This may simplify operations (which is important), but the status quo may be more expensive and based on dated technology.

In greenfield opportunities, the instrumentation and controls specifications are based on a combination of end user's/plant management's and the engineering firm's preferences coupled with facility type and local laws. Water/wastewater facilities are designed to be around for years – if not decades. Does it make sense to install what might be considered the old or existing technology into the new? Are the end users and engineering consultants up-to-date on modern water/wastewater instrumentation



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and controls technologies? What does the long-term support look like for the incumbent equipment? How are best-of-breed technologies reconciled with budget restrictions?

## Funding and Cost Considerations

Property owners have little tolerance for high-price drinking water or costly wastewater services. Retrofits, upgrade and new water/wastewater facilities are necessary yet costly. Funding water/wastewater projects comes from public sources; e.g., bonds, private investors, or a combination of both. Budget is always an issue. However it seems that municipal projects weigh cost higher than private investors. On one hand, there's a "get it done as quick and inexpensive as possible" mindset; on the other is "get it done according to the real long-term requirements with an investment that is in the stakeholder's best interests" posture.

When capital costs dominate the equation, the trade-offs include poorer quality, shorter lifecycles, higher maintenance, less worker productivity and efficiency. The adage "price, performance, product features...pick two," always applies with technology. If a greater weight is given to costs, then product longevity, better energy utilization, capacity, ability to accomplish more sophisticated tasks more intuitively, and being able to do more with less laborers, will suffer.

## Electronics and Environmental Considerations

Instrumentation and control technologies are designed to operate in the environments the manufacturers feel they will be installed in. If the characteristics of the deployment environment are sheltered, temperature-regulated, dry, dust-free, low vibration, minimal electrical interference, and non-combustible, then the technical options are broad. If the technology will be deployed in the outdoors, direct sun, wet, dusty, high-vibration and potentially explosive environments; e.g., hydrogen sulfide, methane, ozone, chlorine, then the facilities' electronics need to match.

When specifying components used to upgrade existing water/wastewater facilities or build new ones, the actual requirements needs to be examined. Just because it worked ten or twenty years ago does not mean it will work for the next ten or twenty years. Costs are important but so are the actual technical requirements of the facility. Water/wastewater facilities can have some environment challenges. The instrumentation and controls selected should match these conditions.

For over 30 years, Beijer Electronics has designed and manufactured human machine interface, industrial panel PCs, automation software, and industrial networking switches, routers and converters. Beijer offers products for most industries but tends to focus on environmentally-challenging industries including water/wastewater, oil/gas, mining, heavy construction, marine, off-shore, transportation and industrial vehicles. The products are design to excel in environments prone to extreme operating and storage temperatures, water, humidity, dust, chemicals, combustion, high vibration, physical shock, and electrical interference. Beijer has shown water/wastewater municipalities that its delivers:

- A rugged broad product line for most size, connectivity, performance and price requirements.
- Excellent product quality, immediate product availability, and reliable technical support.
- Software that provides solid functionality and protocol support, state-of-the-art graphics, smart design and engineering tools, and an open platform.



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