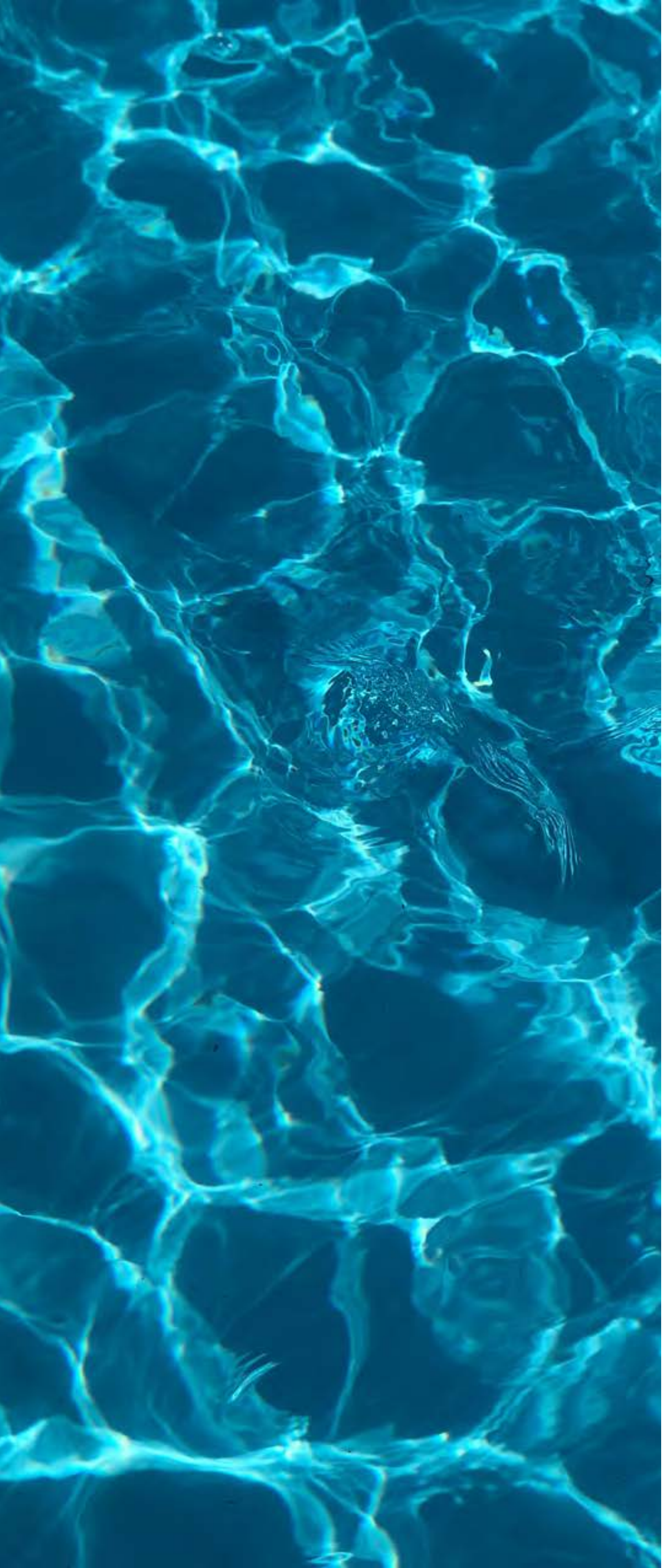
Water Jargon 101

A Guide to Sometimes Overused but Always Essential Terms, Acronyms & Other Basics of the Modern Water Utility Industry

MASTER METER

Table of Contents



Sensors everywhere - not just water - but streets - garbage - everywhere. And everything is getting smarter. With sensors comes measurement, data, and the ability to visualize, understand and manage more effectively. Whether you're new to the water utility industry or you're a seasoned veteran, you have to admit there's a ton of jargon, buzzwords and acronyms to navigate. Like any field, water has its shorthand, and there's a lot to absorb. Granted, much of it is actual terminology used by utilities and engineers, but some is commonly used marketing lingo. After all, the industry is saturated with emerging technologies.

By the way...

"Saturated?" "Absorb?"

Aren't you enjoying these "***dam***" good water puns?

Overall, it's important to define what these words and phrases actually mean and separate the marketing buzzwords from the official terms. Smart water, for example, has been a huge buzzword in the past decade —

maybe longer, depending on who you ask

— so it's not surprising that the definition can get a bit diluted. What constitutes smart water exactly? Are we even talking about water? Or are we talking about a piece of technology? Hardware or software? What does it do? Does it help make a utility more intelligent?

Just how smart is it?

In fact, smart water usually refers to a piece of technology, software, equipment or network. But it may also be viewed as the concept of a utility applying new business processes to better manage its water system. This is just one example of how terms can become confusing or misused. You've probably heard a politician say something in a speech about the importance of "clean water" while touting an infrastructure plan. While it may be obvious to you that they're talking about potable water, did you know that in the water industry, clean water actually refers to wastewater?

This document is tailored to those just beginning a job or career in the water sector, but it can also be a useful reference for just about anyone. In this guide, we'll examine a list of common terms, phrases, waterworks products and acronyms used in the industry today and their basic meanings. These entries are intended to be educational, 101-level descriptions that address how the term is generally used and the industry segment in which it is most applicable.

Rather than being alphabetized, the entries are grouped together based on general subject area for ease of access.

The Basics

Drinking Water

Also called potable water. There are three primary segments of water infrastructure: drinking water, wastewater and stormwater. Beginning with drinking water, this segment of the industry encompasses anything to do with water for the purpose of public consumption. Water is taken from a source, such as a lake, river or reservoir (called source water or raw water), and then transmitted via pipes to a treatment facility to be filtered and chemically treated to potable standards using advanced technology. It is then distributed via other pipelines to businesses and residents within the utility's service area.

Wastewater Technology

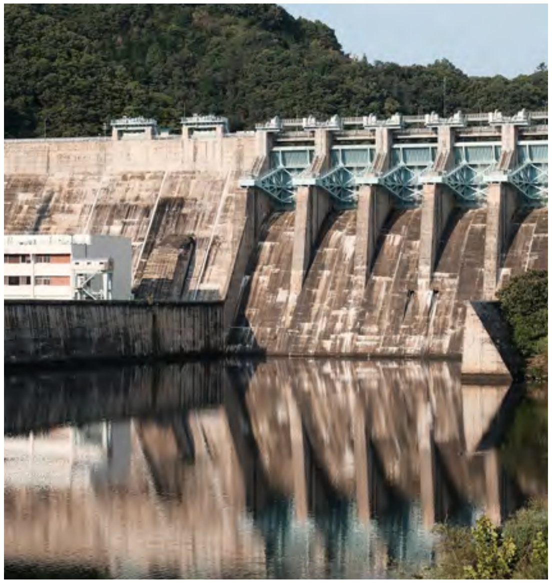
Also known as sewage, wastewater can also be referred to within industry circles as clean water. Wastewater is what is flushed down the toilet or what goes down the sink or shower after use. It travels via sewers and collection systems to the wastewater treatment plant, where it is treated to environmental standards (usually non-potable standards) before being discharged back into a source water body, such as a river, lake or reservoir.

Grey Water

The relatively clean waste water from baths, sinks, washing machines, and other kitchen appliances.

Stormwater

Refers to any water originating from precipitation. According to the American Society of Civil Engineers, stormwater systems range from large concrete storm sewers, roadside ditches and flood control reservoirs to rain gardens and natural riverine systems. Stormwater utilities are on the rise; more than 40 states have at least one. Expanding impervious surfaces in cities and suburbs is also growing, increasing urban flooding, which results in $9 billion in damages annually. Stormwater also affects water quality as polluted runoff from pavement enters water bodies.



Infrastructure

Water Main

The primary pipelines that distribute treated, potable water to homes and businesses. Mains typically connect to smaller diameter service lines that carry water from the main onto private property and into homes and businesses.

Water Service Line

Service lines carry potable water from the main into residences and businesses on private property.

Sewer Lateral

Carries wastewater and sewerage from homes and businesses to the sewer main line or collection system.

Sewer Main

Sewer mains, as part of a sewer collection system, transport wastewater and solids to a treatment plant where the water is treated and solids and pollutants are removed.

Water Distribution

Referring to the drinking water segment of the industry, the process of treated drinking water being "distributed" via water mains and pipes to residents and businesses.

Wastewater Collection

Contrary to distribution, wastewater collection refers to sewer mains and pipelines that carry wastewater or sewerage to the wastewater treatment plant. In most cases, a wastewater collection system carries wastewater using gravity and the natural slope of the land. This is why treatment plants are generally located in low-elevation areas. Pressure sewer systems are also used but are less common.

Combined Sewer System

Sewers designed to collect rainwater runoff, sewage and industrial wastewater in the same pipe. According to EPA, nearly 860 municipalities across the United States have combined sewer systems.

Combined Sewer Overflow (SSO)

See stormwater. Combined sewer overflows occur during rain events (also called wet weather events) when the volume of wastewater exceeds the capacity of the system. When this occurs, untreated stormwater and wastewater can discharge directly to nearby streams, rivers or other water bodies, which can be a huge environmental concern. Many sewer systems in the United States are under government-mandated consent decrees to expand their system in order to combat combined sewer overflows.

Water & Wastewater Treatment

Both drinking water and wastewater go through the treatment process. Water treatment plants treat water to potable standards before distributing it to residents and businesses in the utility's service area. The treatment process is highly regulated by public health standards.

Wastewater is also treated, which involves solids removal before the water is discharged back into a water body, such as a river, lake or reservoir. Like potable water, the treatment of wastewater, also called resource recovery, is similarly highly regulated by environmental standards and governed by agencies like the U.S. Environmental Protection Agency (EPA) and other federal and state regulatory bodies. Both water and wastewater treatment are highly engineered processes.

Millions of Gallons per Day (mgd or MGD)

MGD is typically used when describing treatment plant capacity. For example, the District of Columbia Water and Sewer Authority (DC Water) collects and treats about 300 MGD of wastewater!

Water Reuse

Also known as water recycling or water reclamation. According to the EPA, water reuse reclaims water from a variety of sources, then treats and reuses it for beneficial purposes such as agriculture and irrigation, potable water supplies, groundwater replenishment, industrial processes and environmental restoration. Water reuse can provide alternatives to existing water supplies and be used to enhance water security, sustainability and resilience. Some basic info from EPA can be found here.

Desalination

The process of removing salt from water as a means to use seawater as a water source. This is done through advanced processes such as reverse osmosis (RO), in which high pressure is used to force the pretreated water through semi-permeable membranes that trap salt and other minerals. The high power demands of desalination plants limit their viability. Though not widely used in the U.S., desalination has made headway in recent years, particularly in arid coastal regions.

Decentralized Infrastructure

This type of water infrastructure differs from a city's normal infrastructure where assets and operation of water and wastewater systems remain under the control of a single organization. Typical of rural U.S., these areas are served by onsite wastewater systems and single household wells — as opposed to connecting these households to a single centralized system, which is cost prohibitive.

Digital Water Measurement

Solid-State Water Measurement

Today's digital water meters are categorized as solid-state or static water meters — or, meters with no moving parts, contrary to mechanical meters. A solid-state meter with no moving parts eliminates wear and tear on the device over time in traditional mechanical measurement. This results in greater, more precise accuracy and longer service life. Ultrasonic and electromagnetic meters are both examples of solid-state meters. Check out this short video explaining solid-state water measurement.

Electromagnetic Meters

Electromagnetic meters work by applying the principle of Faraday's Law, which essentially states that when a conductor such as water moves through a magnetic field, it produces an electrical signal. With electromagnetic meters, as water flows through a magnetic field inside the meter, the velocity of the fluid passing through is measured and can be converted to volume.

Ultrasonic Meters

Ultrasonic water meters use solid-state, high-frequency sound waves to measure flow.

There are two primary types of ultrasonic meters: transit time and Doppler.

- Transit-time meters send ultrasound signals into the flow using transducers that can be clamped onto or inserted into a pipe at two locations. The difference between the time it takes for sound to travel upstream and downstream between the two sensors is directly proportional to flow velocity, which is measured and converted to volume.
- Doppler meters use sound waves reflected off materials in the fluid, such as air bubbles or particulates, to measure flow velocity, which is then converted to volume.

Metering & Networks

Remote Monitoring

Refers to any piece of technology used by a utility that is capable of relaying data via sensors. These sensors measure the performance of a distribution or collection system on areas like pressure, flow, leaks, I/I (infiltration/inflow), sewer overflows or water quality data like chlorine levels, pH, temperature and more.

Smart Water

This is a broad industry term often used to describe a technologically advanced waterworks product. Smart water may ultimately refer to a piece of technology, software, equipment or network, or may be used to describe an approach taken by a utility or system to apply new technologies or business processes to better manage water.

Water Metering

The devices that measure water use of residents and businesses. Meters determine how much money customers are billed for water use, generally on a monthly basis.

There are different types of water meters, and newer systems tend to have advanced capabilities.

The very basics of how revenue is generated is tied to the utility's water meters and the way the billing system functions. Meters are frequently likened to cash registers, and without proper metering and accounting of water use, utilities lose money because they don't receive fair compensation for what they provide to customers (see Non-Revenue Water).

Smart Metering

Electronic meters that have the ability to transmit information back to the utility at certain intervals or in near real-time. Smart metering is sometimes loosely used to describe AMR or AMI.

Automatic Meter Reading (AMR)

Automatic or automated meter reading or mobile drive-by automatically collects usage data about customers' water and can transmit that data to a central database, such as a water utility operations facility, for billing and analysis.

Advanced Metering Infrastructure (AMI)

Allows for remote collection of meter data for billing and maintenance purposes without any in-field visits or dispatching personnel. AMI is more accurate and efficient than AMR, drive-by, touch pad or one-way reading systems, and it allows utilities to immediately become more profitable and reliable. AMI solutions are comprehensive: fully automating the meter reading, billing and data collection processes. Contrary to AMR, AMI allows for two-way communication between the meter and the utility. AMI manufacturers also offer customer portals as part of an AMI implementation, in which end users (residents and businesses) can log on to view and track their water use history.

District Metered Area (DMA)

DMAs improve water distribution management and aid in mitigating water loss. Utilities create isolated District Metered Areas or Zones, where water flow into and out of the areas are metered and monitored across specific timeframes providing a precise understanding of non-revenue water (NRW). DMAs also tie into the management of nighttime zone pressures and leak management.

Under-the-Glass

Refers to a meter or device for water measurement or monitoring with no exposed wires or connections (or "ConnectionFree"). All electronics, antenna and power supplies are hermetically sealed and environmentally protected inside the device, or "under the glass."

Cellular

Compared to traditional AMI systems, cellular-based communications offer greater ease of deployment and scalability. Cellular endpoints rely on existing cellular networks, eliminating the need for traditional network infrastructure like gateways. Because of their flexibility, cellular endpoints can be deployed rapidly, from targeted implementations for large commercial customers and hard-to-read locations to full-scale rollouts.

Endpoints

A term used in smart meter network deployment that refers to the sensors that read the water meter at the home or business, and which send a signal to electronic collectors throughout the service area.

LoRa

An abbreviation for Long Range that, in the water sector, is generally used to describe devices such as smart meters that use wireless radio frequency technology that is long range, but low power. LoRa devices and the open LoRaWAN® standard enable two-way communication for smart or IoT applications (Internet of Things; see its definition in the Utility Management section). This article provides an overview of LoRa, LoRaWAN and connectivity for smart water meters.

Software-as-a-Service (SaaS)

Refers to hosted, scalable, highly secure, cloud-based software applications that perform a wide array of functions like Meter data management (MDM), water system modeling, Enterprise Resource Management, SCADA, Billing, and more. SaaS makes data interoperable, it personalizes the user experience based on role and allows secure remote management from any device, anywhere. They are subscription based, with utilities commonly paying only for the number of endpoints deployed. Because of that, many water utilities are finding SaaS or cloud-computing to be a viable alternative to investing money and staff time in maintaining and updating their own servers and operating software.

Network-as-a-Service (NaaS)

NaaS is another type of managed service for an AMI or meter network. Generally, the utility pays a recurring monthly fee, and a third party, such as a vendor or program manager, is responsible for deploying the network and asset monitoring.

Meter Data Management (MDM)

This can refer to anything related to managing data that utilities collect, generally from AMR/AMI meters. MDM can also come in the form of a different software system used for this purpose — as well as manage billing systems and help pinpoint potential errors.

Customer Portal

Refers to a customer account profile that residents use to pay water bills online. Beyond that, more recently, the portals include options for customers to view and track water use directly at their home or business on a regular basis. That way, in the event of a higher-than-usual bill, the customer can view exactly when there may have been a spike in use at their location.

Many meter manufacturers and vendors, as part of their suite of solutions offered to utility customers, are able to set up and connect the utility's customer portal to the new system. The portal can then be customized to the utility's or the city's branding preferences. In addition to being accessible online, these portals are generally available in the form of an app . Here's one example offered by manufacturer Master Meter.

Water Loss

Non-Revenue Water

Water that is not billed by the utility. There are two primary types of non-revenue water: real loss and apparent loss (see definitions below). Although non-revenue water is closely tied to water loss, and the terms water loss and non-revenue water are commonly misused interchangeably, they are not the same. Non-revenue water is the sum of apparent and real water losses, combined with the volume of water used for fighting fires, water main flushing, fire flow testing and similar unbilled authorized consumption, such as theft. Water loss control involves accurately categorizing the nature and volume of a system's real and apparent losses.

Real Water Loss

Physical water losses that can result from leaking water mains and service connections, storage tank overflows, water flow from damaged pipelines and the like, reported or not.

Apparent Water Loss

Refers to water that is lost from inaccuracies associated with metering errors, systematic data handling errors, data gaps, misreported data, unauthorized consumption (theft), estimated volumes due to lack of metering and similar nonphysical losses.

Utility Management

Asset Management

Refers to a plan or program implemented by an organization — a utility, in the case of the water sector — that is designed to maximize asset service life and prioritize capital investment and funding for critical infrastructure projects. According to a 2018 report from Bluefield Research, smarter, more advanced asset management strategies could save water utilities $41.9 billion in capital expenditures by 2027.

One Water

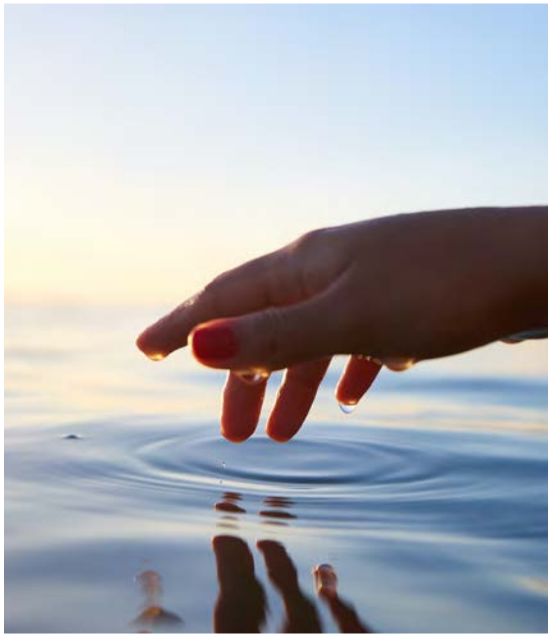
This term is used in the water sector to describe the concept of managing all water (includes surface water, groundwater, stormwater, and wastewater) in an integrated, inclusive and sustainable manner, with future planning in mind. According to the US Water Alliance, whose mission involves promoting a one water approach, the term can refer to anything from utilizing advanced technologies to recover nutrients and energy from wastewater or using green stormwater techniques to mitigate flooding while beautifying neighborhoods to undertaking watershed-level planning and collaboration to address water quality issues or implementing innovative financing and partnership models.

Regionalization

The process by which several water utilities in close geographic proximity combine to form a larger utility. These larger water utilities are commonly formed to create greater operational efficiency, gain significant buying power, and improve service to all communities. The process of regionalization can be politically fraught because of election cycle politics and the need to give up some control to another organization, town, or city.

Machine Learning

Involves the use of algorithms so that computers can automatically learn and improve from experience without being explicitly programmed. In the water sector, machine learning can be used for condition assessment to predict and visualize the Likelihood of Failure (LOF) of water mains in a distribution system.



Supervisory control and data acquisition (SCADA)

SCADA systems collect and store data at intervals of fractions of a second. Water and wastewater treatment plants generally use SCADA for consistent, automated data about what is happening with various systems and equipment in the plant. Personnel can see where problems are occurring in real-time through various data logging points and set alerts if thresholds are reached.

Edge Computing

Edge computing is more about system architectural design than it is a particular type of technology. The idea is to move some data storage and computation closer to the data source (meters and sensors) and away from the cloud to improve speed, improve data efficiency, and preserve system bandwidth. It's the difference between 'Big Data' (cloud computing like Microsoft Azure and Amazon AWS), and real-time 'Instant Data' from different sensors and system nodes. It's about computing happening outside of the cloud, at the edge of the network.

Geographic Information Systems (GIS)

Allows users, such as utility system operators, to access data in a geographical or spatial context, like a map of assets in the system (pipes, valves, pumps, manholes, hydrants, etc.), as well as information about those assets.

Computerized maintenance management systems (CMMS)

CMMS may be used by utility operators or managers to log data like asset inventory, service requests and work orders, preventive maintenance tasks, schedules, inventory management and purchasing, condition and risk-criticality analysis, assessment and renewal planning, data analytics and KPI metrics, risk visualization, reporting and documentation.

Hydraulic Model

Simulates the performance of a water system for utility planning and operations, providing insight and foresight into the distribution system, with predicted pressures, flows and levels in pipelines, pumps and tanks, respectively. The hydraulic model uses input from information systems that serve different departments across the utility, including GIS (mapping and IT), smart metering (customer water usage), SCADA (facility status and control), and CMMS (condition of assets).

Digital Twin

A virtual or digital representation of the elements (assets) and dynamics (behavior or process) of a water/wastewater plant or system. If applied properly, a digital twin will influence the design, construction and operation of the system throughout its lifecycle and help optimize operation through informed insights. In other words, it is a dynamic software model (hydraulic model + machine learning) of the physical plant/system that pairs a live feed from the real system to the digital twin for continuous calibration.

Predictive Analytics

Similar to a hydraulic model or digital twin in that all three have predictive capabilities. Predictive analytics refers to data or analysis of data that may be used by water utility operators or managers to predict a possible future event involving an asset (such as a water main break) based on the historical or current data.

PFAS

Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) are part of the PFAS family of about

6,000 chemicals used in fire retardants, as well as stain-, water- and grease-resistant products. These compounds were created in the 1930s for use in products such as hiking boots, rainwear, swimwear, cookware, and disposable food wrappings. PFOS and PFOA are considered "forever" chemicals that do not break down over time and spread very easily in groundwater. PFOS and PFOA may enter drinking water supplies when products made with the substances are disposed of in landfills or when residues from household use of those products (e.g. washing PFAS-containing cookware or clothing) end up in wastewater. Ultimately, these chemicals can make their way into groundwater basins and eventually into our municipal water systems.

Lead Service Line (LSL)

LSLR may also be used in the industry to abbreviate Lead Service Line Replacement, which has been an important initiative across the industry due to problems caused by lead in drinking water. The American Water Works Association (AWWA) has supported complete replacement of all lead service lines across the United States.

Big Data

In data analytics, this refers to the process of examining large and varied data sets.

Internet of Things

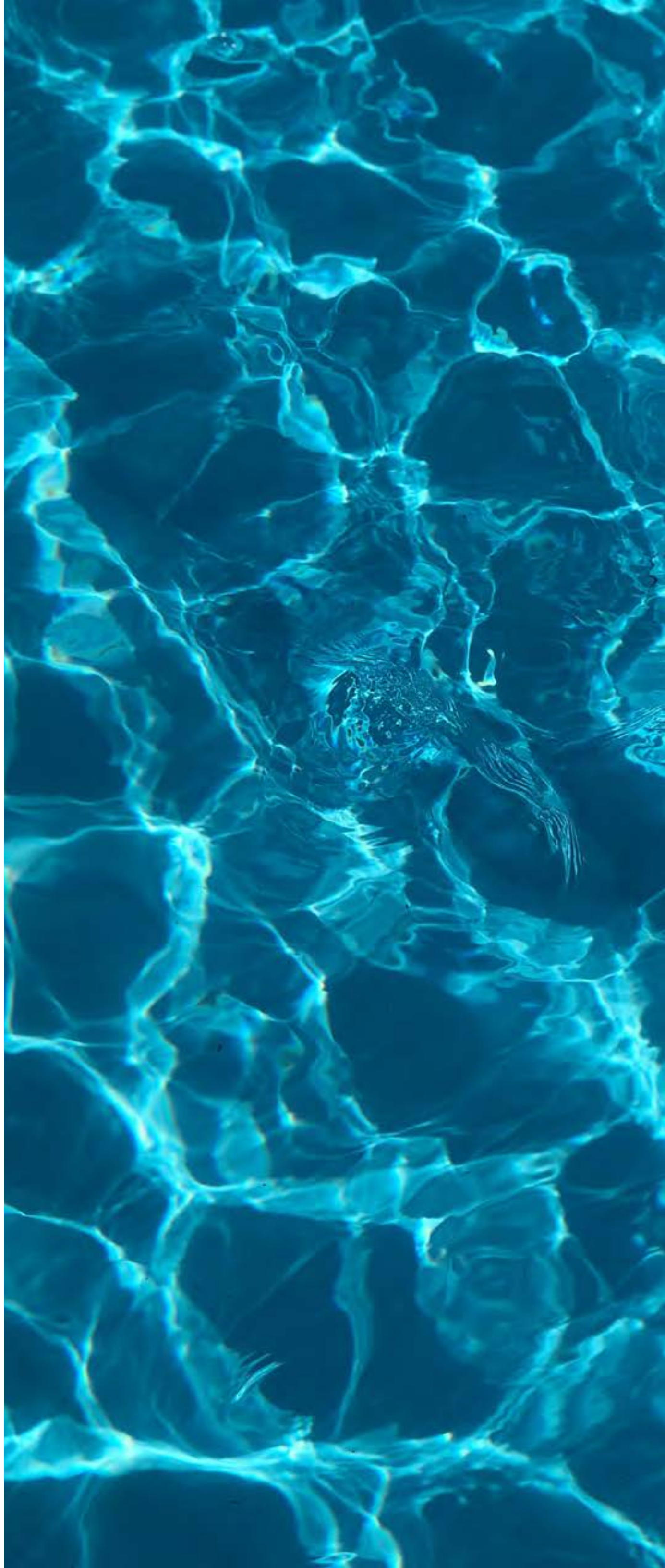
Abbreviated IoT, this refers to interconnectivity via the internet of instrumentation, connected sensors and other devices to machinery and vehicles, which enables them to send and receive data. IoT brings the power of the Internet, data processing and analytics to real-world physical objects — in this case, water/wastewater utility assets and sensors.

Smart Grid for Water

Another general term used to describe a two-way, real-time network that a water utility may implement. This includes sensors and devices that continuously and remotely monitor the water distribution or collection system. Smart metering, defined in the Digital Water Management section, is critical to the success of a smart grid.

Smart City

According to the Smart Cities Council, a smart city uses information and communication technology (ICT) to enhance its livability, workability and sustainability. Smart cities collect information through sensors and communicate that data using wired and wireless networks. That data is then analyzed to improve efficiencies and help utilities make smarter decisions.



But wait, there's more...

Learn more

about the organizations that represent various facets of the water industry; from policy and regulatory issues to utilities, engineering, and manufacturing.

U.S. EPA

The U.S. Environmental Protection Agency (EPA) is a federal government agency that regulates water and wastewater policy and also administers loan and grant programs, such as the State Revolving Funds (Clean and Drinking Water) or the WIFIA loan program. These programs represent a large source of federal funding put toward water and wastewater systems.

AWWA

The American Water Works Association is an international, nonprofit, scientific and educational society dedicated to providing total water solutions and ensuring the effective management of water. AWWA's 51,000 total members represent the full spectrum of the water community: public water and wastewater systems, environmental advocates, scientists, academicians and more.

APWA

American Public Works Association, a 501(c)(3) nonprofit organization with more than 30,000 members that serves professionals in all aspects of public works.

ASCE

The American Society of Civil Engineers (ASCE) represents more than 150,000 members of the civil engineering profession in 177 countries. Founded in 1852, ASCE is the nation's oldest engineering society.

ASCE's Report Card for America's Infrastructure is an excellent resource for general information, if you're new to the water infrastructure sector or looking to learn more about U.S. infrastructure in general. Released every four years, this document depicts the condition and performance of American infrastructure in the familiar form of a school report card. The report addresses the state of various construction markets across the full spectrum of infrastructure — from roads, rail, aviation, ports, bridges, dams and parks to schools, transit, energy, waste and drinking water, wastewater and stormwater.

WEF

The Water Environment Federation is a nonprofit technical and educational organization with 35,000 individual members and 75 affiliated member associations representing water quality professionals around the world.

NACWA

The National Association of Clean Water Agencies represents public wastewater and stormwater agencies of all sizes on legislative, regulatory, legal and communications issues.

AMWA

The Association of Metropolitan Water Agencies is a Washington, D.C.-based organization representing the largest publicly owned drinking water systems in the U.S. AMWA is NACWA's counterpart in representing drinking water systems.

NAWC

The National Association of Water Companies represents private, investor-owned and regulated water systems.

NRWA

The National Rural Water Association, a nonprofit association of more than 31,000 small and rural community water systems.

RCAP

The Rural Community Assistance Program is a network of nonprofits that advocate for and provide training to small U.S. communities whose stories and needs are often overlooked by mainstream media, politics, and leaders.

Value of Water Campaign

An organization that spun off from the US Water Alliance and raises awareness about the importance of water and related challenges. The Value of Water Campaign administers a national advocacy campaign called Imagine A Day Without Water that takes place one day a year and brings together diverse stakeholders to illustrate how water is essential, invaluable and in need of investment.

WWEMA

The Water & Wastewater Equipment Manufacturers Association, a Washington D.C.-based nonprofit trade association representing water and wastewater technology and service providers.

WateReuse

The WateReuse Association is a trade organization dedicated to advancing laws, policy, funding and public acceptance of recycled water.

Water Research Foundation

A 501(c)(3) nonprofit research foundation that funds applied research important to water utilities. The WRF hosts an online research library of more than 2,300 projects valued at $700 million and manages an innovation platform with a database of more than 140 innovative technologies.

Planet Water Foundation

A U. S.-based nonprofit focused on bringing clean water to impoverished communities by installing community-based water filtration systems and implementing water health and hygiene education programs. Projects are focused on schools, children and rural communities across the Asia-Pacific region and Latin America.

Nsf.org

NSF International protects and improves global human health. Manufacturers, regulators and consumers look to NSF to facilitate the development of public health standards and provide certifications that help protect food, water, consumer products and the environment.

Water.org

Water.org is one of the more well-known, global nonprofit organizations working to bring water and sanitation to regions of the world that lack adequate access. You may have seen their commercials on TV featuring co-founder and actor Matt Damon. Water.org does work in Africa, Asia and Latin America, helping people get access to safe water and sanitation through affordable financing, such as small loans.

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- **Was** this **document helpful** in explaining basic **water industry terminology**?
- **What** other terms or **subject areas would you like to see covered** in a future edition?

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