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# WATER TECHNOLOGY TRENDS 2025

Revolutionizing water  
management with the  
power of digital technology



xylem  vue

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# INTRODUCTION

The year 2025 will go down in history as a turning point in the evolution of technology and its global impact. This is particularly true in the field of water. This critical resource is essential for life and is becoming increasingly important as a driver of economic development.

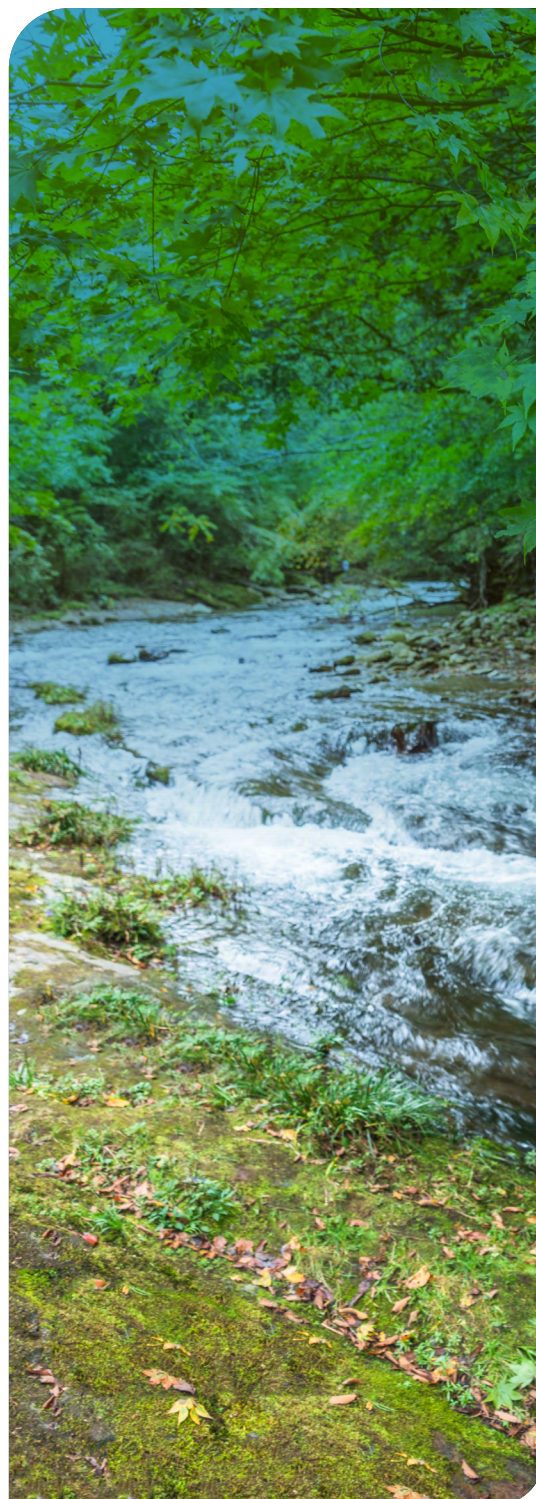
This scenario, also marked by climate change, migratory movements, population growth and over-urbanization, as well as integrated water cycle management, will continue to be a challenge for all countries without exception. Digital transformation, with technology at the forefront, will continue to be the key tool for addressing the water challenges facing the world today: from flood prevention to water resource optimization.

As we embark on a year designated by the United Nations as the International Year of Quantum Science and Technology, computing continues to serve as the backbone of technological progress. This progress is further underscored by the proliferation and “democratization” of transformative technologies such as artificial intelligence (AI) and cybersecurity, which hold immense significance in today’s interconnected society.

The following document analyzes some of the emerging trends that are redefining the water sector, tackling pressing challenges such as extreme events, technological and infrastructure obsolescence, non-revenue water (NRW) and energy inefficiencies.

It details how advanced technologies such as digital twins, decision support systems (DSS) and early warning systems (EWS) are being deployed to mitigate risks and ensure efficient and sustainable water use.

The agricultural sector is a case in point. Irrigation associations are implementing technologies geared towards digital transformation to optimize water use (between 20% and 50%, according to the FAO), improve agricultural productivity (increasing agricultural yields by up to 25%), and reduce costs (up to 30% in energy savings). Beyond these tangible benefits, modernization enhances the future of agriculture by significantly improving water management, a critical need as populations increasingly migrate to urban centers.



Likewise, the rollout of operational intelligence and AI is revolutionizing demand forecasting, energy optimization, and customer relationship management. These innovations are reshaping industry operations, enabling processes that are both more efficient and more sustainable. In doing so, they bolster resource management, address extreme events, and enhance the resilience of critical infrastructure.

Finally, trends in water loss control, wastewater treatment plant management, and the development of smart buildings emphasize how technological innovations can drive sustainability and operational efficiency in a variety of areas, while enhancing quality of life.

In short, this report on water sector trends for 2025 provides a comprehensive overview of these transformations and highlights the crucial role of technology in guaranteeing water security and environmental sustainability in a future that promises to be challenging. In this future, collaboration between companies will continue to be crucial in improving water cycle management. Let's join forces to build a better place for future generations.

**Jaime Barba**  
Head of Xylem Vue  
Idrica Chief Executive Officer



# Artificial Intelligence: efficient water resource management

In 2025, artificial Intelligence (AI) and operational intelligence (OI) are set to play a pivotal role in optimizing water resources, boosting efficiency, reducing operating costs and promoting sustainability. These technologies are capable of analyzing large volumes of data in real time, improving infrastructure management and strengthening user relationships.

Digital platforms integrate AI and operational intelligence systems to address the challenges of the water sector. These tools centralize data from sources such as IoT sensors, SCADA and GIS systems, and deploy advanced algorithms to detect leaks, optimize networks and enhance service quality. They also contribute to the Sustainable Development Goals (SDGs), notably SDG 6: Clean Water and Sanitation, by reducing water waste and carbon emissions, thus fostering more sustainable resource management.

## AI applications: key developments for 2025

Artificial intelligence is poised to become a key tool for transforming water management. The main applications on the horizon for 2025 are detailed below:

### Dynamic optimization in treatment plants

AI will continue to revolutionize treatment plants in 2025 through systems that adjust processes in real time, including reagent dosing and treatment line control. Digital twins will become more sophisticated, simulating complex scenarios to anticipate problems before they occur. This will improve operational resilience to extreme events and further streamline energy resource use.

### Demand forecasting

Trends show that advanced AI algorithms will play a key role in accurately anticipating consumption peaks. Resource management will be seamlessly integrated in 2025, supporting automatic adjustments in water distribution and storage. This will reduce waste and enable utilities to respond proactively to changes in user behavior and weather events.

### Energy optimization

Sustainability will be a priority in 2025. AI can optimize energy consumption in pumping stations and treatment plants through predictive models

that adjust operations according to demand. These solutions, which have already cut consumption by 25%, will become even more efficient thanks to the integration of real-time climate and consumption data, promoting environmental management.

### Pre-emptive problem detection

In 2025, AI systems will become more sophisticated in detecting leaks, fraud and operating irregularities at earlier stages. This will boost resilience and reduce maintenance costs, while delivering a tailored user experience. Utilities will be able to notify customers in real time about specific issues, fostering greater water awareness.

### Wastewater treatment optimization

Artificial intelligence (AI) will be able to completely optimize wastewater treatment in 2025. Predictive systems will automatically adjust critical processes to meet stricter environmental standards. In addition, digital twins will simulate variations in water quality, pre-empting challenges and ensuring long-term sustainability.



## Operational intelligence: a holistic future ahead in 2025

Operational intelligence will develop further in 2025 as an essential solution to centralized data, optimize resources and enhance decision-making in real time. The upcoming trends are detailed below:

### 1. Centralization and advanced monitoring

Operational intelligence solutions will evolve into fully centralized platforms that build in real-time data from multiple sources. In 2025, these platforms will be able to deliver instant visibility across operations, enabling utilities to prioritize critical interventions, reduce operating costs, and respond quickly to events such as floods and outages.

### 2. Personalized decision-making

Data analytics will reach new levels of sophistication in 2025. Configurable dashboards will enable utilities to adjust operations based on specific scenarios. Predictive tools will be able to pinpoint historical patterns, as well as providing real-time recommendations to maximize efficiency and minimize risk.

### 3. Predictive maintenance and algorithm optimization

Predictive maintenance will be the norm in 2025. Advanced algorithms will be able to spot failures before they occur, using operational data such as vibrations and pressure fluctuations. This will significantly reduce repair costs and extend the lifetime of critical infrastructures. In addition, AI-based automated operations will be able to optimize equipment use based on demand and operating conditions.

### 4. Easy integration with external technologies

Operational intelligence systems will be able to embed data from internal water management applications, as well as interfacing with external technologies such as business intelligence (BI) tools, creating a centralized environment to facilitate collaboration and strategic analysis. Organizations will be able to gain in efficiency by integrating these systems, as well as enhancing the quality of customer service by responding more quickly to operational and strategic demands.

## In conclusion,

in 2025, operational intelligence, supported by advanced AI technologies, is set to redefine water resource management. These solutions, from centralizing data to optimizing operations through predictive algorithms, will give organizations a distinct competitive advantage. Embracing these tools will enable companies to improve sustainability, optimize resources, and ensure reliable service in an increasingly challenging environment.

"Artificial intelligence is the driving force set to transform water management in 2025, bringing greater efficiency, sustainability and responsiveness to industry challenges".



José Sanchez,  
PMO Manager at Idrica.

"In 2025, artificial intelligence will be the catalyst that transforms customer journeys and their businesses, driving sustainability and innovation, powering intelligent operations, and maximizing efficiency".



Maria Malhadas,  
Director Client Solutions Europe  
at Xylem.

## Cybersecurity: greater protection for infrastructure

The Cyberthreat Predictions for 2025 report, published by Fortinet, has revealed that AI-designed attacks, focused on the cloud and including real-life threats, are a trend in the upcoming year. The areas most affected by cyberattacks in 2025 are likely to be operational technology (OT) and critical systems in sectors that depend on data continuity. This includes the water sector.

Industrial monitoring and control systems, such as those used in treatment plants and distribution networks, require constant updates to prevent unauthorized access and manipulation or deletion of sensitive data. Therefore, the trends for this year need to factor in solid incident response and backup strategies, as well as proactive approaches such as network segmentation and multifactor authentication.

### Key strategies to strengthen cybersecurity in 2025

1.

#### Technology upgrades and physical security

In 2025, to strengthen cybersecurity in the water sector, systems such as SCADA will need regular upgrades to keep up with today's security standards, factoring in tools such as network segmentation and robust authentication. Additionally, remote control stations must be equipped with physical security measures, such as surveillance and anti-intrusion systems.

3.

#### Strengthening the safety culture

Building a cybersecurity-focused organizational culture will be a must in 2025. This encompasses employee training programs and the implementation of strict policies, such as data encryption and multi-factor authentication, to protect against unauthorized access.

2.

#### Continuous monitoring and risk assessments

Real-time monitoring systems detect and mitigate threats before they escalate. Meanwhile, continuous risk assessments in 2025 will be essential for identifying critical vulnerabilities and planning preventive actions. These tools, integrated with Security Information and Event Management Systems (SIEM), are fundamental to the effectiveness of Security Operations Centers (SOCs).

4.

#### Resilience and recovery plans in the face of attacks

Establishing redundancies in systems and designing recovery plans ensures operational continuity in the face of severe cyber-attacks and technical failures. These measures will be vital in 2025, especially to maintain public trust in critical infrastructures.

## Impact of a comprehensive strategy

A robust cybersecurity policy will be an expected standard in critical infrastructures in 2025. Regulations such as the NIS2 Directive in Europe will not only dictate strict standards but will also encourage international cooperation to ensure effective responses to cyber incidents.

Companies that embrace a holistic approach will be better equipped to mitigate risks and position their services as leaders in innovation and sustainability. This vision will strengthen their corporate reputation and ensure more efficient operations in an increasingly connected, heavily regulated environment.

## Benefits of investing in cybersecurity

The following elements underscore the need to invest in cybersecurity as one of the cornerstones for water sector sustainability and competitiveness in 2025:



### Resource preservation and public trust

Robust measures will be required to protect water as an essential resource to ensure its quality and quantity, preventing interruptions in supply.



### Protection of sensitive data

Utilities handle critical information including personal and financial data. Protecting this data will prevent information theft, as well as economic losses associated with service interruptions.



### Operational optimization and reputation

Efficient cybersecurity deployments reduce the downtimes caused by attacks, improves productivity and reinforces customer trust, strengthening business reputation in the face of competition.

## In conclusion,

strengthening cybersecurity in the water sector will be paramount in 2025, given the increase in digital threats. Technological upgrades, along with strategies such as network segmentation and multi-factor authentication, will be key to protecting critical infrastructures. In addition, continuous monitoring, security training and the implementation of resilience plans can help to safeguard operational continuity and bolster public trust, positioning companies as leaders in innovation.

" Integrating new technologies with robust cybersecurity practices strengthens operations and reinforces user trust."



Begoña González  
Head of Quality and Information Security at Idrica.

# Water loss control: reduction of non-revenue water

Controlling water losses is critical for water utilities around the world. The need to optimize water distribution systems and reduce non-revenue water (NRW) is essential to boost efficiency, guarantee sustainability and reduce costs, though this requires organizational change to ensure ongoing improvements in water efficiency.

The implementation of different types of technology such as real-time data analytics and DMAs will be instrumental in modernizing water utilities and tackling losses in 2025. The following technologies offer competitive advantages in terms of decision-making when detecting leaks, as well as increasing water supply times, boosting operational efficiency, and optimizing the investments to be made in water systems.

## 1. Digital twins

Their ability to provide a comprehensive overview of the system and simulate a variety of scenarios enables utilities to analyze responses to different circumstances. In addition, they boost operational and planning efficiency by delivering a holistic vision of the system, enabling informed decisions that reduce energy costs and optimize hydraulic parameters.

## 2. Advanced metering infrastructure (AMI)

The implementation of AMI will be another key trend in drinking water distribution systems in 2025. Unlike Automatic Meter Reading (AMR), AMI goes a step further as it not only performs remote reading, but also integrates and processes information through big data technologies, making extensive use of digital platforms. In utilities where AMI is already well established, the challenge will be to receive data with less time granularity, making water consumption data available at intervals of less than one hour.

## 3. Geographic Information Systems (GIS)

In 2025, GIS will consolidate their role as essential tools for water utilities. Thanks to advances in sensors for infrastructures, these systems can factor in greater information flows, such as pipe material, installation dates and incident history, thus helping to prevent failures that could lead to serious material damage. GIS are capable of representing any data with a geospatial component, from satellite images and sensor data to vector information, thus enabling better informed decisions to be made in supply systems.

"DMAs are a useful tool for dividing a water network into manageable sections. Utilities can calculate water balances and detect areas with excessive water losses by monitoring inflows and outflows in each DMA, with virtual options providing a more flexible, cost-effective alternative."



Pablo Calabuig,  
Latin America and Canada Director  
at Idrica

## 4. Benefits of District Metering Areas (DMAs)

There is a trend towards the use of real-time data analytics and DMAs, as they are advanced solutions to address the challenges of detecting and controlling leaks within distribution systems. By dividing a water network into smaller sections, utilities can calculate water balances, and detect areas with excessive losses by monitoring inflows and outflows in each section, thus improving the quality of service provided.

## 5. Advanced leak detection techniques

Advanced techniques such as acoustic monitoring, fiber optics and real-time data analytics from smart meters and pressure sensors can further optimize water loss control. These technologies enable utilities to identify and repair leaks quickly, minimizing water waste. In addition, embedding these systems into analytical platforms provides a continuous feedback loop to boost network efficiency.

"Data availability is not the main challenge. The problem lies in how data is used. Many companies have installed systems such as SCADA and AMI, but they operate in isolation. Integrating data in these platforms brings a holistic view of water systems, breaks down information silos and ensures that field operators and utilities have access to actionable information".



Manuel Parra  
Vice President Strategic Partnerships  
and Alliances at Xylem.

### In conclusion,

future innovations in real-time data analytics and DMA management to control water losses will bring more accurate, faster and more cost-effective tools in 2025. The use of advanced technologies such as AI, IoT, enhanced sensors and digital platforms will improve water resource management and protection, optimizing their use in the context of an increasing need for sustainability and resilience.



## Optimization of wastewater plants: the role of emerging technologies

As the global population grows and urbanization accelerates, wastewater treatment plants (WWTPs) are facing increasing pressure to deliver high-quality effluent while minimizing their environmental impact and operational costs. Many organizations such as the United Nations have already earmarked 2025 as the year in which the world's population is set to reach 8.2 billion, a figure that exacerbates water stress and places WWTPs in the spotlight in terms of sustainability.

The recent technological trends that point to digitization and innovative approaches will continue to revolutionize the way in which wastewater is treated in 2025, signaling a shift towards more efficient, intelligent and sustainable systems.

This year, two aspects of sustainability must be taken into account. Firstly, sustainable digital transformation, understood as the environmentally friendly use of technology, and secondly, digital sustainability, i.e., the process through which companies can access and exploit their data thanks to intelligent solutions and applications, regardless of their suppliers.

Industry 4.0 technologies are revolutionizing wastewater management. Smart sensors, IoT devices and analytics driven by artificial intelligence (AI) enable real-time monitoring of water quality, equipment performance, and energy consumption. These tools enable utilities to predict equipment failures, optimize treatment processes, and ensure regulatory compliance.

In addition, the new Directive (EU) 2024/3019 establishes stricter standards for the reuse of wastewater by increasing quality requirements. This poses a challenge for wastewater treatment plants (WWTPs) as it requires them to implement advanced technologies such as membrane filtration and UV disinfection. It also demands continuous monitoring with IoT sensors and promotes energy neutrality through anaerobic digestion. Furthermore, it strengthens the circular economy by encouraging reuse in agriculture and industry, as well as including producer responsibility for covering the costs of microcontaminant removal. These measures require significant investments and technological adaptations to meet these new quality and sustainability criteria.



## 2025 trends in water treatment technologies



### Operational optimization

AI models fine tune processes such as chemical dosing and energy use, bringing cost savings and regulatory compliance.



### Data-driven process optimization

By leveraging big data analytics and machine learning, Treatment System Optimization (TSO) solutions streamline wastewater treatment by refining processes such as aeration, chemical dosing, and sludge retention in real time. TSO employs decision intelligence to provide actionable insights, ensuring compliance with effluent standards while minimizing energy and chemical use.



### Predictive maintenance

AI detects patterns in data to anticipate equipment failures, thus minimizing downtime and extending asset life.



### Enhanced decision-making

Real-time insights enable faster, better-informed decisions.



### Sustainability

AI-driven solutions reduce environmental impacts and encourage efficient resource usage.



### Water reuse and sustainability

The growing scarcity of water drives the implementation of technologies that enable the safe reuse of treated water in applications such as agricultural irrigation and urban uses, contributing to sustainability and the conservation of water resources.



### Discharge control and hydraulic efficiency

The use of IoT sensors and big data enables real-time monitoring of the sanitation network and WWTPs, detecting discharges and optimizing hydraulic performance.

## AI and digital twin integration

The integration of artificial intelligence and digital twin technologies in wastewater treatment plants represents a transformative approach to improving operational efficiency, reducing costs, enhancing decision-making, and achieving sustainability goals. Challenges include ensuring data quality, optimizing process monitoring, and embedding AI into organizational culture.

Currently, AI uptake in treatment plants is around 10-15%, primarily in larger utilities. In 2025, this figure is expected to rise to 25-30%, as AI solutions become more cost-effective, and their ROI becomes clearer.

This trend will increase in the coming years. Experts point out that by 2035, AI will be used in 70-80% of water treatment operations globally, driving compliance, safety, and efficiency across the sector.

This paradigm shift pinpoints AI and digital twins as key components in advancing water treatment technologies.

## In conclusion,

digitalization is transforming wastewater treatment plants into intelligent, sustainable facilities that meet the demands of a rapidly changing world. WWTPs are becoming more efficient, improving compliance, and enhancing environmental stewardship thanks to real-time monitoring, predictive analytics, and automation. As technology advances, including WWTPs in smart city frameworks will enhance their role as key contributors to sustainable urban ecosystems.

# Flood management: effective responses to extreme events

Digitalization is set to emerge as a crucial tool in 2025 for managing both urban and fluvial floods. We are likely to witness a number of trends and technological solutions tailored to the characteristics of different flood types.

The increasing frequency of floods, such as those that occurred in Valencia (Spain), southern Brazil, and eastern Africa in 2024, underscores the urgent need to implement advanced and innovative technologies for early warning systems and decision-support tools to address these events. The adoption of such technologies, combined with comprehensive territorial management policies, can significantly reduce the risks and impacts of future similar catastrophes.

## 1. Decision Support Systems (DSS)

Flood management poses challenges that demand advanced tools to optimize decision-making and risk prevention. DSS use digital technologies and predictive algorithms for real-time, medium and long-term planning and management. These tools enable the analysis of large datasets, help identify trends, and develop strategies powered by artificial intelligence.

## 2. Early Warning Systems (EWS)

EWS focus on the short term, generating alerts for extreme weather events with minimal lead times. They facilitate rapid responses to impending floods, providing time to activate emergency plans. EWS combine detailed information about topography and terrain characteristics with advanced hydrological models to simulate how rivers and channels might behave during heavy rainfall. Although these systems include hydrological simulations and historical data, their core prevention functionalities are real-time alerts and management.

**Both DSS and EWS rely on key tools for managing floods in urban and fluvial contexts. The following technologies will continue to gain traction in 2025:**



### IoT sensors and smart networks

Water level sensors installed in urban storm drains and rivers will remain instrumental in providing real-time data. Additionally, alert systems connected to mobile applications for notifying residents will become increasingly popular.



### Geographic Information Systems

These systems help identify priority intervention areas by mapping flood-prone areas. Based on urban topography, land use, and historical flooding patterns, it will be possible to make more informed and effective decisions.



### Simulation and response platforms

Digital twins of cities will be used to predict flood scenarios and evaluate the impact of potential solutions. In this way, decision-makers can identify the most effective strategies to reduce risks, optimize available resources and prioritize necessary interventions.

The following tools will continue to play a key role in advanced fluvial flood management:

1. **Hydrological and climate models:** these tools simulate river and aquifer behavior by incorporating predictive models that include historical, topographic, and climate data to forecast floods.
2. **Satellite technology and geospatial data analysis:** GIS systems will become increasingly popular to map risk areas within watersheds and conduct spatial analyses to design preventive measures, such as constructing dams and diversion channels.
3. **Big data and machine learning:** enhanced predictions will rely on analyzing both historical and real-time data. These technologies will also help identify patterns in the frequency and severity of floods.
4. **Integrated water resource management:** digital platforms combining meteorological, hydrological, and household data will be increasingly adopted by water authorities to coordinate efforts across watersheds.

## In conclusion,

the combination of technological innovation, global cooperation, and a holistic approach is essential for adaptive and efficient water management. In this context, Decision Support Systems (DSS) and Early Warning Systems (EWS) are indispensable tools. Their ongoing enhancement, along with the adoption of emerging technologies, is fundamental to achieving comprehensive, sustainable water management. These tools will play a decisive role in addressing extreme events.



"Big data analytics, artificial intelligence, and data lakes are proving to be powerful tools to tackle these challenges. Smarter and more resilient solutions are being developed for effective water management to provide the necessary early warning tools that minimize the effects of flooding."



Sergio Morant,  
Water Specialist at Idrica.

"With advanced tools like digital twins and predictive analytics, we can transform flood management into proactive solutions that not only protect communities but also optimize resources and reduce operational costs."



Christian Perez  
Senior Business Development  
Manager - Digital, Middle East and  
Turkey at Xylem.

# Agriculture and irrigation: improvements in operability and management

Digital transformation and the uptake of advanced technologies are set to transform agricultural and urban irrigation in 2025. This includes everything from optimizing the use of water and energy resources in agricultural irrigation to efficient water management in parks and gardens in towns and cities. Tools such as smart sensors, remote sensing and digital platforms are ushering in significant changes in sustainability as well as in water and energy efficiency. These advances not only enhance environmental sustainability, but also boost operability and reduce costs, making smart irrigation a key part of the future.

## Challenges and developments in smart agricultural irrigation

Agriculture is facing critical challenges such as the scarcity of water resources due to climate change, which makes optimizing irrigation essential. Smart

irrigation is emerging as a key solution for the coming years, as it enables watering rates and frequency to be adjusted according to the real needs of soil and crops. Irrigation associations will be able to significantly improve environmental sustainability and operational efficiency through remote sensing, sensor technology and advanced algorithms.

In addition, the use of technologies such as Geographical Information Systems (GIS) is revolutionizing agricultural management. Platforms that integrate GIS into irrigation associations' infrastructures and plots, combined with real-time data on water consumption, crop characteristics and soil conditions, will enable better-informed decisions to be made through dynamic GIS representations. This will streamline infrastructure maintenance operations and improve management efficiency.

## Fundamentals of digital transformation in agriculture

In 2025, the key trends in agricultural irrigation will be defined by the following technologies:

### 1

#### Remote metering and hydraulic control

Remote metering will continue to be a key tool in modernizing irrigation associations, generating accurate real-time readings, reducing human error and optimizing the billing cycle. In addition, remote metering facilitates advanced leakage and fraud control through real-time and historical data analysis. Likewise, consumption monitoring at plot level will provide greater control over water allocations and generate water footprint ratios for different types of crops. The installation of sector meters and pressure sensors will help to identify and manage critical points in irrigation networks.

### 2

#### Remote sensing and advanced algorithms

Satellite image processing can be used to calculate a range of standardized indices, providing detailed maps of soil and crop health using key parameters such as biomass and soil moisture. These tools can automatically adjust irrigation volumes through algorithms that factor in soil water balances and weather forecasts, optimizing water consumption and, as a consequence, streamlining energy use in activities such as pumping, thus promoting more sustainable management in the coming years.

### 3

#### Integrated digital platforms

Holistic digital platforms will be key in 2025 to centralize data and improve irrigation decision-making. These Decision Support Platforms enable geo-referenced asset management, thereby facilitating infrastructure maintenance and repair. These solutions can also monitor the energy ratios of pumping systems, setting up alarms for any significant deviations, and can integrate data from solar photovoltaic plants, prioritizing their operations and reducing their carbon footprint.

## Smart urban irrigation

In 2025, smart urban irrigation is expected to leverage advanced technologies to automate and optimize water use in parks and urban green areas. These systems incorporate water efficiency algorithms and digital platforms that centralize operational information, enabling accurate, sustainable management.

1

### Automation and centralized control

In the coming years, irrigation, pumping and fertilization systems will be programmed from a single control center, and adjusted automatically according to weather forecasts, soil conditions, soil characteristics and crop types. This centralization will streamline operational efficiency, reduce maintenance costs and optimize water consumption.

2

### Advanced real-time monitoring

In 2025, sensors will be measuring soil moisture, water quality and weather conditions, providing real-time data that adjusts irrigation systems to minimize deep percolation and ensure optimum usage.

3

### Alerts and data analysis

Systems will be able to set up parameterized alarms for weather and agricultural events as well as for asset failures. In addition, historical data analysis will improve irrigation planning and identify opportunities for optimization in 2025.

## Impacts on agriculture and urban irrigation

Digital transformation is redefining agricultural and urban irrigation. The introduction of advanced technologies not only improves water and energy efficiency, but also contributes to sustainable, cost-effective practices. These innovations, supported by strategic initiatives such as the Spanish Recovery, Transformation and Resilience Plan, funded through the European "Next Generation" mechanism, will accelerate the modernization and digital transformation of irrigation associations and the uptake of smart urban irrigation in the coming years. Optimized use of water resources, improved operability, reduced energy costs and the control of consumption and leaks are some of the benefits that irrigation associations will benefit from thanks to the deployment of holistic decision-support platforms.



## In conclusion,

digital transformation and smart irrigation in both agricultural and urban areas will be key in 2025 to meet climate change-related challenges and the efficient management of water and energy resources, ensuring food productivity and a more sustainable urban environment.

"Real-time data management transforms irrigation efficiency and sustainability, empowering better-informed and more responsible decisions."



Begoña Tarrazona,  
Irrigation Specialist at Idrica.

## Smart buildings: resource and energy management in cities

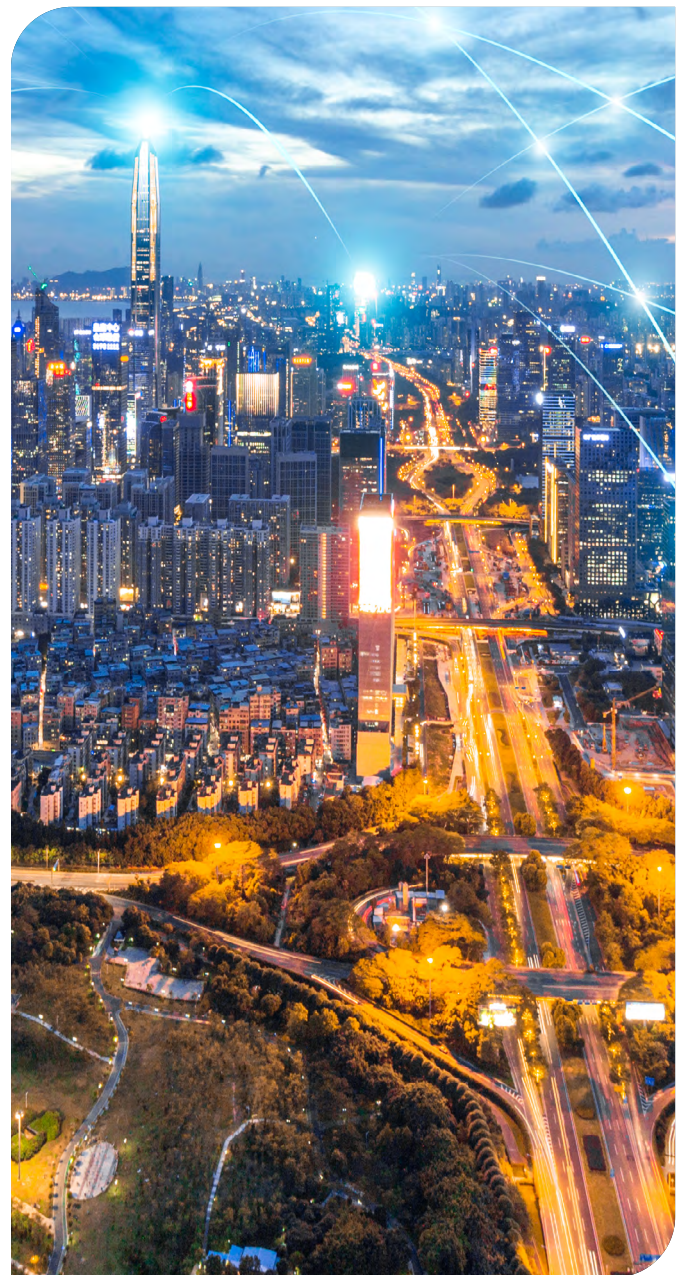
**In the context of urban sustainability, smart buildings and district heating and cooling (DHC) networks are revolutionizing the way resources and energy are managed in cities. As we move into 2025, factoring in digital technologies becomes essential to optimize these systems and ensure a more efficient and environmentally friendly future.**

### Smart buildings: innovation and growth

Smart buildings will continue to redefine resource efficiency and sustainability in 2025, when the global market is set to reach between \$117 billion and \$252 billion, according to different estimates, with compound annual growth predictions ranging from 21.8% to 29.7% (Fortune Business Insights) in key segments such as energy management and security. This increase comes on the back of the uptake of technologies such as artificial intelligence, IoT and advanced data analytics systems.

These buildings, which are equipped with ICT-based systems, require digital platforms to manage their assets and monitor their behavior. In turn, this boosts energy efficiency and optimizes the performance of a range of processes, such as lighting, access, air conditioning, video surveillance, parking and security.

New smart building-related solutions include digital twins and energy management systems that streamline resources and predict maintenance requirements. These tools increase efficiency, as well as helping to reduce operating costs in commercial buildings, which are set to continue to lead the market with a 53% share in 2025.



## DHC networks: key to urban sustainability

District heating and cooling networks (DHC) produce heat and cold from a single central source, then use this model to transport thermal fluids from the point of generation to the buildings connected to the network. Digital platforms are essential to efficiently manage thermal energy distribution. These platforms build in various renewable energy sources and facilitate real-time adaptation to heating and cooling requirements in different structures. The platforms optimize energy flow, improve operational efficiency and ensure rapid response to fluctuations in demand through constant monitoring.

In 2025, district heating and cooling systems will continue to gain relevance as a means to reduce emissions and improve energy efficiency. These networks are increasingly embracing renewable sources and waste energy recovery systems, thus fostering circular models. In addition, the benefits of DHC grids include a smaller operational footprint and reduced maintenance costs, positioning them as an essential element of smart cities.

"Combining data in integrated platforms is transforming energy efficiency and leading the way towards sustainable cities".



Beatriz Bolonio,  
Solutions selling Buildings &  
Industry at Idrica.

### Main advantages



Optimization of local  
resources and renewable  
energy



Integration with digital  
platforms for real-time  
management



Reduced visual and  
environmental impact in urban  
environments

### In conclusion,

smart buildings and DHC networks, powered by digital platforms, are key to urban sustainability in 2025. These solutions optimize resources, improve energy efficiency and boost the use of renewable energies, making them essential for the cities of the future.

## Optimization of water resources: enhanced management to provide quality water supply

Managing water resources has become a priority, given the current climate crisis which is constantly aggravating water stress. According to UNICEF, "Climate change is disrupting weather patterns, leading to more frequent and more intense extreme weather events, unpredictable water availability, exacerbating water scarcity and contaminating water supplies".

It is therefore essential to pave the way for a new scenario that ushers in strategies and technologies that can transform service quality.

To achieve this goal, water utilities must have the right tools at their disposal to be able to deliver good quality service to their end customers.

The next few years will see the rollout of technology that enables utilities to manage and access information easily and clearly. This will facilitate and improve decision-making processes to ensure an efficient, safe and continuous service.

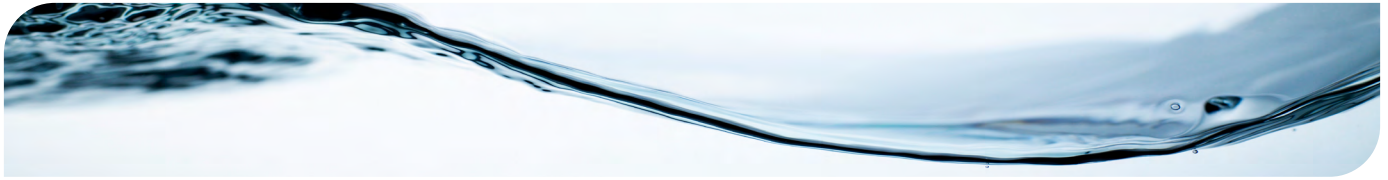
In 2025, the introduction of new technologies will be key to monitoring service provision and issuing alerts to enhance water resource management. These innovations will also facilitate two-way communication between users and water utilities so that queries, complaints, suggestions and emergencies are answered quickly and effectively.

"In the coming years, optimizing water resource management will be key to improving service quality, promoting sustainability, operational efficiency and transparency, so that users have constant access to a quality water supply."



Josep Reguart,  
Non Revenue Water Expert at Idrica.





## 1. Advanced algorithms

One of the objectives of data scientist teams is to develop algorithms that can correct and eliminate erroneous, incomplete, inaccurate, redundant and irrelevant information from the huge amounts of data that are received in real time in water cycle management. This will enhance event detection accuracy, identifying behavioral patterns and reducing unnecessary operating costs, ensuring end users do not suffer possible interruptions in their water service provision.

## 2. Remote control of infrastructure

This will enable water utilities to monitor risks and vulnerabilities remotely, ensuring the quality, continuity and efficiency of the water supply.

## 3. AI and machine learning

Combining mathematical models with AI and machine learning will ensure a continuous water supply. This is essential to provide utilities with tools that facilitate swift, accurate analysis of a network's needs. The development of consumption patterns, and especially the ability to embed new event-related behaviors into mathematical models (Digital Twin), are essential.

## 4. Early detection of events and generation of work orders

Remote monitoring of the flows and pressure supplied and of the consumption of population groups help to detect anomalous events and transform this information into critical work orders that guarantee production and supply, preventing disruptions in customer service, and controlling non-revenue water (NRW).

## 5. Online services

End users are more interested than ever in accessing all their consumption details online or being alerted to possible leaks in a second residence, especially in emergency situations that prevent access to residential areas. Services such as the use of online payment gateways through virtual offices and mobile applications mean in-person visits to an office are no longer necessary. Customers can also read their own meters, enter their readings or send photos of them, removing the need for meter operators to travel to users' homes and offices.

### In conclusion,

the goal for the coming years is to optimize water resource management and improve service quality. These applications seek to improve water supply management, promoting sustainability, improving transparency and ensuring that users have access to good quality service.

**“Digital transformation is a very important change for utilities, enabling companies to be more efficient, identifying problems much faster and preventing problems before they occur”**



Pedro Pina,  
Senior Director, Client Development  
Europe & Emerging Markets at Xylem.

# CONCLUSION

The future of water management and water resources in 2025 is shaping up to be a dynamic scenario, driven by technological advances and profound digital transformations, but not without challenges such as insufficient access to drinking water (around 2.1 billion people lack access to drinking water), water scarcity (affecting 40% of the population) and water stress and the impact of climate change. Additionally, poor infrastructure exacerbates the problem; in regions like Latin America, an average of 40% of the drinking water produced is lost.

Addressing these global water challenges urgently demands smarter, more resilient, and sustainable strategies. The technologies outlined in this report, such as artificial intelligence (AI), digital twins, cybersecurity, and the digital transformation of irrigation, must take center stage in crafting solutions.

As the United Nations highlighted in its Sustainable Development Goals declaration, “unless progress quadruples”, the survival of billions of people will be seriously compromised. Tackling these challenges requires a holistic and inclusive approach that considers urban, rural, and industrial areas alike. Technologies such as Decision Support Systems (DSS), smart irrigation systems, IoT sensors, the digital transformation of infrastructures and smart buildings are redefining resource management in these areas. These solutions do not just increase operational efficiency, they also

improve citizens' quality of life by guaranteeing more robust, transparent and responsive services, as well as food security in the face of growing climate pressure.

It is increasingly evident that the future is digital, or there will be no future. This is where cybersecurity takes on special relevance, protecting critical infrastructures from cyber threats that could compromise water security and economic sustainability. Meanwhile, fostering environmental sustainability and the circular economy remains imperative. Technologies such as AI and water reuse in wastewater treatment plants will see broader uptake, enhancing resource efficiency and reducing environmental impact.

In this context, the technological transformation of the sector will largely depend on the public and private sectors' ability to work together. Technology will serve as the catalyst for building a more resilient, inclusive system that ensures water sustainability for generations to come.

In short, 2025 marks a turning point where the convergence of technology and sustainability redefines the global water paradigm. This digital revolution offers a unique opportunity to address longstanding issues while building smarter systems that are ready for an ever-changing world.



# Xylem | zīlām |

- 1) the tissue in plants that brings water and nutrients upward from the roots.
- 2) a leading global water solutions company.

Xylem is the connective tissue and system in plants which cleanses and transports water from the root to where it is needed most to sustain life.

And this is the essence of Xylem as a company. We are committed to driving sustainable impact by ensuring our connected technologies and solutions support our customers and the communities they serve, to tackle the water challenges that matter most to them.

**For more information on how Xylem can help you, visit [xylem.com](https://xylem.com).**



**Xylem Vue** is the result of the partnership between Xylem, a global leader in water technology and Idrica, an international pioneer in water data management, analytics and smart-water solutions. Through this partnership, Xylem and Idrica bring together their technology, innovation, and expertise to solve the world's most critical drinking water, wastewater and other water-related challenges.

Our single, integrated software and analytics platform – built by utilities, for utilities – enables utilities to take digital transformation to the next level, maximize investments, identify and solve problems more quickly, operate more efficiently and deliver water more effectively and affordably to their communities.