

DEYAK Water Utility Drives Technology Advancement for Water Systems in Greece

OpenFlows™ Provides Digital Twin to Decrease Leak Response Time by 50% in Kozani

LEADING WATER MANAGEMENT REFORM IN GREECE

As part of their post-pandemic National Recovery and Resilience Plan to promote energy reform, digitization, and modernization, Greece is aiming to achieve sustainable waste and water management, ensuring residents' rights to access clean water. At the end of 2022, all European Union (EU) member states were directed to put systems in place to ensure wholesome and clean water. The water needed to be clear of microplastics, toxic chemicals, and dangerous microorganisms, as well as assess leakage rates from their water infrastructure.

With Greece's public water supply systems losing approximately 26% of water annually due to leaks, their households consume more drinking water than any other country in the EU.

Leading the charge for water system reform is DEYAK, the water supply and sewerage company for Kozani, a city in Western Macedonia. Concerted improvements to Kozani's water system began in 1985 when DEYAK expanded the water network over several decades, eventually providing service to 63 settlements in and around the city. Working with ReonHydor and Tech-Go-Round, DEYAK is embracing innovative technology solutions to optimize water supply management, reducing waste and ensuring reliable potable water supply to Kozani's modest population of 60,000. "Kozani presented an ideal opportunity to create a model system for other Greek utilities," said Dimitris Papailiopoulos, owner of Tech-Go-Round. "It's easier to bring smaller water authorities to a point where they can adopt this innovative technology. [With] a large water authority, such as the Athens Water Authority for example, there is a lot of preparatory work that has to take place, and it may take several years before they are even in a position to install it."

ADDRESSING MANUAL PROCESSES AND DIGITIZATION CHALLENGES

Given the significant water loss, DEYAK realized that their manual methods of monitoring Kozani's water system had to be addressed. "Everything was done manually, if at all. There were great water losses. The quality of the water was manually tested on a regular basis, but they knew they could do better," said Papailiopoulos. While the system has undergone some technological upgrades over the past 12 years—including segmentation into district metered areas (DMAs) for nonrevenue water (NRW) reduction and pressure management—DEYAK, ReonHydor, and Tech-Go-Round sought to digitize and automate the entire Kozani water system, creating a comprehensive digital twin model. They set out to develop a dynamic 3D hydraulic model to streamline water monitoring processes and optimize system performance.

However, before they could incorporate digital monitoring methods, they needed to conduct a thorough mapping assessment and generate a 3D network model of the entire system. Once the map was complete, the next step was to implement a supervisory control and data acquisition system (SCADA) with digital sensors to measure water pressure, flow, and quality. However, it presented compatibility and connection challenges between the monitoring devices and different software platforms used by various vendors and utility staff. To generate an accurate digital twin in a connected data environment to provide holistic insight into the water system, DEYAK needed open, interoperable hydraulic modeling and analysis software. "You need to keep the connections and signals of the equipment connected with the digital twin to gain the right insights at the right time from all the data," said Konstantinos Gkonelas, co-owner of ReonHydor and a hydraulics and water systems expert who worked alongside Tech-Go-Round.

PROJECT SUMMARY ORGANIZATION

DEYAK (Water Utility of Kozani)

SOLUTION

Water and Wastewater

LOCATION

Kozani, Western Macedonia, Greece

PROJECT OBJECTIVES

- ◆ To digitize the Kozani water distribution system as part of Greece's post-pandemic National Recovery and Resilience Plan.
- ◆ To develop a network digital twin for optimizing water supply management.

PROJECT PLAYBOOK

OpenFlows

FAST FACTS

- ◆ Losing approximately 26% of water annually due to leakages, Greek households consume more drinking water than any other country in the European Union.
 - ◆ DEYAK water utility is leading Greece's water system reform through technological advancements to better manage water supply in Kozani.
 - ◆ Working with ReonHydor and Tech-Go-Round, DEYAK developed a water network digital twin to perform holistic evaluation, leakage control, and asset maintenance and management.
- ## ROI
- ◆ Using OpenFlows as the basis for the digital twin ensured that utility staff spent 40% less time on pressure management tasks.
 - ◆ The speed and quality of repairs on newly reported and unreported leaks improved by 50%.
 - ◆ Improved leak management has reduced water waste, with 20% less water flowing through the network.



“The implementation of a digital twin helped us gain useful insights to improve the performance and operations of our entire water supply network.”

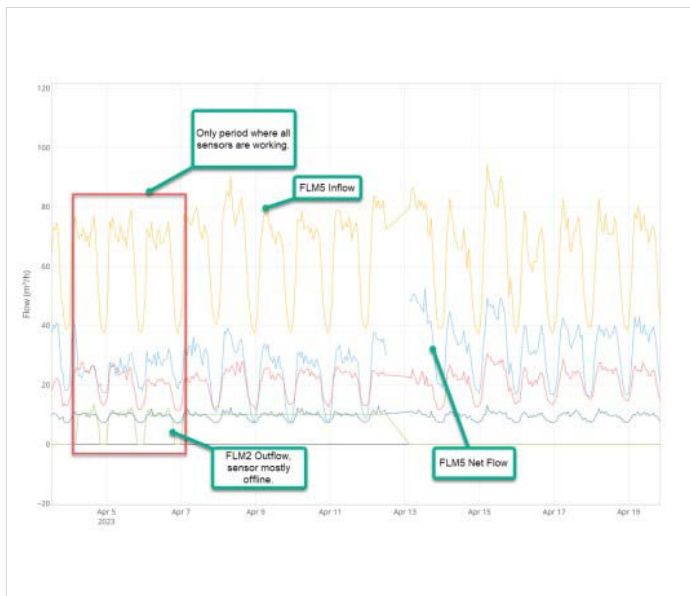
– Konstantinos Gkonelas, Ph.D., Co-owner, ReonHydor



FACILITATING DYNAMIC DIGITAL NETWORK MANAGEMENT

With its dynamic nature, the field of water management is well suited to a digital twin. “Where water is concerned, there is no such thing as a fixed or static environment. Water models, therefore, should be dynamic and sensitive to minute-to-minute system changes to best optimize network functionality. It is something a digital twin can offer,” said Gkonelas. Leveraging Bentley’s OpenFlows applications, the team developed a digital twin, incorporating data from the different software and sensors into a connected digital environment. Bentley’s solution allowed DEYAK to view the data collected through the SCADA system in a unified platform, facilitating rapid visual assessments and more accurate decision-making regarding potential network issues and required repairs.

“The implementation of a digital twin helped us gain useful insights to improve the performance and operations of our entire water supply network,” said Gkonelas. Using Bentley’s open hydraulic digital twin technology enables real-time, integrated dynamic simulation of the Kozani network within a single model to perform risk assessments and make better decisions. The digital twin solution facilitates holistic network evaluations and compliance with upcoming EU regulations to assess leakage rates from the water infrastructure and report water quality and system performance data to consumers.

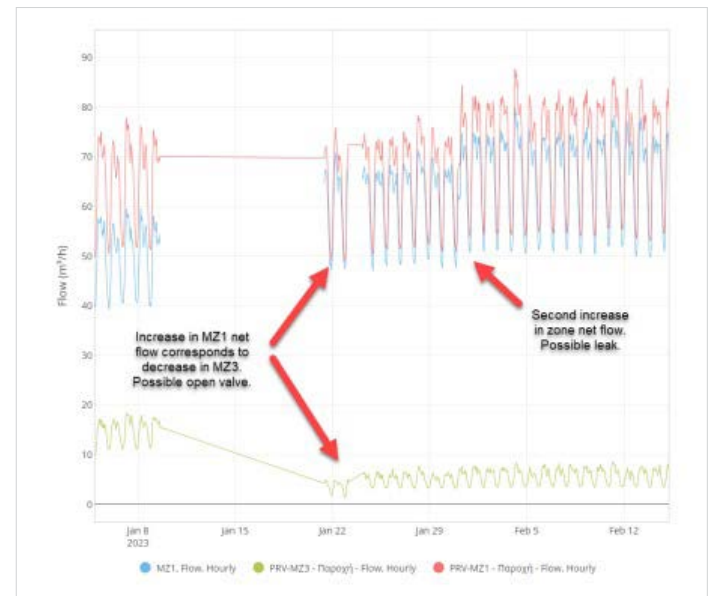


DEYAK water utility is leading Greece’s water system reform through technological advancements to better manage water supply in Kozani. Image courtesy of DEYAK (Water Utility of Kozani).

DIGITAL TWIN ACHIEVES SAVINGS AND SUSTAINABILITY

Using OpenFlows to create a digital twin of Kozani’s water system is optimizing operations and saving environmental resources. Incorporating digital monitoring devices and implementing automated workflows and processes, DEYAK’s staff now spends 40% less time on pressure management tasks while preventing system water loss. Leaks are identified more quickly, leading to faster and higher-quality repairs. “Spatial detection time of new unreported leaks in a DMA level is reduced by 50%, using algorithms that enhance applications, such as leakage detection allocation,” said Gkonelas. Improved leak management has also cut down on real losses, with 20% less water flowing through the network.

All four strategies to reduce NRW in Kozani have improved: pressure management, speed and quality of repairs, active leakage control, and asset management. By harnessing the power of hydraulic digital twins, DEYAK is supporting national economic growth, environmental initiatives, and social sustainability in Greece. Kozani residents are already reaping these benefits. Reduced water loss means lower utility bills and guaranteed reliable access to clean water, which decades from now could be an even scarcer resource. “Across Greece and the globe, water utilities will look to the cutting-edge improvements in Kozani as a model,” said Gkonelas.



Using OpenFlows as the basis for the digital twin ensured that utility staff spent 40% less time on pressure management tasks. Image courtesy of DEYAK (Water Utility of Kozani).



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