



Case Study: Acquedotto del Fiora SpA

Italian utility AdF adopts Geospatial AI tools to boost performance, including improving leak detection and prevention.



Water SAT – Pipeline Risk

Overview

Acquedotto del Fiora SpA (AdF) is Tuscany's largest water company in terms of the size of its network, which covers 55 municipalities, including all 28 in the province of Grosseto and 27 in the province of Siena. With many water treatment and distribution assets, AdF's pipeline network stretches across 8,000 km.

The Challenges

Rural Tuscany has a relatively low population density, and despite the size of its network AdF serves only around 400,000 customers. With unaccounted for water totalling around 42.5% of its treated water, this extended network makes it particularly challenging to identify failures and the sources of losses.

"Our network is large but with low customer numbers, so it is a challenge to find water losses quickly," explains Alessio Giunti, Head of Water Balance and Metering Equipment, Water Resource Protection, Acquedotto del Fiora S.p.A.

On a mission to become a data-driven utility, AdF needed to analyse its network for leak detection and determine how to utilise its workforce most efficiently.

Turning to Advanced Digital Solutions

Faced with additional network challenges and striving to meet its regulatory requirements, AdF turned to smarter, digital solutions. Initially, the utility opted for a standard Geographical Information System (GIS) approach, enabling the team to better understand its network.

However, recognising its limitations, AdF quickly looked at exploring more advanced solutions and reached out to water measurement and service solution specialist ISOIL Industria S.p.A to help reduce its non-revenue water. With a deep knowledge of market needs, ISOIL Industria partnered with Rezatec to deploy its Pipeline Risk Assessment tool on the AdF network.





The Geospatial AI Edge

Rezatec's Geospatial AI, Pipeline Risk product was deployed across 674km of the AdF water network in a pilot programme launched in January 2021. The solution is being used to verify the network trends and identify those parts of the network that must be replaced in the following investment plan period.

The Rezatec model considers parameters such as the diameter and age of a pipeline, as well as the material of its construction, ductile iron or polyethylene, for instance. This is combined with environmental data, including data on the terrain and soil characteristics the pipeline is buried in, such as its pH. Fused with satellite data, Rezatec's machine learning model also analyses the smallest displacements to assess factors such as ground motion, uplift and subsidence. Vegetation patterns and potential changes in vigor can also be observed, which may indicate leakage.

The Pipeline Risk tool assesses these parameters against several years of historical network failure data to characterise the risk factors. These allow the machine learning engine, at the heart of the model, to build a predictive model identifying risk. Now able to deploy field crews and investment at the most critical parts of their network, the Rezatec approach allows water distribution companies like AdF to drive their investments towards the top 20 per cent of failure risks. With this top 20 per cent responsible for around two-thirds of all leaks from a typical distribution system, the Pipeline Risk model enables more proactive planning of scheduled upgrades as well as a reduction in both CAPEX and OPEX.

Encouraging Results

Early performance indicators have been encouraging. Data from the first four months of 2021 reveals that 18 leaks were identified by internal loss research teams across nine days of activity. Of these, 15 of the leaks were identified by the Rezatec model as having a high risk of failure. This gives an evident correlation of over 80 per cent between actual losses identified in areas reported on the Rezatec portal as critical.

Similarly, Operational Management Units, considering replacements for the three-year period 2021-2023, have identified and requested nine specific network interventions. Of these nine, six fall in an area indicated as very high criticality, two in high criticality areas and just one in a low criticality area as determined by the geospatial AI model.

By quickly identifying those pipeline sections with the highest risk and consequences of failure, Rezatec's geospatial AI model enables water distribution companies to improve accuracy and direct maintenance resources to the right place. New technologies such as satellite data and AI enable progressive companies like AdF to work smarter, not just harder.

Renowned as the birthplace of the Renaissance, Tuscany and AdF are now part of a new digital movement in which data-led asset management decisions can be more accurate, productive and, where relevant, more profitable.

"This is something that can help us improve our performance and enable us to reach our goals and the key performance indicators mandated by ARERA, the Italian Regulatory Authority for Energy, Networks and Environment."

Alessio Giunti, Head of Water Balance and Metering Equipment, Water Resource Protection, Acquedotto del Fiora S.p.A.

