

## CABB

### Optimization of the primary wastewater network

The Bilbao Bizkaia Water Consortium (CABB) is the public utility responsible for managing the main drinking water and wastewater network in the province of Bizkaia, serving over one million residents through a range of water supply pipelines, sewer networks, and wastewater treatment plants across 97 municipalities.

The largest infrastructure asset is the Galindo-Lamiako system, located within the Nervion River basin. Its three major pipelines transport sewage to the Galindo Wastewater Treatment Plant (WWTP). The city of Bilbao, which has a population of nearly 900,000 people and numerous industrial areas, is located within this basin. The network includes 187 km of sewers, 53 pumping stations, 20 storm tanks, 123 spillways, 13 single wells, and one siphon, ensuring effective discharge under normal conditions and during heavy rainfall.

The Galindo WWTP treats approximately 115 hm<sup>3</sup> of wastewater annually. Most of the treated water is discharged into the Cantabrian Sea, in a sensitive area of the Bilbao estuary close to several beaches. The Consortium prioritizes continuous improvement of hydraulic performance and protection of the surrounding environment in this densely populated urban area, which is highly sensitive from both environmental and tourism perspectives.

#### Challenges

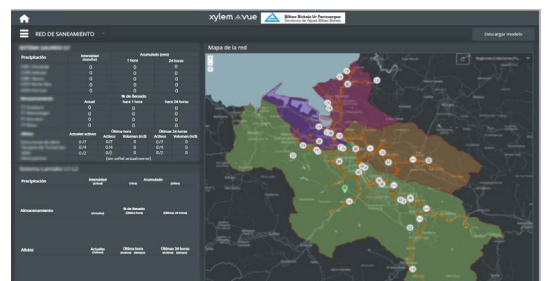
CABB’s main challenge, in a context marked by increasingly stringent environmental regulations at European and national level, was to minimize combined sewer overflows into the Nervion estuary as these could potentially impact beaches and recreational areas. This required optimizing the coordinated operation of the combined sewer system and its regulation and control infrastructure. The system operates within a highly complex hydraulic environment prone to significant flow variations, particularly during heavy rainfall.

The scale of the infrastructure, with hundreds of kilometers of sewers, numerous pumping stations, storm tanks and spillways, made comprehensive management essential. This approach had to be capable of anticipating hydraulic behavior in real time, monitoring system status, and providing actionable recommendations based on predefined control strategies, thereby facilitating decision-making for operators.



#### Key aspects of the project:

- Digitization and unified view of the primary combined sewer network
- Data integration and operational coordination
- Optimization of sewer and storm tank operations
- Reduction of combined sewer overflows (CSOs)
- Enhanced environmental protection of the estuary and beaches, strengthening regulatory compliance.



Wastewater network map

## Solutions

CABB turned to the [Xylem Vue platform](#) as an integrated and scalable solution, serving as a central system for data ingestion and structuring. The solution is built around three main components: the Smart Water Engine (SWE), the Unified Network Management application, and various optimization algorithms.

The SWE is at the heart of data integration and governance, centralizing heterogeneous signals through its IoT Core: sensors, pumping stations, storm tanks, SCADA systems, smart meters, and a hydraulic model. It provides a single, standardized environment, facilitating real-time operational management and structuring information through Domain Master Data to create a unified, consistent repository designed for real-time decision-making.

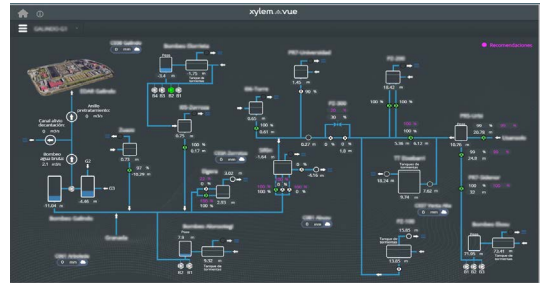
The Xylem Vue Unified Network Management application builds on this foundation to deliver an advanced operational and visual layer. It monitors and coordinates network assets through customizable synoptic views, transforming the wastewater system into a single environment to dynamically control and optimize operations.

The project culminates in the development of a Real-Time Decision Support System (RT-DSS) based on market-based optimization algorithms that generate optimized recommendations for the coordinated operation of controllable assets in the wastewater network and help prevent overflows.

## Results

The implementation of Xylem Vue aims to significantly improve CABB's wastewater management system in operational, environmental, and regulatory terms. Characterizing the system's overall behavior as a single operational platform will provide a new holistic perspective facilitating coordination between management, technical services, and operations. The goal is to make stormwater tank management more efficient, reduce overflow incidents and energy and resource consumption, and optimize WWTP performance. The most significant result could potentially be a reduction of up to 10% in overflows from the Galindo-Lamiako system, depending on rainfall.

These advances could contribute directly to the protection of local ecosystems and the improvement of water quality in the Bilbao estuary and nearby coastal areas, prioritizing the protection of beaches and recreational areas during the summer without compromising the strategic management of winter events. Preliminary results indicate that operational network optimization will improve asset coordination and prioritize relief points based on their environmental impact, strengthening regulatory compliance and positioning the Consortium as a leader in sustainable wastewater management. It will also maximize infrastructure performance and enhance response capacity during rainfall events. This project, developed in collaboration with a local partner [Ansareo](#), positions CABB as a leader in sustainable wastewater management practices in Spain.



Synoptic view of the network



Control structure diagram and signals

**“Our systems help us optimize infrastructure use during extreme rainfall and prevent overflows. By integrating AI and weather forecasting, we can make informed decisions in real time, ensuring that even the most unpredictable weather events don't overwhelm our networks.”**



Koldo Urkullu,  
Director of Operations and Asset  
Management at CABB