



# acquedotto pugliese

l'acqua, bene comune



acquedotto  
pugliese

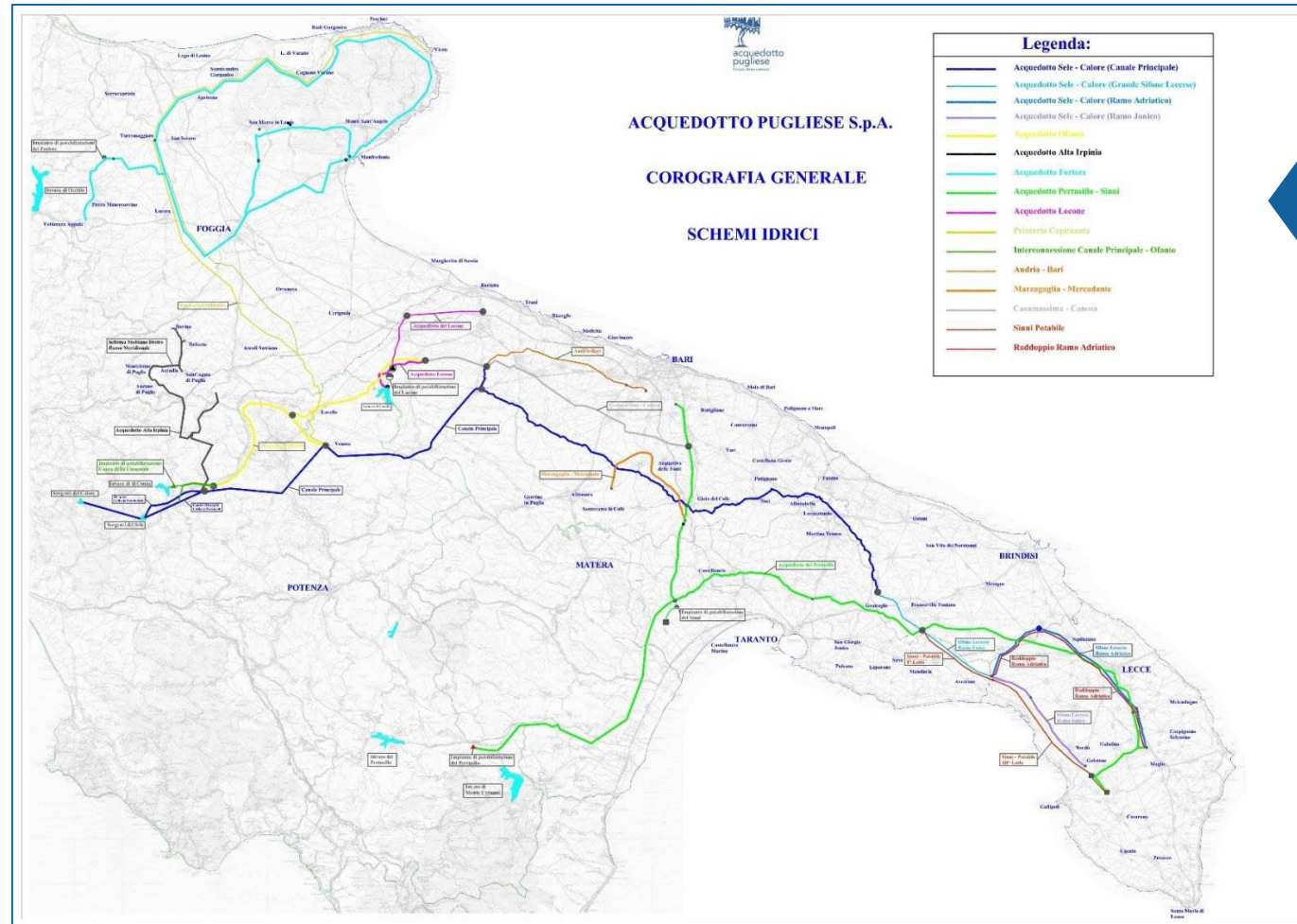
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# AQP WATER RESILIENCE STRATEGY



# THE WATER SYSTEM

## The Major Water Conveyance System – Water Supply Schemes



The integrated water supply and transport system is one of the longest in the world:

## 5.500 km

Six major water supply schemes:

- Sele-Calore
- Sinni
- Locone
- Pertusillo
- Fortore
- Ofanto

Main features:

### Strong interconnection:

the ability to transfer water resources according to demand fluctuations and to compensate for variable production rates from different sources.

### High transport capacity:

the system can convey a total of 790 million cubic meters of water per year.

### Advanced age of the conduits:

the weighted average age of the conduits (based on their linear development) exceeds 40 years.

# WATER SUPPLY SOURCES

Types and geographic distribution

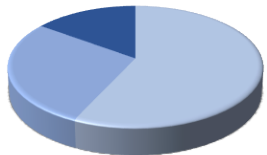
The drinking water supply system is fed by three types of sources:

- **springs**
- **groundwater** (via wells)
- **artificial lakes or reservoirs** (via water treatment plants)

The springs are located in **Campania**, the wells in **Puglia**, and the reservoirs are partly in **Basilicata**, partly in **Puglia**, and partly in **Campania**.

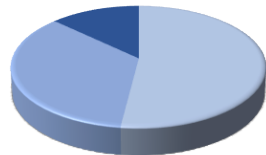


## AVERAGE WITHDRAWALS



- Reservoirs 56%
- Springs 29%
- Groundwater 15%

## WITHDRAWALS 2024



- Reservoirs 58%
- Springs 28%
- Groundwater 14%

AQP ensures water supply to:

- **2% of Campania**
- **25% of Basilicata**
- **100% of Puglia**

## WATER DEMAND AND SOURCE ORIGINS

Water demand (Mm <sup>3</sup> )	Import (Mm <sup>3</sup> )	Export (Mm <sup>3</sup> )	Water demand met by out-of-region sources
485	350	0	72% of which <ul style="list-style-type: none"><li>▪ from Basilicata 47%</li><li>▪ from Molise 6%</li><li>▪ from Campania 48%</li></ul>





### EFFICIENCY IMPROVEMENT

Restoring water networks, optimizing pressure management, and raising community awareness about responsible water consumption and the installation of autoclave systems.

### REUSE

Increase the share of treated wastewater from AQP purification plants for reuse.



### ALTERNATIVE SOURCES

Continue exploring new water sources, from desalination plants to new aqueducts, to diversify supply and enhance self-sufficiency.

### CHANGE MANAGEMENT

Innovate management processes, enhance system interconnection, and assess climate risks.



Every action we take and every resource we invest is aimed at a single goal: building a sustainable reality where water and innovation are integral to a resilient, adaptable, and responsible system.

For years, Acquedotto Pugliese (AQP) has been working on multiple fronts:

- **Reducing water withdrawals**
- **Expanding water reuse in agriculture**
- **Improving service quality**  
(minimizing losses, implementing district metering areas, and optimizing network pressure management)
- **Enhancing interconnection between water supply schemes**
- **Diversifying water sources**

From 2009 to 2024, AQP has saved **100 million cubic meters** of water. The 2025 water budget aims for a **further reduction of 10 million cubic meters** of water withdrawals from natural sources.

The ability to conserve and maximize the use of resources actively contributes to the sustainability of the Southern Apennine water system. This approach balances water demand with a sustainable management model, adapting to increasing scarcity. In **2024**, the first **network-wide pressure reductions** were necessary **only starting from October '21**, ensuring optimized water distribution in compliance with the **Integrated Water Service Charter**.

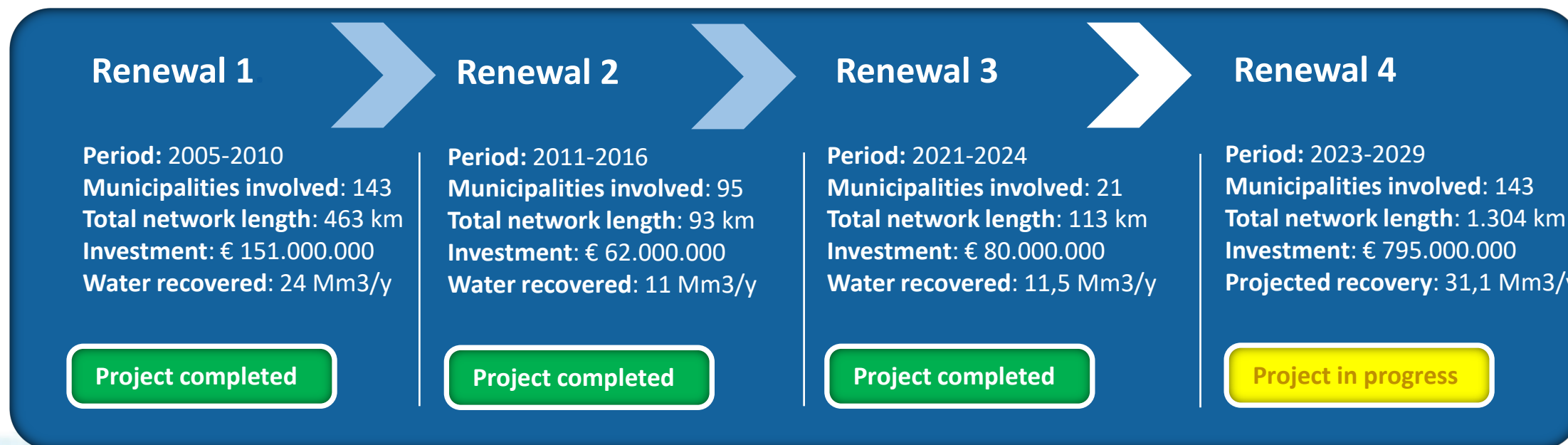
AQP is tackling climate change through additional initiatives, ranging from raising awareness about water consumption — **Puglia's citizens remain the most water-conscious in Italy, using just 156 liters per person per day compared to the national average of 214** — to extensive communication campaigns promoting conservation, proper use of autoclaves, and responsible resource management. These efforts include targeted educational activities, particularly aimed at schools and younger generations.



## 2023 AND 2024 DATA AND WATER NETWORK RENEWAL

AQP INVESTMENTS	2023	2024
WATER RECOVERY	€ 75.800.000	€ 92.600.000
REUSE	€ 12.100.000	€ 23.400.000
<b>TOTAL</b>	<b>€ 87.900.000</b>	<b>€ 116.000.000</b>

## WATER NETWORK RENEWAL



**Acquedotto Pugliese (AQP) has implemented numerous investments aimed at improving networks, particularly in controlling and reducing water losses. Currently, rehabilitation interventions are underway, covering almost 1,300 kilometers of pipelines, with an investment of 800 million euros.**

These rehabilitation projects, along with other initiatives such as the replacement of deteriorated pipes, network pressure monitoring and control through automatic valves, district metering, and the renewal of installed meters, have led to a significant reduction in distribution network leakage rates over the years.

Despite widespread use and media coverage, the percentage-based leakage indicator is inconsistent and unreliable, creating several paradoxes that put companies like AQP at a disadvantage. With the same volume of losses, this indicator is 'favored' by higher consumption, as it decreases when per capita consumption rises. It is no coincidence that the three regions with the lowest percentage loss rates are often among the top four in per capita water consumption. Conversely, this percentage-based metric disadvantages utilities whose users are more efficient and consume lower volumes of water.

TOTAL WATER LOSSES IN MUNICIPAL DRINKING WATER DISTRIBUTION NETWORKS (%)	2018	2020	2022	2024	2026	2028
Water losses in municipal water networks – Integrated Water Service (SII) South (%)	46,5	48,4	50,5	n.d.	n.d.	n.d.
Water losses in municipal water networks – Integrated Water Service (SII) Puglia (%)	45,1	43,6	42,1*	40,6	38,9**	37,2**



**Desalination, included in Puglia's Water Management Plan since 2002 as a solution to address water crises, is a key focus for AQP, which is currently engaged in multiple projects. Three of these are in an advanced stage.**



The desalination process is based on the reverse osmosis method, which is the most efficient in terms of production relative to energy consumption and land use. Technological advancements primarily focus on developing increasingly high-performance membranes and enhancing energy recovery systems from the osmotic process.

### **TARANTO**

#### **Source**

Brackish water from Tara springs

#### **Capacity**

1.000 l/s – Serving 385.000 inhabitants

#### **Planned operational start**

2026

The project, awarded for €86 million, will be financed with €27 million from PNRR funds, while the remaining portion will be covered by FSC resources. The decisive Services Conference for the implementation of the project concluded with a predominantly positive outcome on January 10, 2025. The final step awaited for the PAUR, before the handover of the construction site, is the approval resolution by AIP.

### **TREMITI ISLANDS**

#### **Source**

Seawater

#### **Capacity**

12 l/s – Serving 5.000 inhabitants

#### **Planned operational start**

2026

AQP has developed the technical and economic feasibility study for the project. The awarding of the executive design and construction works will be managed by the Municipality of the Tremiti Islands, which can finance the project through PNRR M2C1 - Investment 3.1: "Green Islands." The estimated investment is approximately €3.6 million. The future management of the plant will be handled by AQP.

### **BRINDISI**

#### **Source**

Seawater

#### **Capacity**

1.000 l/s – Serving 600.000 inhabitants

#### **Planned operational start**

2032

The plant will be built in an area near ENEL's Federico II thermal power station in Cerano. The current study phase will continue until June 2025. Following this, various design and location alternatives for the desalination plant will be assessed to estimate costs and benefits. The Water Management Plan has estimated an investment of €100 million for the project.

Acquedotto Pugliese is actively seeking the water of tomorrow to safeguard future generations and mitigate the effects of climate change.

In addition to the three desalination plants in Taranto, Brindisi, and Tremiti, AQP is evaluating three alternative water supply options. These solutions are currently under study.

### DESALINATION PLANT OF MANFREDONIA

The construction of a desalination plant in **Manfredonia** was proposed in the **2009-2018 Water Management Plan** as a potential solution to supplement water resources for central and northern Puglia. The initiative is still under study and will require in-depth scientific assessments before advancing to the design and authorization phases. An alternative site for the plant, in **Margherita di Savoia**, is also being considered.

### AQUEDUCT FROM ABRUZZO

Acquedotto Pugliese has commissioned a study on the waters of the **Tirino River** in **Abruzzo**, conducted by the **Polytechnic University of Bari** and the **University of Chieti-Pescara**, to assess the feasibility of diverting water towards **Puglia**.

### AQUEDUCT FROM ALBANIA

The proposal envisions an **underwater pipeline** connecting **Albania to Puglia** to channel any surplus water towards Italy. The first step in this complex project will be a **comprehensive study of Albania's water balance**.

### AQUEDUCT FROM MOLISE

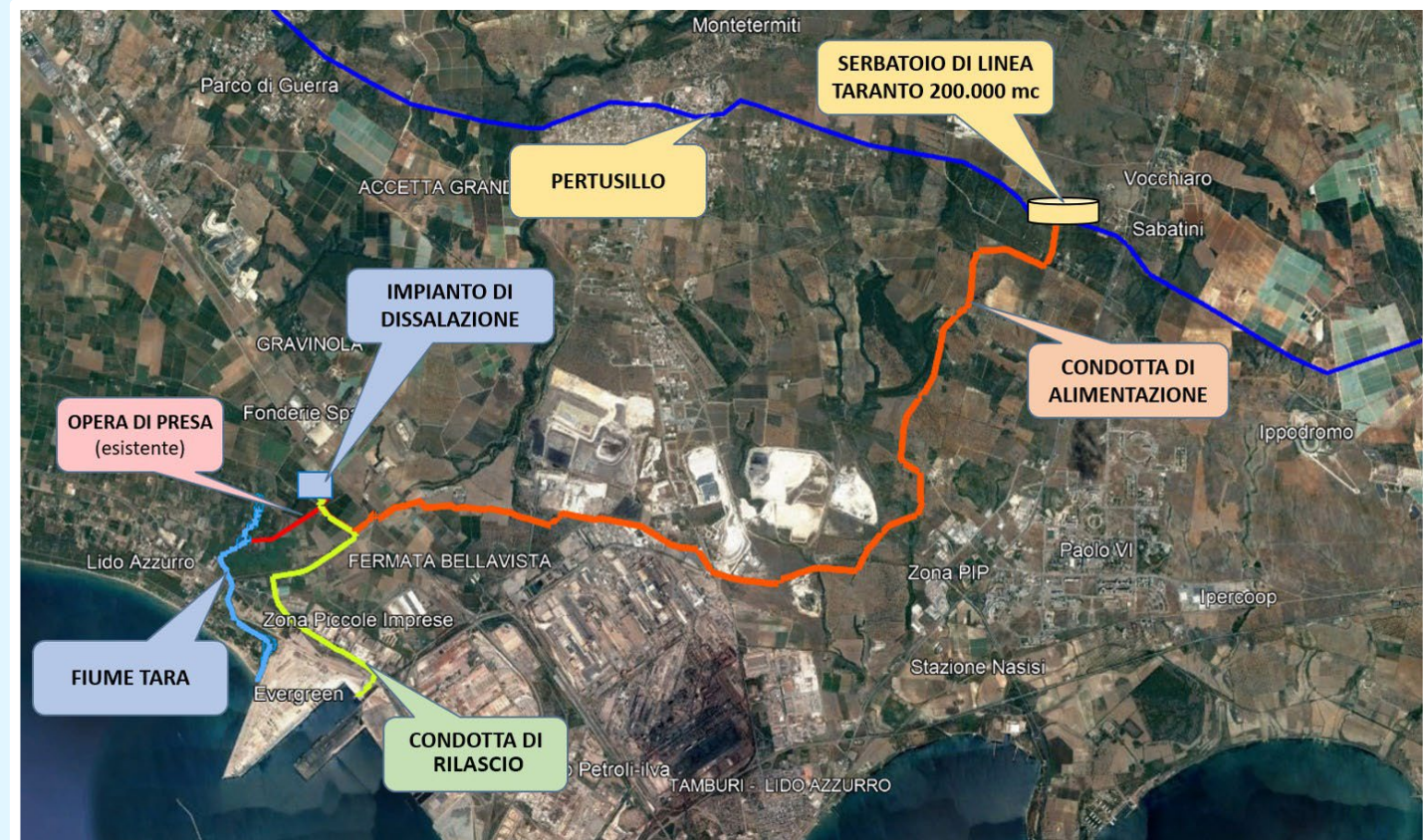
The proposal involves constructing a **pipeline connection** between the **Liscione reservoir** and **Puglia** to supply water to the **Capitanata** region.



The **Taranto desalination plant** will use the **reverse osmosis** process to purify the **brackish waters of the Tara River**. The facility is designed to produce an amount of water equivalent to the **daily needs of approximately 385,000 people**.

The Taranto desalination plant has been recognized as the best solution to ensure water resilience and self-sufficiency for Puglia in the context of the climate crisis.

Specifically, it will benefit the **Taranto area** and the **Ionian-Salento arc**, which are currently served by a **single supply line**, the **Sinni-Pertusillo system**.



The construction work is scheduled to begin in March 2025 and be completed by 2026.





Acquedotto Pugliese is a **hub of innovative technologies and professional expertise**, developed over more than a century in the service of public water.

**2,300**  
dedicated  
professionals

**24,000 km**  
water network

including 5,000 km of large-scale  
conveyance

**structured around six** water supply systems

**more than 13,000 km** of sewer networks

AQP is a leader in integrated water management.  
The company operates **185 wastewater treatment plants**,  
**45 of which are capable of providing water for agricultural use.**

AQP's infrastructure includes **570,000 interconnections** and **11,000 sensors** embedded in the network, all managed through its **digital brain—the Control Room**. This **smart monitoring system** enhances resource protection and enables faster, more precise interventions, providing a **comprehensive real-time view** of an **extensive and complex water system**.

The **Control Room** is a key enabler for achieving **AQP's strategic objectives: water resource protection, circular economy, and digital transition**. Among its core features is the **Smart Water Management platform**, AQP's digital integration project. Utilizing **Geographic Information Systems (GIS)**, the **Internet of Things (IoT)**, **Workforce Management (WFM)**, **network modeling**, **Business Intelligence (BI)**, and **Key Performance Indicators (KPI)**, AQP has developed a **digital twin**—a virtual replica of its water system. This allows for **simulated operations** and **predictive analytics**, ensuring **more efficient and sustainable water management**.



**Smart Water Management** is **Acquedotto Pugliese's** project for developing an **integrated system** that enables a unified and efficient management of the **water network**.



A digital model of the network has been created to conduct "what-if" predictive analyses



Advanced technological solutions are used to prevent water losses, including: **Geographic Information Systems (GIS)**, **Internet of Things (IoT)**, **WorkForce Management (WFM)** **Business Intelligence (BI)**, **Key Performance Indicators (KPI)**. Define the most effective operational strategies in response to critical situations, enhance network management efficiency, **Support** field operations by simulating and verifying the impact of interventions in advance.



REAL-TIME INFORMATION



RESOURCE  
OPTIMIZATION



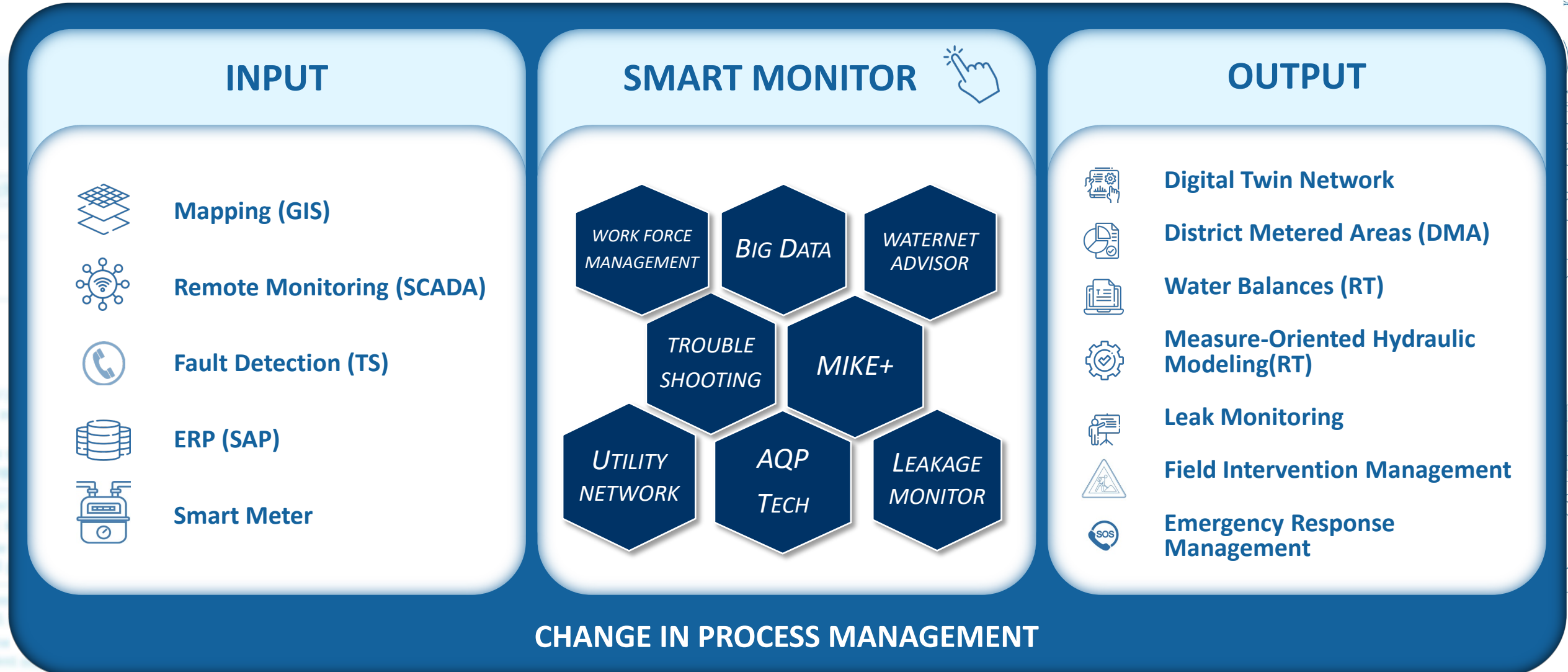
MONITORING AND  
CONTROLLING



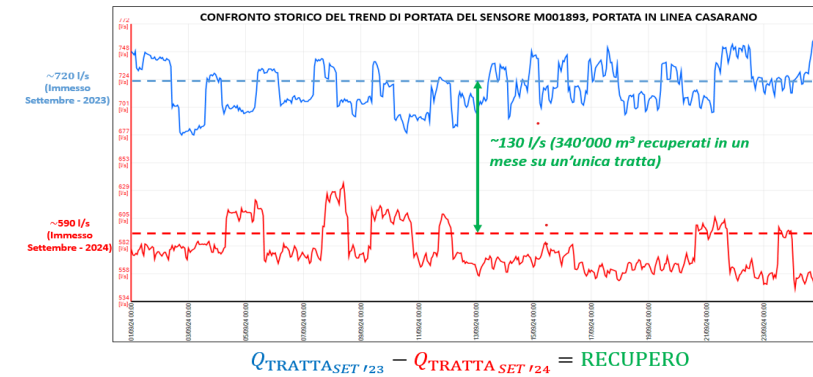
REDUCTION OF  
OPERATING COSTS



An integrated platform featuring *real-time* (RT) data reception from corporate information systems, enabling advanced processing for the management of the integrated water service.



The analysis and recovery of water resources through **Smart Water Management** is applied using two innovative technologies implemented by Acquedotto Pugliese to precisely **detect potential leaks** in large-diameter conveyance pipelines:



### SMARTBALL

The **Smartball** is an **innovative leak detection system**, consisting of a 70 mm diameter sphere that travels inside pressurized pipelines. Equipped with **acoustic, pressure, and motion sensors**, it collects data along its path, enabling the identification and localization of leaks.

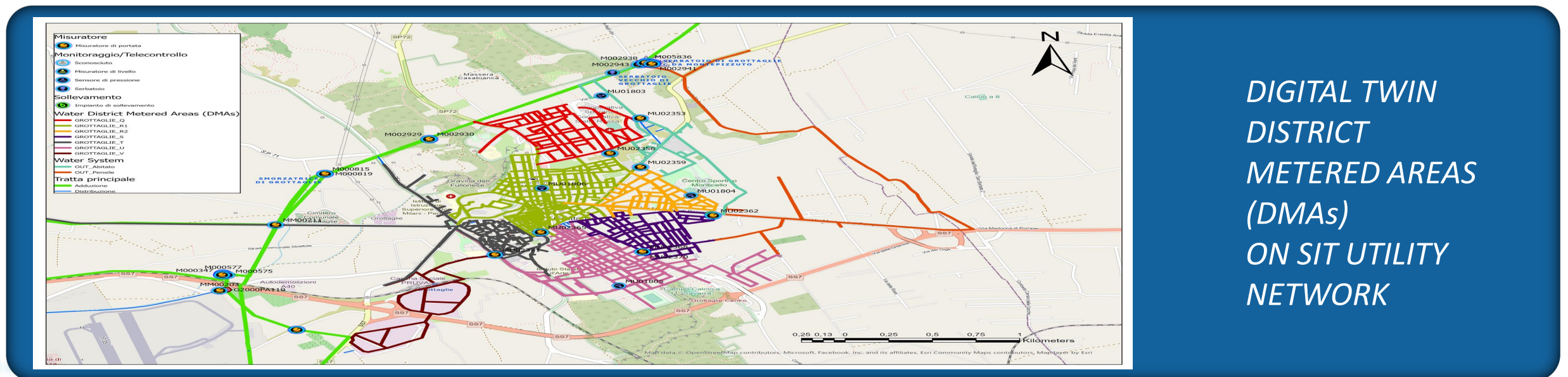
### CORRELATING HYDROPHONES

**Correlating hydrophones** are specialized instruments with **hydrophone sensors** that, when installed in direct contact with the pipeline under investigation, can detect fluid-transmitted noises within the pipe. Leak localization using these loggers relies on **remote and permanent multi-correlation acoustic technology**.

This dual **leak detection approach**—using both Smartball and correlating hydrophones—was applied in the pipeline transporting water from the Sant'Eleuterio reservoir to the Curtivecchie reservoir, which supplies the municipalities of Casarano, Taurisano, Ruffano, and Collepasso in Lecce province. Both technologies successfully **identified six high-intensity leaks** along the pipeline, which were later confirmed by Acquedotto Pugliese's Leak Detection Teams and repaired within approximately two months (from May 24, 2024, to July 23, 2024).

**A concrete example of how Acquedotto Pugliese's Control Room operates within the Smart Water Management framework is its role in building a digital twin of the managed water networks.**

The case study focuses on the municipality of Grottaglie, in Taranto province. The Grottaglie water network has undergone a district metering approach and consists of seven urban districts and two extra-urban districts. Blue pipelines represent those upstream of the urban districts, supplied by the underground reservoir of Grottaglie; red pipelines are those served by the elevated reservoir of Grottaglie. Using its GIS-based application, "UTILITY NETWORK", AQP's Control Room has successfully created the digital twin of the network districts, modeling the system based on its geometrical layout. Each district is monitored through flow sensors at the district inlets, essential for water balance analysis at the district scale, and pressure sensors, allowing for detailed pressure regime analysis within each district. By controlling and optimizing water pressure, the system ensures that water circulates within its designated district, significantly reducing network losses and enhancing resource recovery.





### Operations Control Room

Manages anomaly signals from sensors and internal data.



### Dispatching Room

Manages the dispatching of corrective actions for faults and anomalies.



### Technical Contact Center

Receives fault reports from external sources and assigns priority levels.



■ Management Area

■ Technical Area

### Facility Management

Coordinates the maintenance and development activities of hardware and software systems, as well as the workspace management of the Control Room.



### Remote Monitoring

Manages the field infrastructure related to remote monitoring and remote control.



### Measurement Equipment

Ensures the management and maintenance of field measuring devices.



Lot 1	Progress Status	Installed Loggers	Network Kilometers Covered
Minervino Murge	Terminato	206	36
Modugno	Terminato	578	124
Cerignola	Terminato	756	153
Ruvo di Puglia	Terminato	402	76
Corato	Terminato	575	142
Vico del Gargano	Terminato	225	42
Monte Sant'Angelo	Terminato	235	44
Santeramo in Colle	Terminato	440	77
Mola di Bari	Terminato	407	76
Molfetta	Terminato	535	129
Bisceglie	Terminato	573	115
Anzano di Puglia	Terminato	80	19
Sant'Agata di Puglia	Terminato	53	11
Bovino	Terminato	62	17
Trani	Terminato	540	114
Altamura	Terminato	970	204
Manfredonia	Terminato	720	138
Cassano delle Murge	Terminato	345	59
Terlizzi	Terminato	375	63
Giovinazzo	Terminato	320	68
Foggia SUD	In corso	-	116
TOTALE		8397	1823



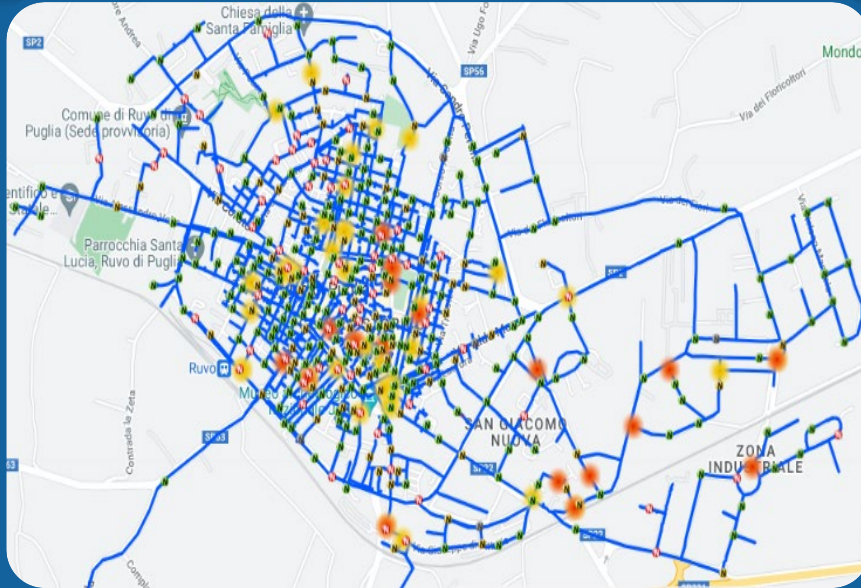
### PROJECT:

Supply and installation of **20,000 noise loggers** with correlation function, permanent monitoring, pre-localization, and leak detection across **4,000 km** of water distribution networks in **34 municipalities**.

Lot 2	Progress Status	Installed Loggers	Network Kilometers Covered
Cannole	Terminato	80	14
Presicce	Terminato	196	35
Gagliano del Capo	Terminato	219	40
Cursi	Terminato	127	28
Carmiano	Terminato	395	72
Brindisi – Zona SUD	Terminato	674	151
Brindisi – Zona NORD	Terminato	338	107
Martina Franca	Terminato	666	148
Taranto SUD	Terminato	713	150
Taranto NORD	Terminato	1128	254
Ostuni	Terminato	610	108
Galatina	Terminato	650	137
Bari Est	Terminato	610	125
Bari Sud	Terminato	985	185
Bari Centro	In fase di ultimazione	615	120
Bari Ovest	In fase di affidamento		187
TOTALE		8006	1861



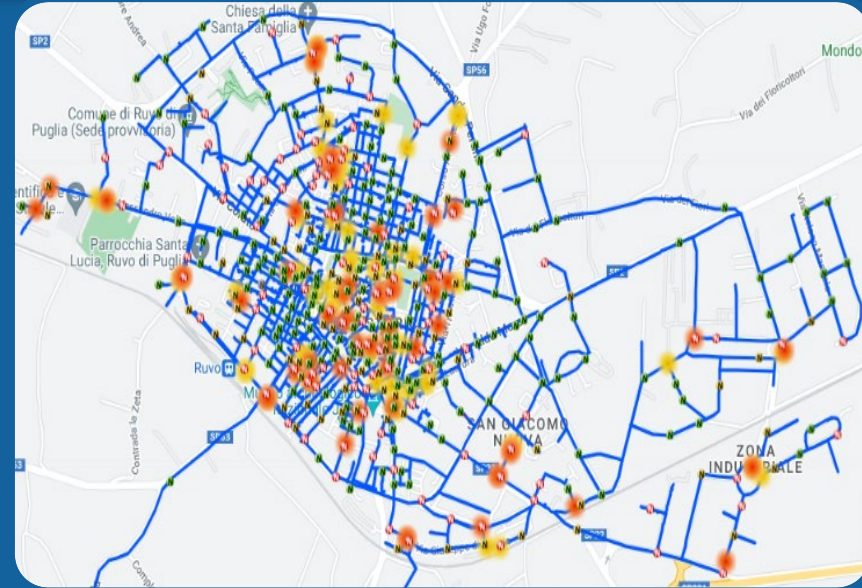
### CASE STUDY – RUVO DI PUGLIA



**October 2024**

**76,4 km** of Distribution Network

**402** Installed Noise Loggers



**October 2025**

**222** Verified Leaks

**160** Repaired Leaks

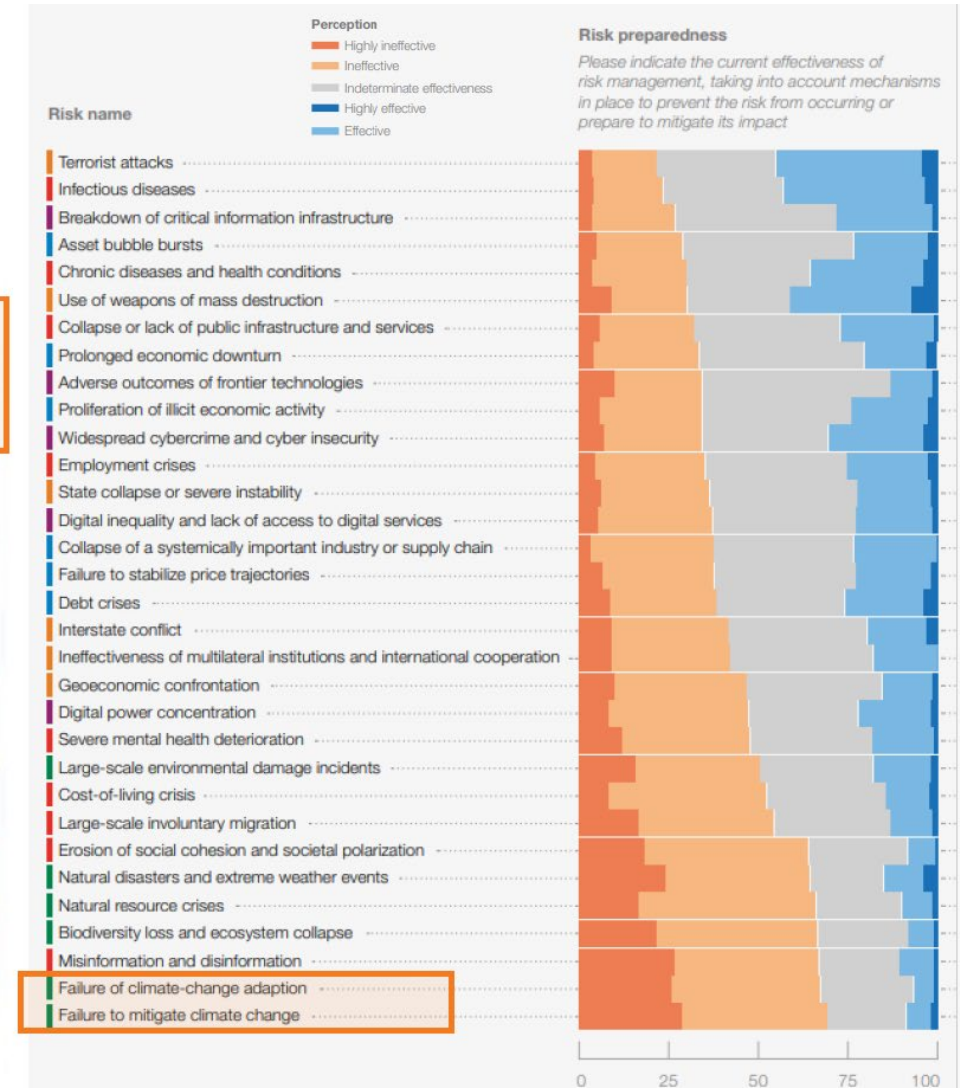
There has been a clear improvement and a significant reduction in the number of potential leaks and noise signals detected in the network. In particular, over the course of a year, 222 leaks were verified, and 160 were repaired, thanks to the deployment of noise loggers.



### WEF: THE GAP BETWEEN BUSINESS RISK PERCEPTION AND MANAGEMENT

Businesses classify **climate change** as the highest impact risk in the next ten years period, while it is considered to be among the **worst risks preparedness-wise**.

#### Gravità d'impatto in 10 anni



**Adopt a formal approach** to determine the necessary actions and develop a **cohesive and feasible Resilience Plan** for AQP, addressing **well-identified risks**.

**Leverage scientific and methodological expertise** in **climate risk analysis**, providing concrete responses based on the **specific risk scenarios of AQP's managed territory** and the **actual impacts on AQP's processes**.

**Engage and raise awareness** among **technical teams**, recognizing them as both the **real and potential drivers of adaptation**.

**Conduct a quantitative assessment of climate change and its impacts** to accurately direct investments and **design targeted interventions**

**Turn climate threats into opportunities** by researching and applying **innovative and unconventional process solutions**, offering a **viable alternative** to navigate an unprecedented shift in context.



### OBJECTIVES

1

Develop forecasting, assessment, management, and control systems

2

Increase the resilience of all AQP processes

3

Mitigate risks

4

«Manage» phenomena related to climate change

### BENEFITS

#### STRATEGY

- ✓ AS IS Analysis
- ✓ Vulnerability Analysis
- ✓ Impact Analysis of Structural Interventions

#### OPTIMIZATION

- ✓ Availability Forecasting
- ✓ Resource Utilization Planning
- ✓ Applicability to Every Source
- ✓ Complete Water Cycle

#### LEGAL/SAFETY

- ✓ Drought
- ✓ AlertFlood
- ✓ AlertESG
- ✓ ReportingARERA
- ✓ Reporting

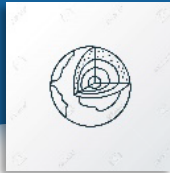
#### INTEGRATION

- ✓ System IntegrationControl
- ✓ Room InterfaceReal-Time
- ✓ Data AvailabilityWater
- ✓ Safety Plan (PSA)

#### SYNERGY

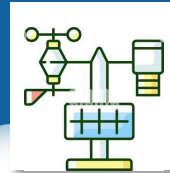
- ✓ Collaboration with Institutions and Stakeholders
- ✓ Research Institutes and Universities





### GEOMORPHOLOGICAL STUDY

Development of a digital twin for scenario analysis and forecasting in target areas.



### METEOROLOGICAL DATA COLLECTION

Meteorological and forecasting data, therefore hazard analysis (P) associated with climate events.



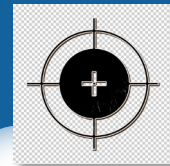
### HYDRAULIC WORKS

Identification of the project area and relevant infrastructure, with a focus on those potentially vulnerable (V) to eExtreme weather events.



### OBSERVATION COLLECTION

Data historicization



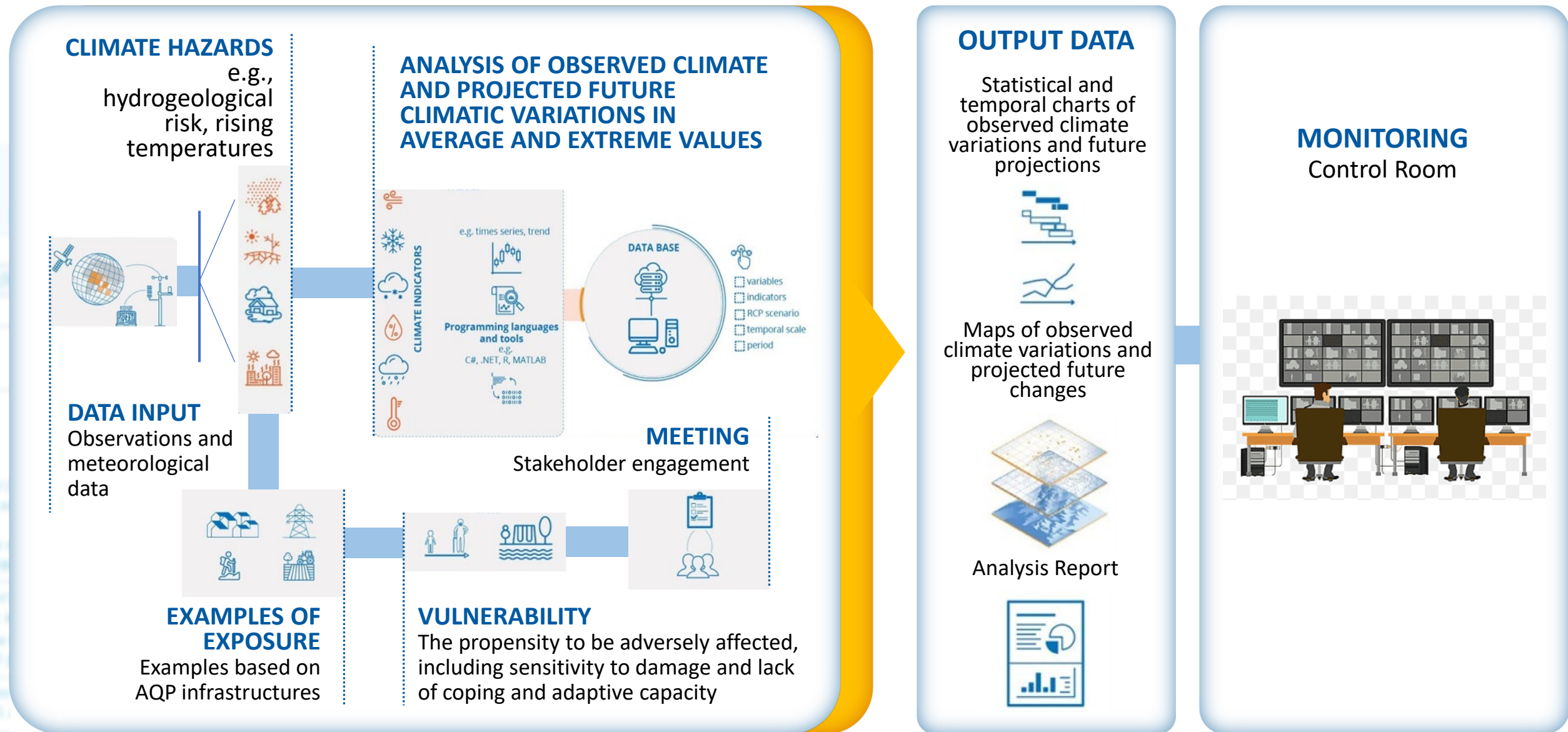
### MODEL CALIBRATION AND VALIDATION

Comparison of digital tool results with historical data to ensure consistency and accuracy.



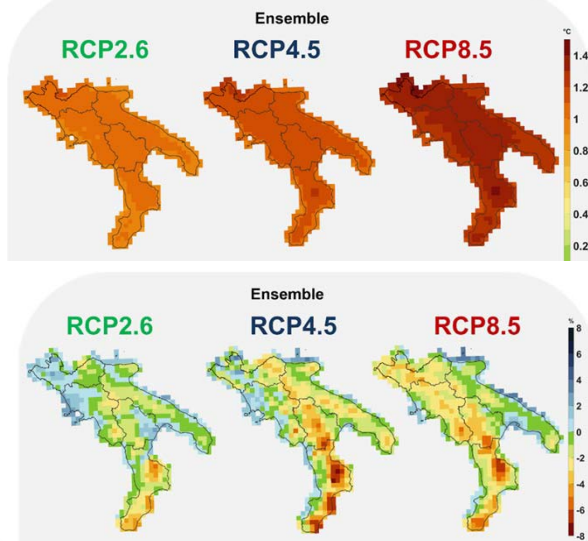
### RESULTS AND MANAGEMENT TOOLS

Risk analysis, obtained as the product of  $P \times V$ , by cross-referencing meteorological and forecasting data with exposed areas and infrastructure. Identification of adaptation and mitigation measures.

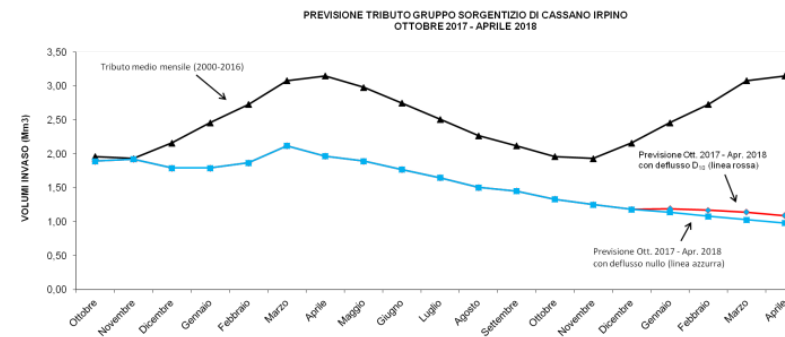


### Combinations of forecasting tools for climate change analysis

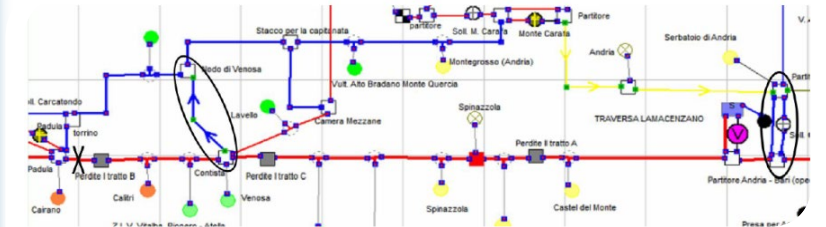
Determination of climate anomalies (temperature and precipitation) under RCP 2.6, 4.5, and 8.5 scenarios



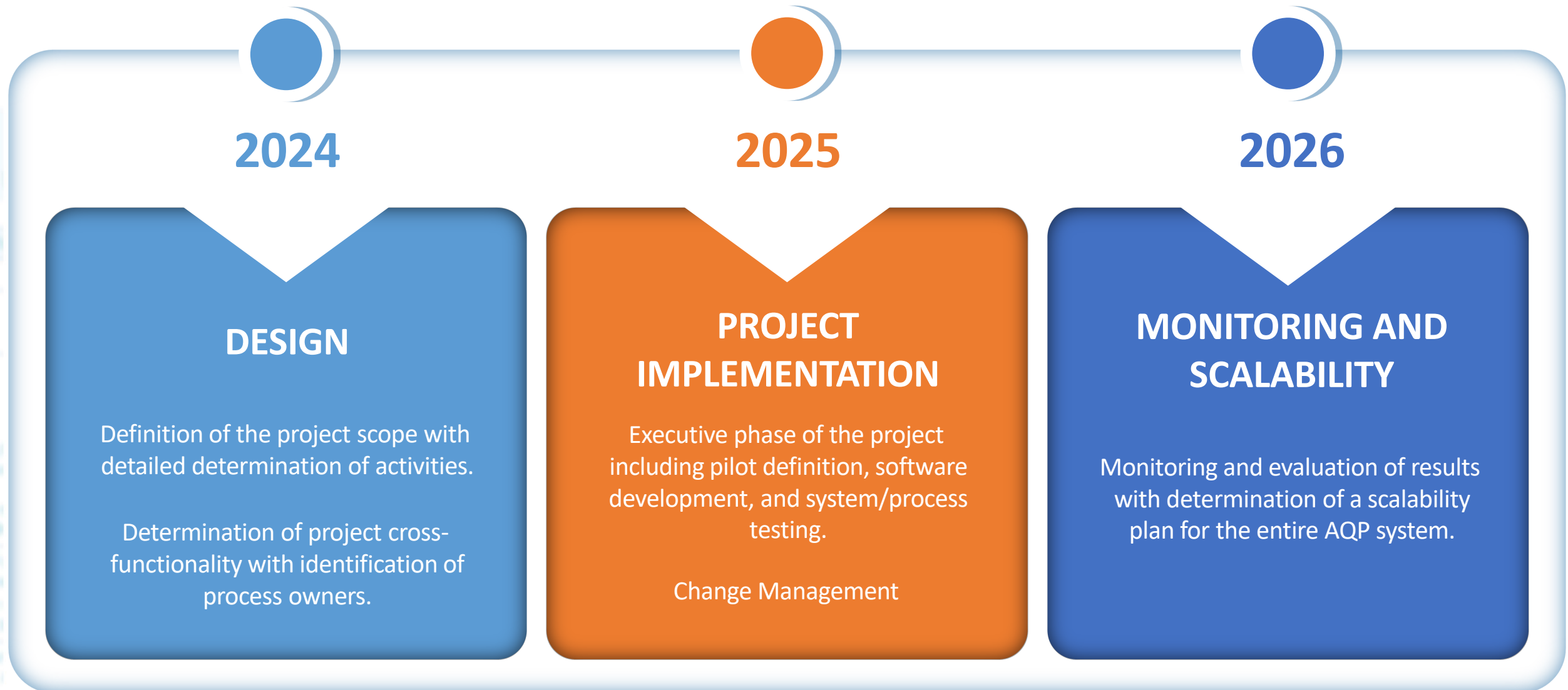
Assessment of water availability for different supply sources under various scenarios using impact models



Quantitative analysis  
– Risk assessment and identification of adaptation measures







### EU TAXONOMY OBJECTIVE



Transizione ad una economia sicura, climaticamente neutra, resiliente ai cambiamenti climatici, più efficiente in termine di risorse

### HOW



Redirecting capital flows towards sustainable investments aimed at achieving sustainable and inclusive growth.

### TOOL



The establishment of a unified classification system for sustainable activities.

With EU Regulation 2020/852, the European Commission has introduced into the European regulatory system the European Taxonomy, a unified framework establishing criteria to determine whether an economic activity can be considered environmentally sustainable. Its purpose is to identify the level of environmental sustainability of an investment and facilitate its financing.







### ACQUEDOTTO PUGLIESE'S OBJECTIVE UNTIL 2026

Corporate Sustainability Reporting (EU 2022/2464)

### HOW AQP APPROACHES THE ISSUE

Establishment of a **DELIVERY UNIT** to ensure project governance, given the importance of the topic.

### DELIVERY UNIT'S DELIVERABLES

Within 60 days, the DU ensured the following deliverables:

- Project timeline with projection to 2026
- Identification of the project governance model
- Operational planning of activities



### WHERE DID WE START FROM

#### 1st STEP

Analysis of the state of the art, which, through collaboration with AQP's internal departments involved in the assessment process, led to a GAP analysis regarding the objective of evaluating the taxonomy eligibility of activities carried out by Acquedotto Pugliese.

#### 2nd STEP

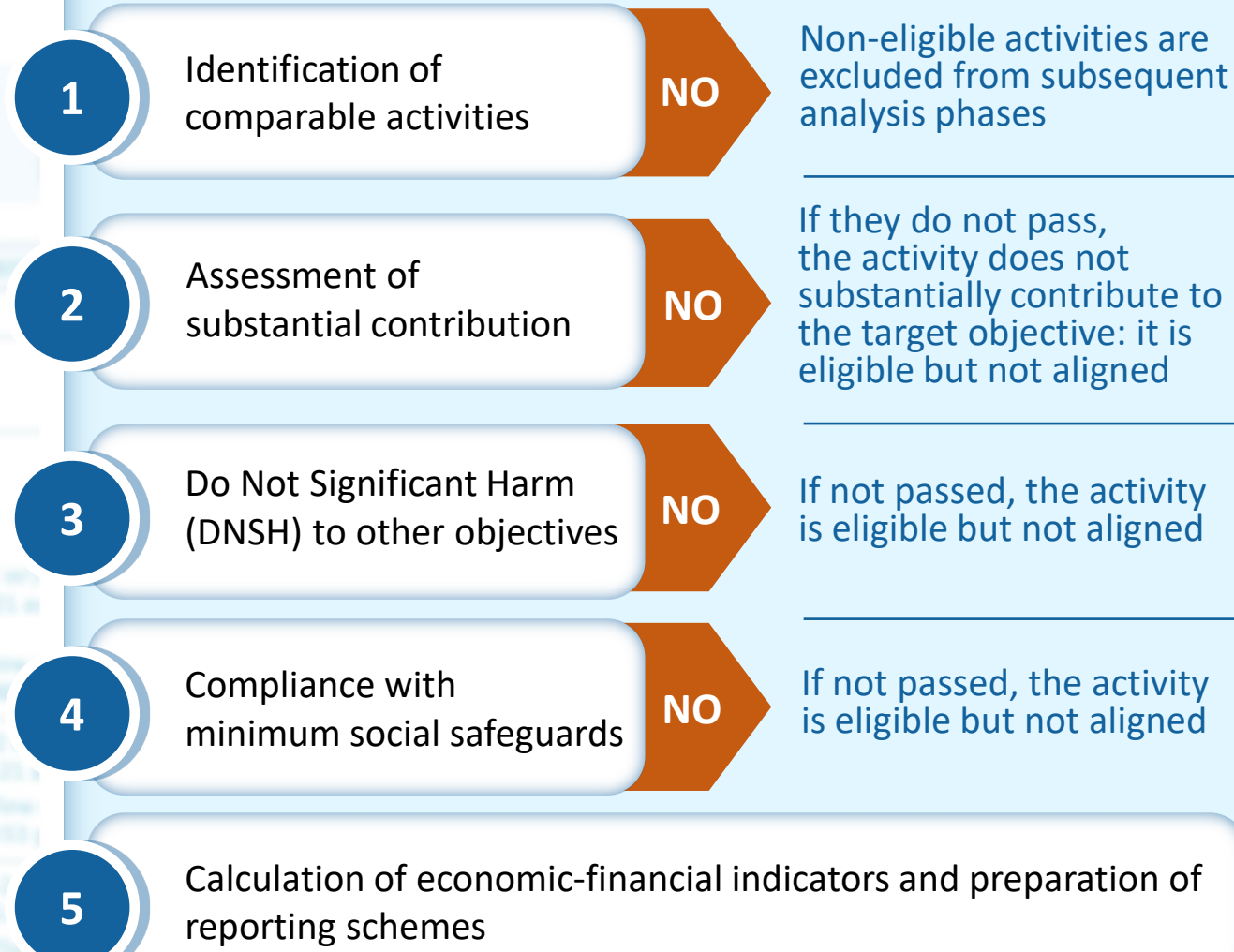
Study and analysis of official European regulations published to date:

- |             |             |
|-------------|-------------|
| ▪ 2020/852  | ▪ 2022/2464 |
| ▪ 2021/2139 | ▪ 2023/2485 |
| ▪ 2021/2178 | ▪ 2023/2486 |

#### 3rd STEP

Identification and involvement of internal AQP Process Owners, organization of working groups, and preliminary results from interactions with technical/administrative structures involved in the activity assessment process.

### IDENTIFICATION OF THE ASSESSMENT PROCESS FOR TAXONOMIC ACTIVITIES



### IDENTIFICATION OF A METHODOLOGY

The applied methodology was based on the requirements and criteria outlined in Regulation 2020/852, detailed in the technical aspects by Delegated Regulations EU 2021/2139, EU 2023/2485, and EU 2023/2486, and in the reporting aspects by Delegated Regulation EU 2021/2178.

#### PHASE 1

Identification of activities carried out by AQP included in the list of activities aligned with the Taxonomy.

Unification of taxonomic activity codes.

#### PHASE 2

Analysis of technical requirements and supporting documentation.

Assessment of technical screening criteria and DNSH (Do No Significant Harm) requirements for assets related to taxonomic activities.

Identification of the technical KPI drivers matrix

#### PHASE 3

Analysis of economic-financial data for eligibility:

- CAPEX
- OPEX
- REVENUES





# acquedotto pugliese

l'acqua, bene comune

**Acquedotto Pugliese Spa**  
**con Unico Azionista Regione Puglia**

Italy - 70121 Bari, Via Cognetti 36

[www.aqp.it](http://www.aqp.it)

