



# acquedotto pugliese

l'acqua, bene comune



**TAIEX TSI**  
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Workshop to support the implementation of the revised  
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– Nicosia 13-15 October 2025

## Increasing water efficiency in the urban water sector

Gianfredi Mazzolani, PhD

Director of the Department of Research, Development and International Activities



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# Who we are, what we do





- The region of Apulia has always been affected by **water scarcity**, known since the time of the Latin poet Orazio, who called it "**siticulosae Apuliae**".
- The history of Acquedotto Pugliese dates back to the **beginning of the XX<sup>th</sup> century**, when the Kingdom of Italy financed the project for the construction of a large regional transmission system (including a 244 km canal), a project of huge economic commitment and **unparalleled technical challenge**.



- Today, Acquedotto Pugliese (otherwise known as AQP) is the **largest publicly-owned Italian water company** and a leading European public player in the management of integrated water and wastewater systems.
- AQP is a joint stock company entirely **owned by the Government of Region Puglia**.



- The company is in charge of **the management of integrated water systems** in the region of Puglia (250 municipalities, 4 million inhabitants) and 12 municipalities in the neighboring region of Campania. It runs one of the largest water conveyance system worldwide: 5,000 km of large-diameter transmission pipes interconnected carrying water to all the urban centers.



- In 2024 the Italian Government recognized Acquedotto Pugliese as a "**Company of strategic relevance to the national interest**" (Law No. 191 of December 13, 2024).

# The solution to thirst

THE INTEGRATED SUPPLY AND TRANSMISSION SYSTEM IS  
AMONG THE LONGEST IN THE WORLD MORE THAN

**5.000 KM**



|                                                |                               |                                          |                          |
|------------------------------------------------|-------------------------------|------------------------------------------|--------------------------|
| Acquedotto Sele - Calore (Canale Principale)   | Acquedotto Ofanto             | Acquedotto Locone                        | Marzagaglia - Mercadante |
| Acquedotto Sele - Calore (Grande Sifone Lecce) | Acquedotto Alta Irpinia       | Primaria Capitanata                      | Casamassima - Canosa     |
| Acquedotto Sele - Calore (Ramo Adriatico)      | Acquedotto Fortore            | Intercapedine Canale Principale - Ofanto | Sinni Potabile           |
| Acquedotto Sele - Calore (Ramo Jonico)         | Acquedotto Pertusillo - Sinni | Andria - Bari                            | Raddoppio Ramo Adriatico |

Puglia 100%  
Campania 2%  
Basilicata 25%

**485**  
Mm<sup>3</sup>

Artificial lake

**56%**

**29%**

**15%**

..... Springs

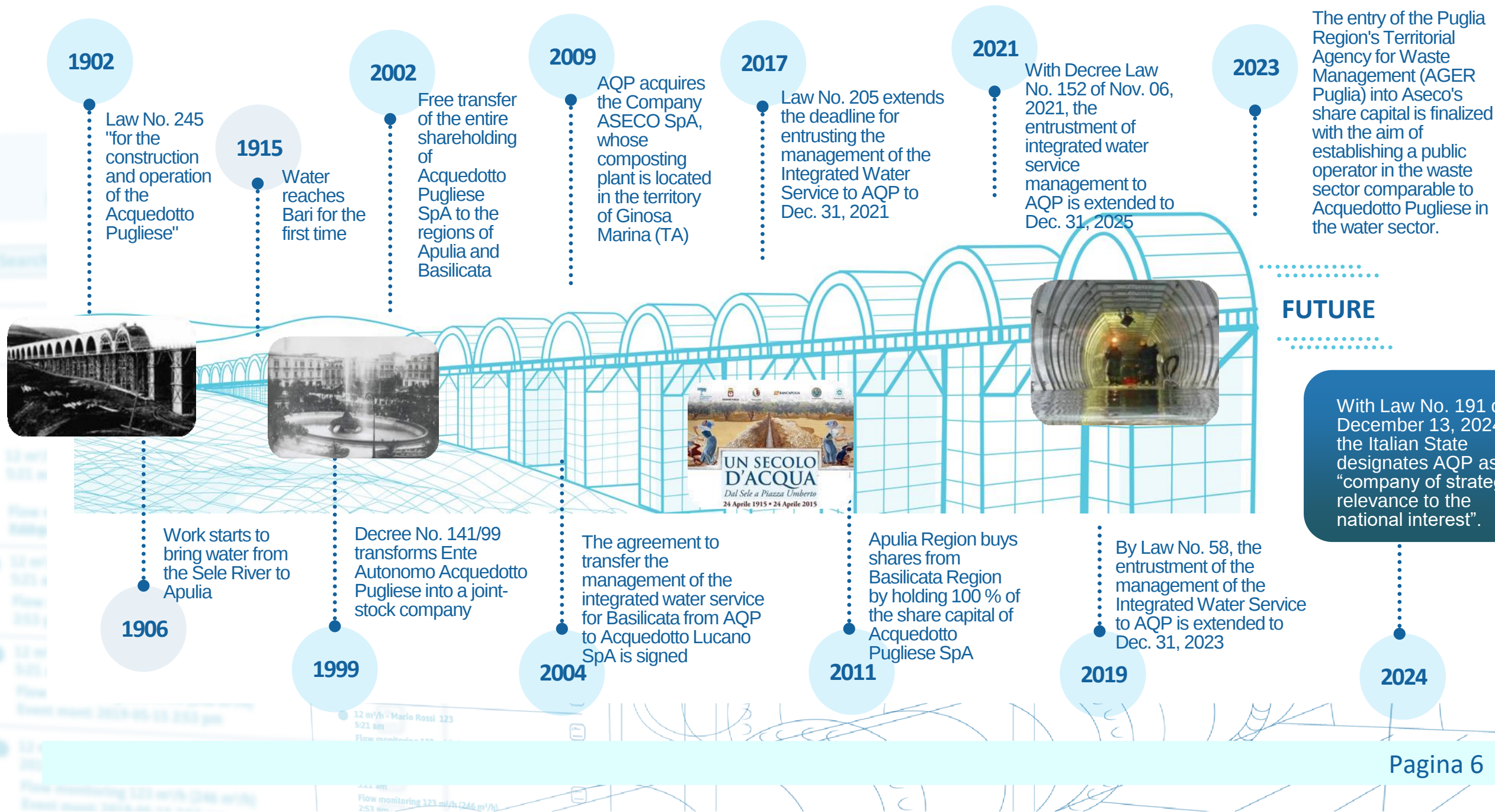
..... Wells

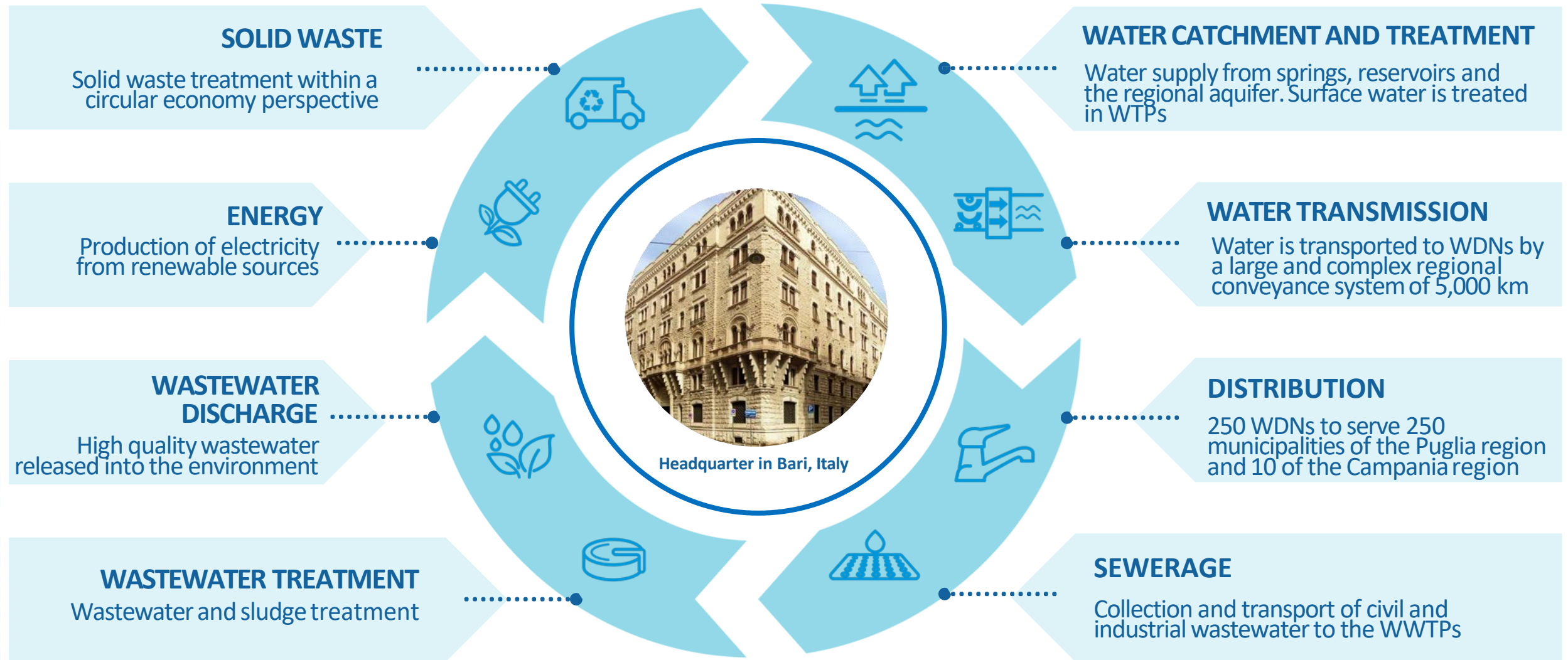
**The Sele-Calore is the oldest and longest main transmission pipe (free flow)**

It is an extraordinary work of hydraulic engineering  
It is important to tell that includes:

- **99 tunnels (with a total length of 109 km)**
- **91 canal bridges**
- **dozens of branches to urban areas**

# Historical landmarks





PLANNING AND OPERATION

PROCESS OPTIMIZATION

KNOWLEDGE ENHANCEMENT



**260**

Municipalities served  
water distribution



**248**

Municipalities served by  
the sewer system



**255**

Municipalities served by  
wastewater treatment



**+24 k km**

Water pipelines



**+13 k km**

Sewer pipelines

**2.290**

Employees

**100%**

With a permanent  
contract.

**119 k**

Hours of training

**52h**

(average training  
time per person)



**+1 M**

Customers  
served



**185**

Wastewater  
treatment plants



**1**

Composting  
plant



**45**

Water refining  
plant



**170 k ton**

Sludge  
produced

-2,8% compared to 2023



**170 k ton**

Sludge reused



**≈ 4 M**

Population  
served



**+3 billion**

Tenders issued  
from 2022 to 2024

Tenders awarded in 2024

**270**

Total value

**498 M€**



More than

**50 %**

of active contracts are  
awarded to companies  
based in Puglia



**7,04 GWh**

Electricity  
generated from  
renewable  
sources

**≈ 50k**  
samples

Approximately  
**1,3 M**  
parameters  
monitored for  
drinking and  
wastewater quality



**≈ 2.174 ton**

CO<sub>2</sub> emissions  
avoided



**€ 537,5 M**

Equity



**€ (349,4) M**

Net Financial  
Position



**€ 453,3 M**

Investments



**€ 696,4 M**

Production value



**€ 235,1 M**

Gross Operating  
Margin



**€ 8,4 M**

Net Income



**Baa3  
stable**

Moody's Rating



**6**

Ongoing  
research  
projects

# Water loss regulation and KPIs

## European level – The Drinking Water Directive (DIRECTIVE (EU) 2020/2184 16 Dec 2020)

According to Art. 4.3 Member States shall ensure that an **assessment of water leakage levels** within their territory and of the potential for improvements in water leakage reduction is performed using the **infrastructural leakage index (ILI) rating method or another appropriate method**.

The results of the assessment shall be communicated to the Commission by 12 **January 2026**.

By 12 January 2028, the Commission shall adopt a delegated act (...) by **setting out a threshold**, based on ILI or another appropriate method, above which Member States shall present an action plan.

Within two years of the adoption of the delegated act (...) Member States having a **leakage rate exceeding the threshold** set out in the delegated act shall present an **action plan** to the Commission laying down a set of measures to be taken in order to **reduce their leakage rate**.



- For the first time, EU will apply a **single method** for drafting the water balance and a **uniform system of KPIs** for evaluating the performances.
- The DWD Leakage Sub-group is largely **opposed to ILI**, since the majority of member states is in favor of the **linear loss indicator** (m<sup>3</sup>/d/km).
- Several reasons for opposing to ILI e to the percentage indicator (applied in Italy!). 🙄
- Choosing **effective KPIs** is crucial for driving correctly the high public expenditure for water loss reduction (pipe rehabilitation, DMAs, pressure control, etc.)

- Two “levels” of water regulation in Italy: a national level of **ARERA** (Autorità di Regolazione per Energia Reti e Ambiente), the Regulatory Authority for Energy, Networks and Environment and a local/regional level with **AIP** (Autorità Idrica Pugliese, Apulian Water Authority) in the Apulia region.
- Looking at water losses, a complex **incentive regulation is applied by ARERA** (no other similar method across Europe), whereas the task of AIP is to validate water balance and KPIs drafted by AQP, and approve the investment plan targeting the reduction of water losses, which is carried out by AQP.



**National level**



**Regional level**

## ARERA regulation of water losses

| Classes                     |                | M1a - perdite idriche lineari (mc/km/gg) |              |              |              |         |
|-----------------------------|----------------|------------------------------------------|--------------|--------------|--------------|---------|
|                             |                | M1a <12                                  | 12 ≤ M1a <20 | 20 ≤ M1a <35 | 35 ≤ M1a <55 | M1a ≥55 |
| Perdite idriche percentuali | M1b <20%       | A                                        |              |              |              |         |
|                             | 20% ≤ M1b <35% |                                          | B            |              |              |         |
|                             | 35% ≤ M1b <45% |                                          |              | C            |              |         |
|                             | 45% ≤ M1b <55% |                                          |              |              | D            |         |
|                             | M1b ≥55%       |                                          |              |              |              | E       |

## Annual target according to the class

| ID | Indicatore                               | Categoria tariffaria | ID Classe | Obiettivi        |  |
|----|------------------------------------------|----------------------|-----------|------------------|--|
| M1 | M1a - Perdite idriche lineari [mc/km/gg] | RES                  | A         | Mantenimento     |  |
|    |                                          |                      | B         | -2% di M1a annuo |  |
|    |                                          |                      | C         | -4% di M1a annuo |  |
|    | M1b – Perdite idriche percentuali [%]    |                      | D         | -5% di M1a annuo |  |
|    |                                          |                      | E         | -6% di M1a annuo |  |

## ARERA regulation of water losses (since 2018)

Two water losses KPIs applied in the ARERA regulations: 1) the linear indicator M1a (m<sup>3</sup>/km/d); 2) the percentage indicator M1b (%).

Water utilities are classified each year in one of 5 classes (A, B, C, D and E). The “worst” KPI between M1a and M1b prevails in defining the class.

Annual target reduction of M1a is defined according to the class.

A complex ranking system and money reward / penalty mechanism is applied every two years: utilities reaching the target are rewarded, otherwise penalized.

The method is under discussion because of several distortions caused by M1b.

AMSI was introduced in two 2024 research papers  
lead by prof. Orazio Giustolisi of the Technical University of Bari,  
both co-authored by Acquedotto Pugliese

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 **Routledge**  
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RESEARCH ARTICLE

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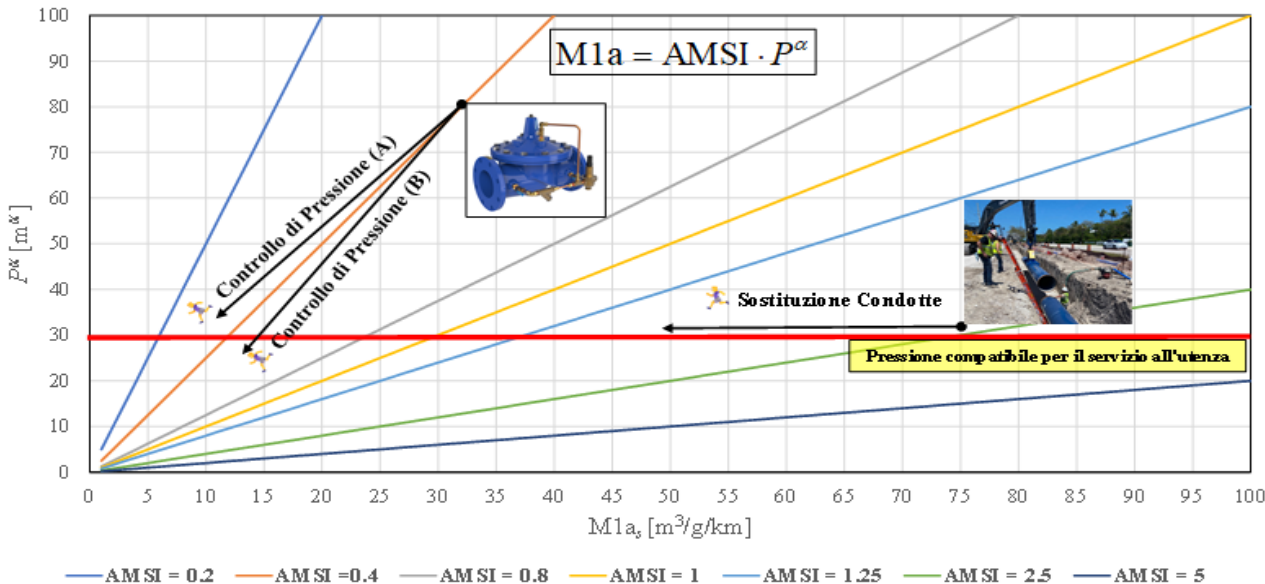
## Effectiveness of water loss performance indicators for asset management

Orazio Giustolisi<sup>a</sup>, Francesco Gino Ciliberti<sup>b</sup>, Gianfredi Mazzolani<sup>c</sup>  
and Domenico Laforgia<sup>b</sup>

<sup>a</sup>DICATECH, Technical University of Bari, Bari, Italy; <sup>b</sup>INGEO, University of Chieti-Pescara, Pescara, Italy; <sup>c</sup>Acquedotto Pugliese S.p.A, Bari, Italy

### ABSTRACT

**Introduction:** Water loss management in hydraulic infrastructures is a major concern for utilities worldwide since leakages undermine their economic, environmental and energy sustainability. Long-term investment plans for reducing leakage levels are often cost-intensive and always target a specific water loss performance indicator (WLPI). The choice of a proper and effective WLPI is thus a relevant issue because of its direct impact on the quality of public expenditure.



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From advanced hydraulic modelling to performance indicator for the  
efficiency of investments in leakage management of pressurized  
water systems

O. Giustolisi<sup>a,\*</sup>, G. Mazzolani<sup>b</sup>, L. Berardi<sup>c</sup>, D.B. Laucelli<sup>a</sup>

<sup>a</sup> Politecnico di Bari, via Orabona, 4, Bari, Italy

<sup>b</sup> Acquedotto Pugliese S.p.A., via Cognigni, 36, Bari, Italy

<sup>c</sup> Università degli studi "G. D'Annunzio" Chieti-Pescara, viale Pindaro, 42, Pescara, Italy

### ARTICLE INFO

**Keywords:**  
Drinking water infrastructures  
Water distribution networks  
Hydraulic modelling  
Performance indicators

### ABSTRACT

**Introduction:** The digital transition is meant as the review of processes using digital technologies and strategies to increase efficiency based on a simpler collection of representative data. The process of interest here is the leakage management in systems distributing water.

**Objective:** To develop a novel key performance indicator (KPI) for leakage management considering the needs of ongoing digital transition in the water sector, which is opening a new era in the management of drinking water infrastructures.

**Methodology:** The novel KPI, named Asset Management Support Indicator, is developed starting from advanced hydraulic modelling and the physical laws governing leakage outflows, in order to be physically based and rational for increasing the efficiency of leakage management activities using representative process data.

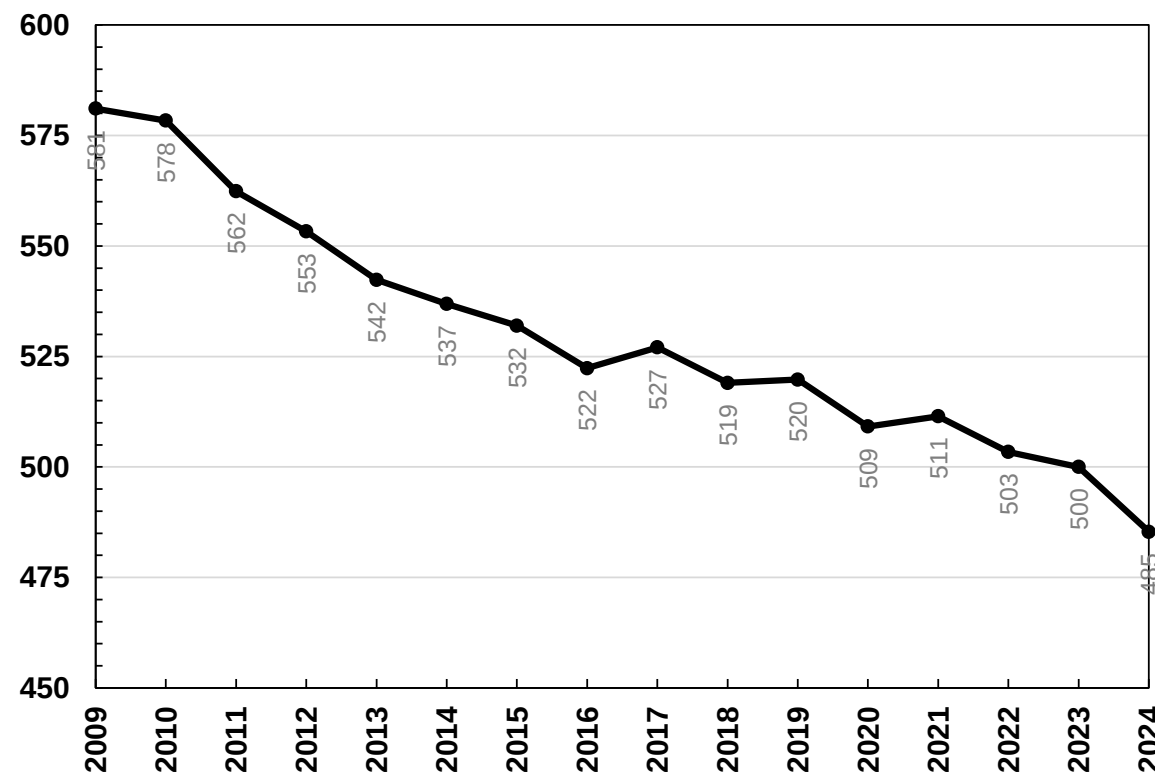
**Results:** The Asset Management Support Indicator supports effective leakage management strategies by driving towards efficiency, as discussed and demonstrated using several real case studies.

**Conclusion:** The novel indicator is consistent with the digital transition perspective and current need of increasing the efficiency of water utilities, and it is also suitable to be adopted by water authorities to benchmark their performances, because it overcomes the weaknesses of traditional KPIs.

# Tackling water losses:

## Best practices of Acquedotto Pugliese

Water volume produced by Acquedotto Pugliese  
2009-2024 (Mm<sup>3</sup>)



# Best practice #1 – The Control Room



The Control Room is a centralized space for driving the digital transformation

24/7 Call Center for failure management

SCADA and GIS management

Pressure management and MNF analysis in DMAs

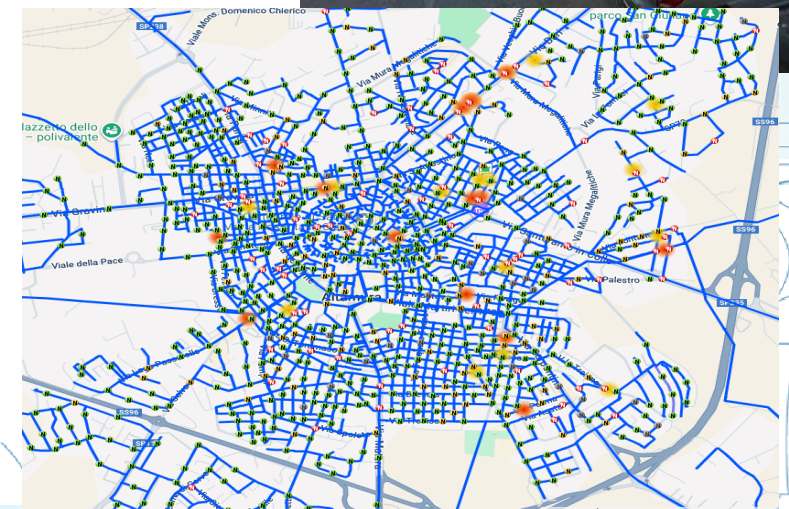
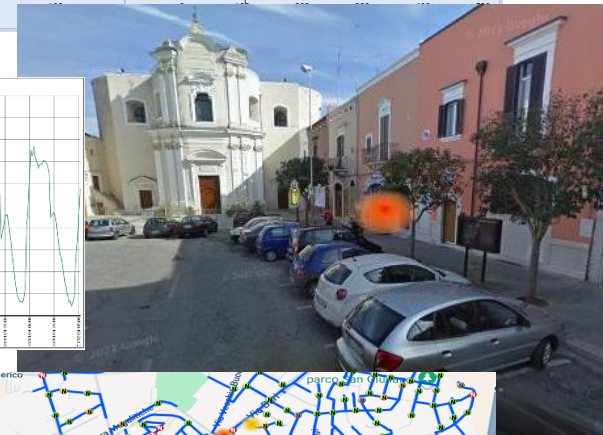
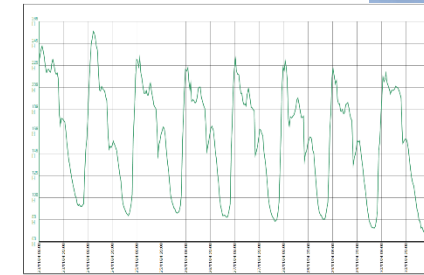
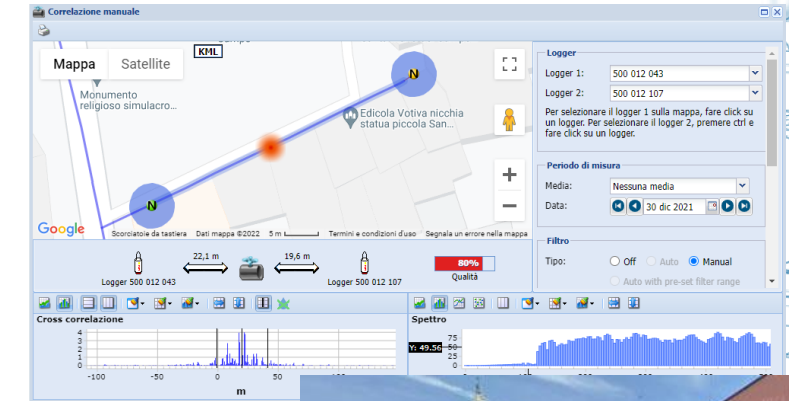
Leakage monitoring and control

Real time and forecast simulation with **advanced hydraulic modeling**

# Best practice #2 – Deploying 20,000 noise-loggers in WDNs



- **Noise-logger technology with correlation function** and data transmission through NB-IoT protocol is one of the most effective method for leakage permanent monitoring and prompt pinpointing in WDNs.
- Daily data transmission and leakage management through a dedicated platform.
- The system enables to virtually reduce to zero the time between the formation of a new unreported leakage and its repair.
- Acquedotto Pugliese is carrying out the deployment of **one of the largest noise-logger project worldwide** (if not the largest): 20,000 devices under installation in around 4,000 km of mains in 34 municipalities.



# Best practice #3 – The smart metering plan



- **Advanced Metering Infrastructures** provide several benefits to water utilities: i) improving water balance and WDNs efficiency; ii) control of apparent losses; iii) no consumption estimate in billing; iv) post-meter leakage detection.
- **Ultrasonic water meters** transmitting data with **LoRaWAN protocol** represent a proven and effective solution for building an AMI.
- In 2021 Acquedotto Pugliese started **the largest Italian smart metering plan**: the 10-year replacement of >1,000,000 mechanical meters with electronic meters to be managed in a fixed network.

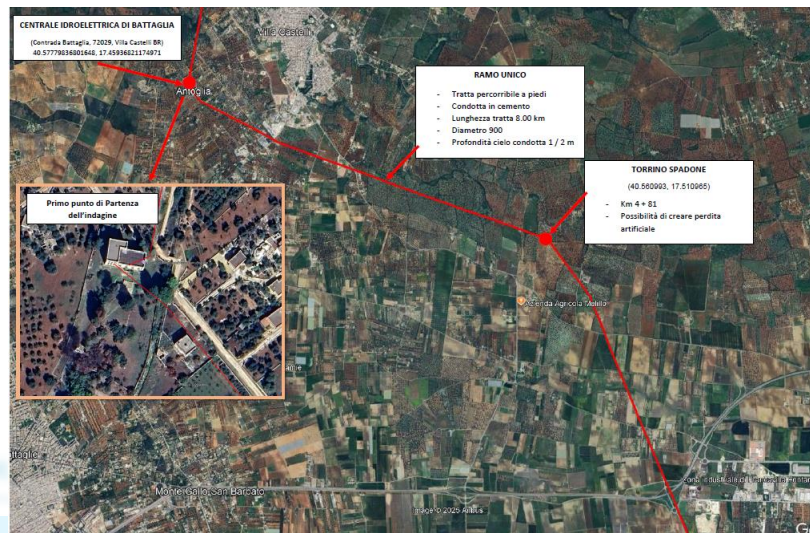


- 360,000 mechanical meter replaced with ultrasonic water meters so far.
- LoRaWAN communication infrastructures in two provinces. Meter Data Management (MDM) platform under deployment.

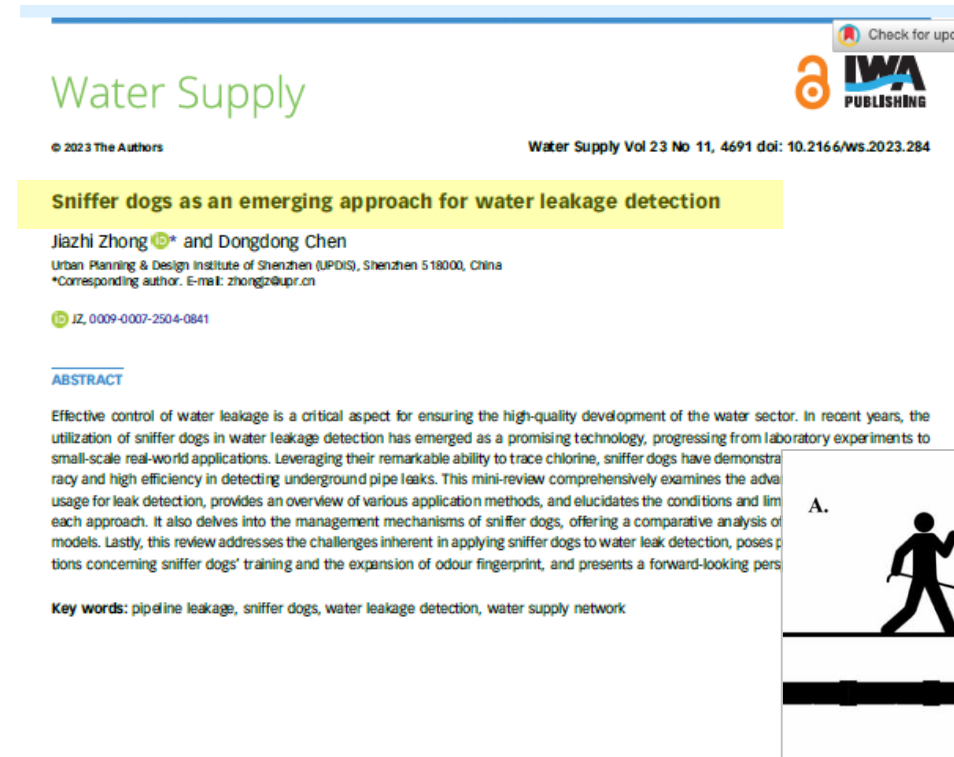


# Best Practice #4 – Sniffer dog for detecting leaks in transmission pipes

- AQP is the first Italian water utility testing a **sniffer dog** for pinpointing leaks, and one of the few utilities worldwide applying this “nature-based” solution in the last ten years (Australia, UK, US, France and Morocco).
- Dogs are **natural biosensors** because they have 220 million odor receptors compared to 5 million in humans.
- According to the 2023 IWA paper *Sniffer dogs in water leakage detection has emerged as a promising technology (...). Leveraging their remarkable ability to trace chlorine, sniffer dogs have demonstrated an impressive accuracy and high efficiency in detecting underground pipe leaks.*



- The only Italian sniffer dog is a **labrador retriever named Ippolito**, trained by an innovative breeder of environmental dogs from the Marche region.
- Testing the ability of Ippolito to detect leaks in our transmission pipes (accounting 5,000 km of total length) is in progress.



**Thank you for the attention!**



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Gianfredi Mazzolani, PhD

Director of the Department of Research, Development and  
International Activities

[g.mazzolani@aqp.it](mailto:g.mazzolani@aqp.it)



# acquedotto pugliese

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

Italy - 70121 Bari, Via Cognetti 36

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

