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WATER-REUSE TECHNOLOGIES

WASTEWATER TREATMENT – AN ASSET FOR THE REGION

WASTEWATER TREATMENT PLANT

A sophisticated and highly technological facility where wastewater from our homes, collected through the sewage system, undergoes a biological treatment process to be either reused or safely returned to the natural water cycle.

AQP manages 185 wastewater treatment plants

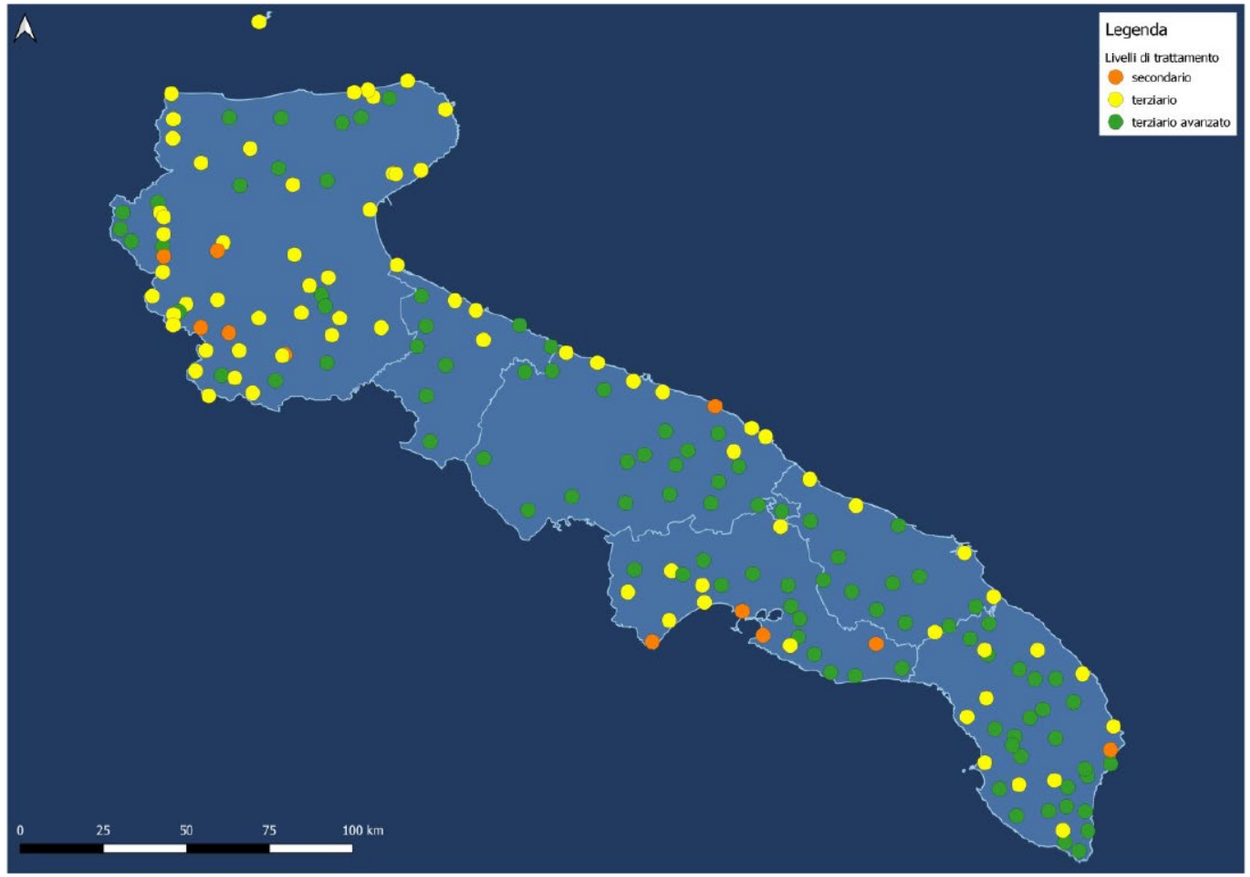
A treatment infrastructure among the largest and most advanced in Italy, both in terms of technology and water quality.

In these plants, wastewater treatment is exclusively biological: thanks to decomposing microorganisms, the so-called "good bacteria," the natural purification process is replicated in a controlled and accelerated manner within a confined space.

Wastewater treatment plants serve as sanitary safeguards, protecting both the territory and the environment.

TREATMENT LEVELS IN OPERATIONAL WASTEWATER TREATMENT PLANTS IN PUGLIA

AQP manages 185 wastewater treatment plants



- **13 plants** with a capacity of ≤ 2,000 PE;
- **52 plants** with a capacity between 2,000 and 10,000 PE;
- **110 plants** with a capacity between 10,000 and 100,000 PE;
- **10 plants** with a capacity of ≥ 100,000 PE.

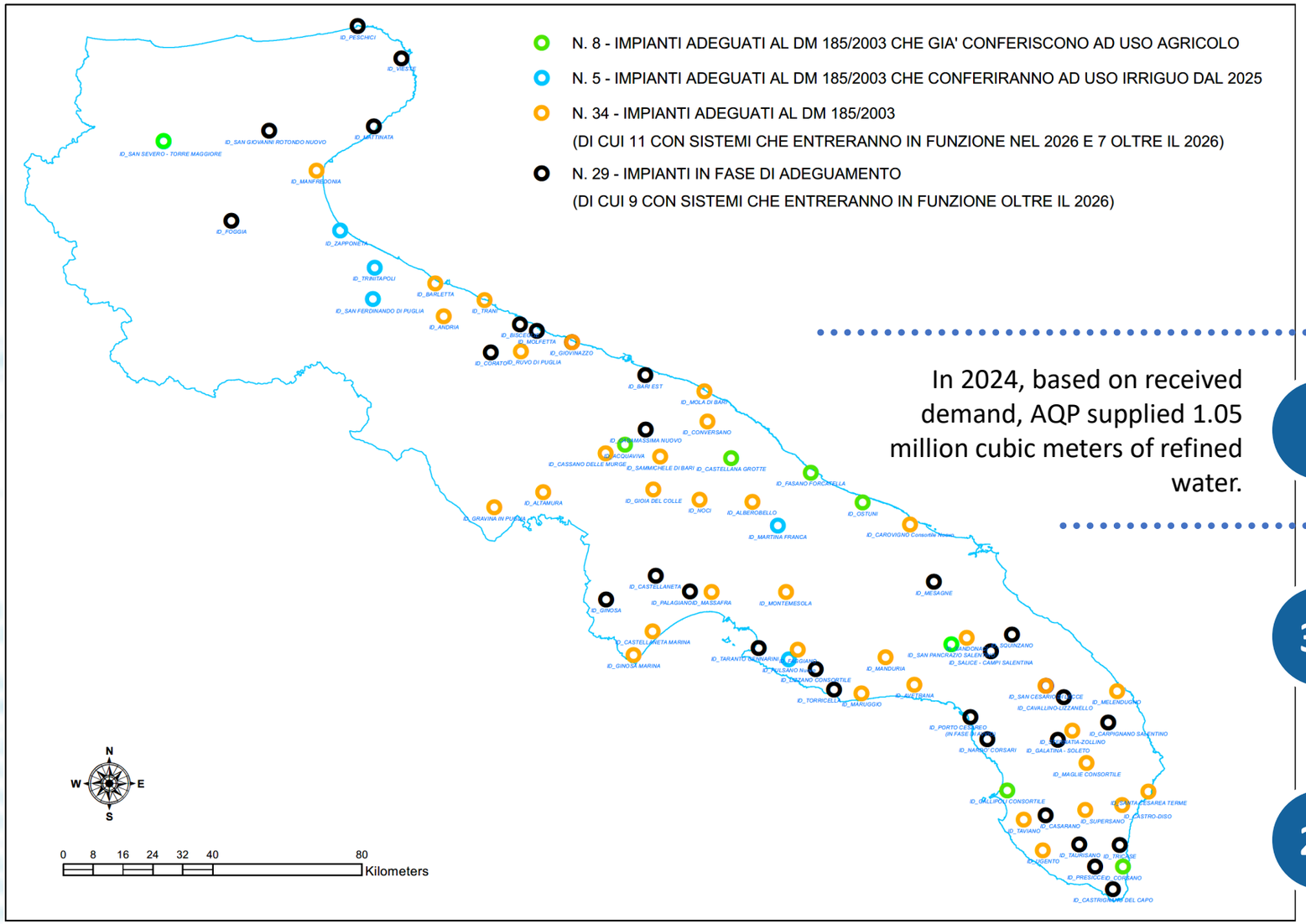
Since 2008 (ref. Regional Law No. 27/2008), the Puglia Region, with the aim of promoting water reuse for irrigation purposes, has assigned the Integrated Water Service operator the additional responsibility of wastewater refining.

10 plants with secondary treatment — **5%**

175 plants with tertiary or advanced tertiary treatment — **95%**

REUSE OF REFINED WATER

AQP's plan until 2028



In 2024, based on received demand, AQP supplied 1.05 million cubic meters of refined water.

76
Plants out of a total 185

~132 Mmc/y
Reusable resource

8 Operational plants — Capacity of ~ 15 Mmc/y

39 Configured plants — Capacity of ~ 55,5 Mmc/y

29 Plants with Scheduled Interventions by 2028 — Capacity of ~ 61,5 Mmc/y

REUSE OF REFINED WATER

The 76 planned or completed infrastructure upgrades

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8 Operational plants > Capacity of ~ 15 Mmc/y

Prov.	Impianto	mc/y	Stato
BA	ACQUAVIVA	1.474.600	Operativo
BA	CASTELLANA GROTTE	725.255	Operativo
BR	FASANO FORCATELLA	3.115.640	Operativo
BR	OSTUNI	1.565.850	Operativo
BR	SAN PANCRAZIO SALENTINO	604.440	Operativo
FG	SAN SEVERO - TORRE MAGGIORE	4.337.295	Operativo
LE	CORSANO	485.085	Operativo
LE	GALLIPOLI CONSORTILE	2.611.210	Operativo

Projected capacity per province by 2028

Bari	31 Mmc/y
BAT	17 Mmc/y
Brindisi	11 Mmc/y
Foggia	25 Mmc/y
Lecce	26,5 Mmc/y
Taranto	21,5 Mmc/y

39 Configured plants > Capacity of ~ 55,5 Mmc/y

Prov.	Impianto	mc/y	Stato
BA	NOCI	1.457.080	Adeguato
BA	ALBEROBELLO	424.495	Adeguato
BA	ALTAMURA	4.665.065	Adeguato
BA	CASSANO DELLE MURGE	672.330	Adeguato
BA	CONVERSANO	23.360	Adeguato
BA	GIOIA DEL COLLE	2.190.000	Adeguato
BA	GIOVINAZZO	1.140.260	Adeguato
BA	GRAVINA IN PUGLIA	1.915.155	Adeguato
BA	MOLA DI BARI	2.119.190	Adeguato
BA	RUVO DI PUGLIA	3.263.830	Adeguato
BA	SAMMICHELE DI BARI	846.435	Adeguato
BAT	ANDRIA	4.908.520	Adeguato
BAT	BARLETTA	4.897.570	Adeguato
BAT	SAN FERDINANDO DI PUGLIA	674.885	Adeguato
BAT	TRANI	2.699.905	Adeguato
BAT	TRINITAPOLI	738.760	Adeguato
BR	CAROVIGNO Consortile Nuovo	2.763.050	Adeguato
BR	SANDONACI	313.900	Adeguato
FG	MANFREDONIA	4.176.330	Adeguato
FG	ZAPPONETA	196.370	Adeguato
LE	CASTRO-DISO	663.570	Adeguato
LE	MAGLIE CONSORTILE	3.124.400	Adeguato
LE	MELENDUGNO	1.308.890	Adeguato
LE	SAN CESARIO DI LECCE	1.729.370	Adeguato
LE	SANTA CESAREA TERME	237.980	Adeguato
LE	STERNATIA-ZOLLINO	107.675	Adeguato
LE	SUPERSANO	540.565	Adeguato
LE	TAVIANO	947.175	Adeguato
LE	UGENTO	590.570	Adeguato
TA	AVETRANA	119.355	Adeguato
TA	CASTELLANETA MARINA	570.860	Adeguato
TA	FAGGIANO	175.930	Adeguato
TA	GINOSA MARINA	459.900	Adeguato
TA	MANDURIA	0	Adeguato
TA	MARTINA FRANCA	1.606.000	Adeguato
TA	MARUGGIO	308.790	Adeguato
TA	MASSAFRA	1.691.775	Adeguato
TA	MONTEMESOLA	262.800	Adeguato
TA	PULSANO Nuovo	1.002.655	Adeguato

31 Plants with Scheduled Interventions by 2028 > Capacity of ~ 61,5 Mmc/y

Prov.	Impianto	mc/y	Stato
BA	BARI EST	365.000	2028
BA	CASAMASSIMA NUOVO	1.048.645	2025
BA	CORATO	3.872.285	2025
BA	MOLFETTA	4.827.490	2025
BAT	BISCEGLIE	3.020.010	2025
BR	MESAGNE	2.370.675	2028
FG	FOGGIA	13.089.630	2027
FG	MATTINATA	269.005	2025
FG	PESCHICI	259.150	2028
FG	SAN GIOVANNI ROTONDO	1.497.230	2028
FG	VIESTE	1.177.855	2028
LE	CARPIGNANO SALENTINO	498.225	2026
LE	CASARANO	3.133.890	2026
LE	CASTRIGNANO DEL CAPO	1.195.010	2026
LE	CAVALLINO-LIZZANELLO	1.281.880	2025
LE	GALATINA - SOLETO	1.511.100	2026
LE	NARDO' CORSARI	1.293.925	2025
LE	PORTO CESAREO	-	2025
LE	PRESICCE	477.055	2025
LE	SALICE - CAMPI SALENTINA	1.835.585	2025
LE	SQUINZANO	1.664.035	2028
LE	TAURISANO	302.585	2025
LE	TRICASE	1.035.140	2028
TA	CASTELLANETA	780.370	2028
TA	GINOSA	1.012.510	2028
TA	LIZZANO CONSORTILE	1.281.880	2028
TA	PALAGIANO	874.540	2026
TA	TARANTO GENNARINI	11.408.075	2028
TA	TORRICELLA	190.165	2027

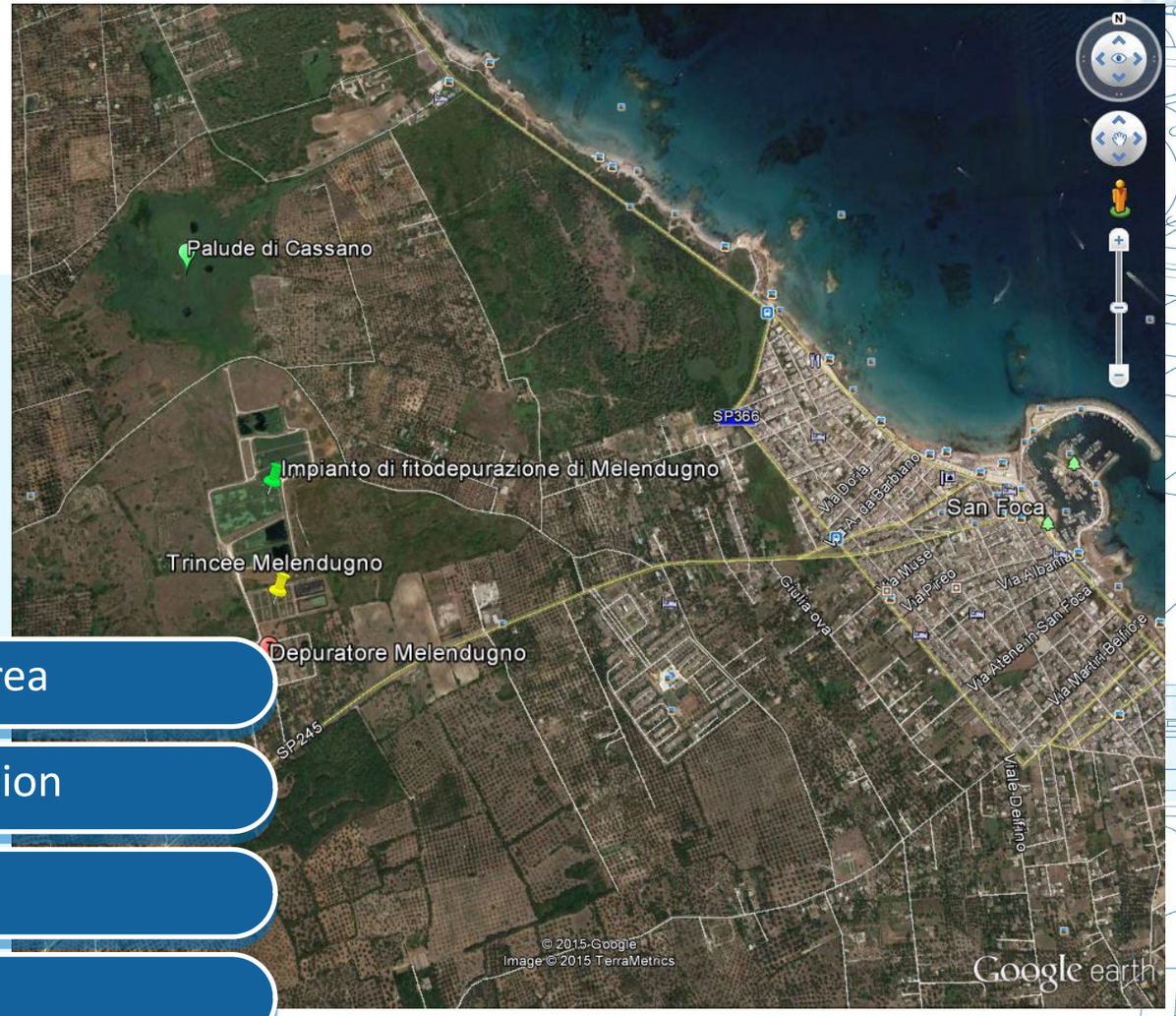
TREATED WASTEWATER: A RESOURCE FOR ENVIRONMENTAL REUSE

MELENDUGNO PHYTOREMEDIATION SYSTEM

The constructed wetland treatment system is fed by water from the wastewater treatment plant serving the municipalities of Melendugno, Calimera, and Martignano.

Wastewater Treatment Plant Capacity

- Population Equivalent **43.500 P.E.**
- Average Daily Flow **9.000 m³/day**
- Peak Flow **600 m³/h**



5.1 ha of water surface within an **8.3 ha** green area

Up to **9,000 m³/day** with no electricity consumption

4 horizontal flow constructed wetland basins

4 lagooning tanks with a 70 cm water depth

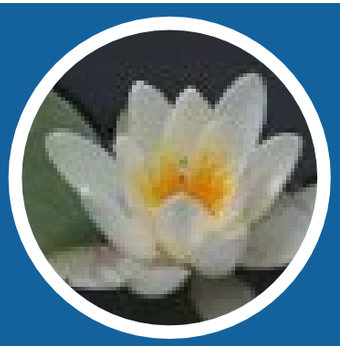
MELENDUGNO CONSTRUCTED WETLAND – THE FLORA

COMMON DUCKWEED

COMMON REED

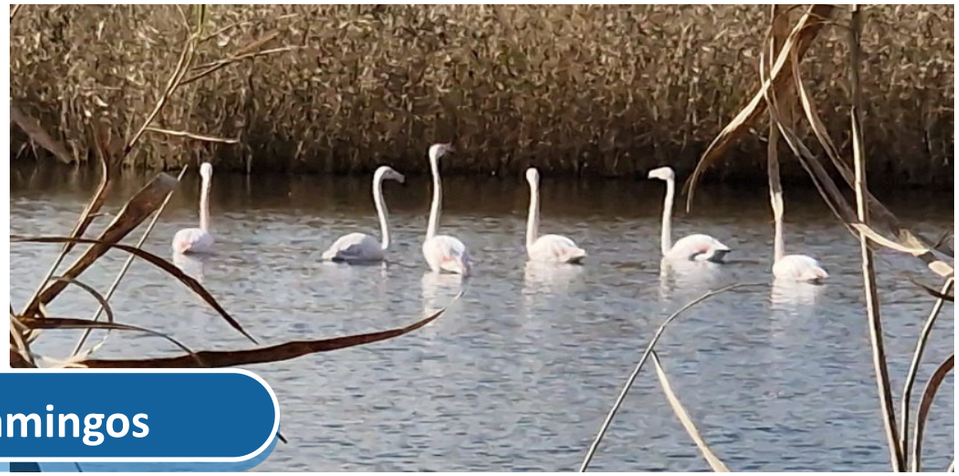
BROADLEAF CATTAIL

COMMON RUSH



WHITE WATER LILY

MELENDUGNO CONSTRUCTED WETLAND – THE FAUNA



Flamingos

Amphibians

Reptiles

Insects

INVESTMENTS IN EFFICIENCY IMPROVEMENT

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
TOTAL	**€ 87.900.000**	**€ 116.000.000**

WATER NETWORK RENEWAL

Renewal 1

Period: 2005-2010
Municipalities involved: 143
Total network length: 463 km
Investment: € 151.000.000
Water recovered: 24 Mm3/y

Project completed

Renewal 2

Period: 2011-2016
Municipalities involved: 95
Total network length: 93 km
Investment: € 62.000.000
Water recovered: 11 Mm3/y

Project completed

Renewal 3

Period: 2021-2024
Municipalities involved: 21
Total network length: 113 km
Investment: € 80.000.000
Water recovered: 11,5 Mm3/y

Project completed

Renewal 4

Period: 2023-2029
Municipalities involved: 143
Total network length: 1.304 km
Investment: € 795.000.000
Projected recovery: 31,1 Mm3/y

Project in progress

INVESTMENTS FOR EFFICIENCY IMPROVEMENTS

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**

ALTERNATIVE SOURCES

Desalination

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

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.

ALTERNATIVE SOURCES

Other hypotheses under study

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.

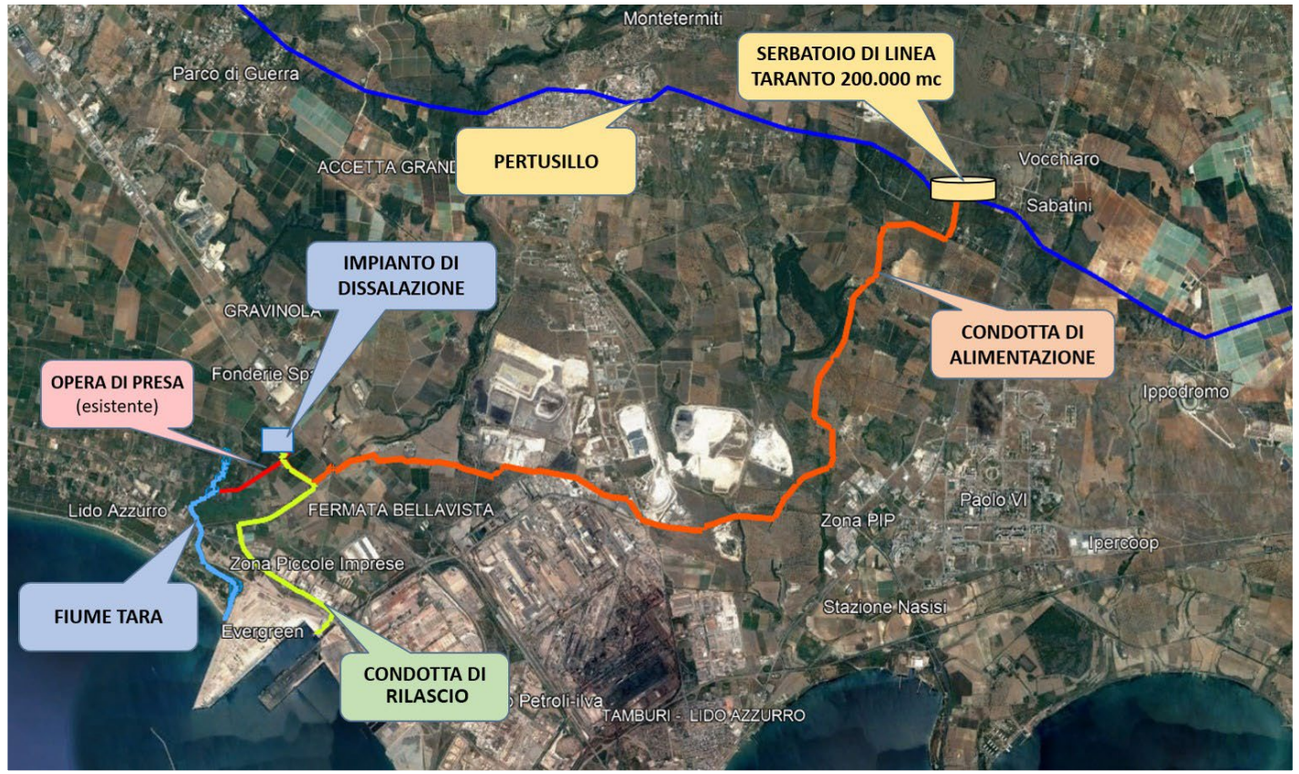
ALTERNATIVE SOURCES

Taranto desalination plant

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 be **completed by 2026**.

CHANGE MANAGEMENT

Digital innovation – Control Room and Smart Water Management

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

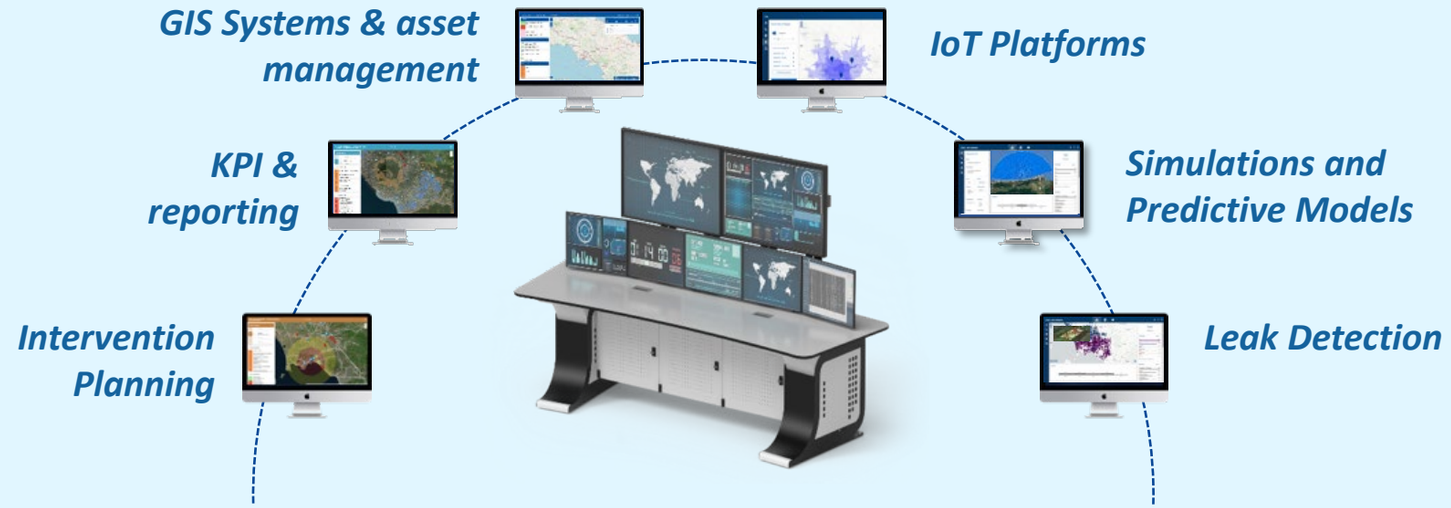
more than 14,000 km of sewer networks

AQP is a leader in integrated water management.
The company operates 185 wastewater treatment plants, 47 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**.

CHANGE MANAGEMENT

Smart 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

CHANGE MANAGEMENT

Smart Water Management

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

INPUT

- Mapping (GIS)
- Remote Monitoring (SCADA)
- Fault Detection (TS)
- ERP (SAP)
- Smart Meter

SMART MONITOR

OUTPUT

- Digital Twin Network
- District Metered Areas (DMA)
- Water Balances (RT)
- Measure-Oriented Hydraulic Modeling(RT)
- Leak Monitoring
- Field Intervention Management
- Emergency Response Management

CHANGE IN PROCESS MANAGEMENT

CHANGE MANAGEMENT

Control Room

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.

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.

CHANGE MANAGEMENT

NOISE LOGGERS - Digital Innovation in Leak Detection

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

acquedotto pugliese

l'acqua, bene comune

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