

Smart water services helping Macao achieve water sustainability





Conserving precious fresh water

Macao, one of the world's most densely populated cities, is a peninsula where freshwater is so scarce that about 96%¹ of the city's raw water comes from Zhuhai. Macao's location at the Pearl River Estuary makes it highly vulnerable to the threat of salt tides. It is therefore vital to conserve freshwater resources and ensure the quality and safety of the water supply.

On the other hand, with an area of around 33 square kilometers, Macao has over 680,000 residents and welcomes over 30 million tourists from all over the world each year. The booming tourism and gaming industries inject economic vibrancy, boost social development and drive demand for safe water.

¹ Data from the Marine and Water Bureau of the Macao SAR.

SUEZ, a part of
the Macao community
for over **30** years



With a history in the water and waste sectors stretching back over 160 years, SUEZ draws on its extensive expertise to preserve and restore essential elements of the environment. We help people constantly improve their quality of life, by protecting their health and supporting economic growth.

In 1985, the Group acquired an 85% share in Macao Water. The same year, we signed a 25-year water supply concession contract with the Macao Government, to provide the city with full water services. This contract, the first water supply concession contract of SUEZ in Asia, was extended by 20 years in 2009. Thanks to its excellence in management and service delivery, Macao Water is now **the most successful Public-Private Partnership (PPP) model, and a benchmark for China's water industry.**

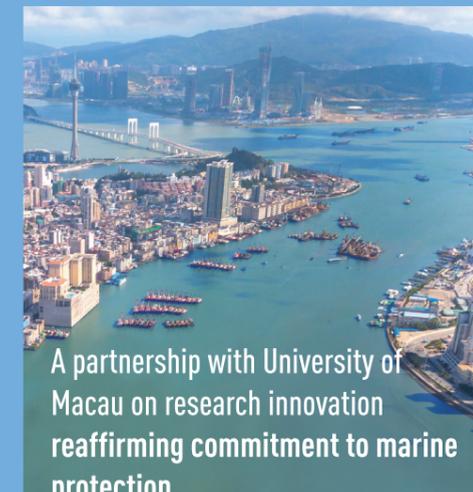
Reliable and quality water services

Reinforcing Macao's resilience and prosperity

Since 1985, SUEZ has introduced different solutions to meet Macao's growing demand, while preserving scarce water resources. We are committed to delivering reliable and high-quality drinking water that **meets both Macao and European drinking water standards, and surpasses World Health Organization guidelines.**

Our water treatment plant uses the most advanced water processing techniques. Using the Group's proprietary technologies, we incorporate smart water into water supply systems and manipulate urban water supply, with big data. This further optimizes water supply facilities and the operational efficiency of the water network, to consistently supply high-quality drinking water to all Macao citizens and industries.

520,000 m³
daily water treatment capacity



Integration of industry's most comprehensive treatment processes

- Aquazur V
- Pulsator
- Mediazur V
- AquaDAF
- The most advanced AquaDAF plus ultra-filtration process
- Pulsazur® powder activated carbon contactor

Mature smart water solutions

- AQUADVANCED® Network Performance
- AR technology
- Smart metering
- Digitalizing services

Achieved benefits



Conserve
water resources



Minimize
energy consumption



Promote
efficacy of asset operation and management



Enhance
water quality, drinking water transcends the standard of World Health Organisation

In 2020, SUEZ, Macao Water, and the University of Macao signed a cooperation framework under which the three parties will combine their resources in scientific research and marine ecosystem conservation, establish an ambitious joint research platform to explore innovative research in the offshore ecosystem and water treatment technology (among other fields) and combine to protect the marine environment, while also enriching marine biodiversity.

Digitalizing water services

Building a water-conserving smart city to achieve water sustainability



In the past few years, the Macao government has accelerated progress towards its smart city vision by utilizing digital technology and serving people through smart solutions. Smart water is an important part of this vision. Leveraging on the Group's global experience and solutions, SUEZ has been implementing these solutions in our daily activities to help Macao make the **most productive use of water resources** and improve its resilience.

For example, China has set a target to bring the **leakage rate** from urban public water supply networks to **below 9% by 2025**. Macao Water has been leading the world in terms of non-revenue water, outperforming even this official target 10 years ahead of the Government's target. This enables it to continue playing a leading role, as a showcase, in the region.

8%

NRW in Macao

has plummeted from 18.1% in 1985 to around 8%² today, a world-leading standard

2M m³

water conserved per year equal to the water consumption about 3,200 households

² Data as of end of 2022



AQUADVANCED® water networks optimizes performance efficiency

Since introducing this system in 2014, we can now monitor water network to guarantee the safety of the water delivered to end-users. It also tracks anomalies in the network, through data analysis, to reduce the occurrence of water pipe bursts. Thanks to its excellence in management with this smart solution and service delivery, Macao Water has significantly reduced the non-revenue water rate from 18.1% in 1985 to around 8% at present, far beneath the Asian average and among the global category leaders. Due to the substantial reduction in pipe leakages, we have helped save 2 million m³ of water per year, equal to the water consumption of about 3,200 households.



AR Technology manages underground pipework

Because of Macao's narrow streets and compact city landscape, we explore a hybrid solution of AR technology and a geo-information management system to enable visual management of pipelines and valves through secondary positioning with GPS and machine vision.



Self-innovated solution to ensure water quality and safety

We have innovated a safer, faster and more sensitive and precise detection method, using Droplet Digital Polymerase Chain Reaction (DDPCR) technology to absolutely quantify water-borne pathogens in water supply systems. This solution is the first of its kind to be deployed in the Macao's water industry. It further ensures the water quality and safety.



Smart Metering raises awareness of water conservation

In 2017, SUEZ pioneered a smart metering scheme in Macao. Through real-time consumption records, we can now analyze users' water consumption patterns and alert users to leakages. This optimizes meter reading and billing management, reduces the need for human recording of meter measurements, and eliminates inaccuracies. Users with smart meters can check their weekly water usage and review water consumption over a seven-day period. They also receive notifications about water usage abnormalities by subscribing to the Water Consumption Alert.

Seac Pai Van Water Treatment Plant

Meeting Macao's growing demand for the next decade

When constructing a smart city, "green building" is a critical factor in accelerating urban sustainability development. **Controlled carbon emissions** and **enhanced energy efficiency** in buildings reduces carbon footprints. Constructed and operated by SUEZ, the Seac Pai Van Water Treatment Plant in Macao is one of the best examples in driving community water conservation efforts.

Featuring a green building design, the new treatment plant, incorporated alongside natural sunlight and ventilation to reduce its energy footprint, was awarded the first Green Building Design Label of its kind in Macao. The plant has become the demonstration base for public education in water treatment and conservation. With a daily treatment capacity of 130,000 m³, the plant was commissioned in 2021. This has increased Macao Water's combined supply capacity from 390,000 m³/day to **520,000 m³/day, enough to meet Macao's growing demand for the next 10 years.**

Green building reduces carbon footprint



- ⇒ Using a combination of efficient pumping systems and natural sunlight and ventilation to reduce energy footprint.
- ⇒ Reclaimed water can be reused for greening sites, road irrigation, water supply for flush toilets. Backwash water is reclaimed for treatment, averting freshwater wastage.
- ⇒ Application of patented Pulsatube®, Pulsazur® and Aquazur-V filtration water treatment technologies to control chemical consumption flexibly.
- ⇒ Integrated design structure, to achieve space saving, energy saving, water saving, material saving and environmental protection effects.

Seac Pai Van Water Treatment Plant granted **first-ever** Green Building Design Label of its kind in Macao



Combination of green building & smart technology **facilitating** energy efficiency & low carbon emission



Driving innovation for unrivalled service excellence

Digital services further boost customer satisfaction

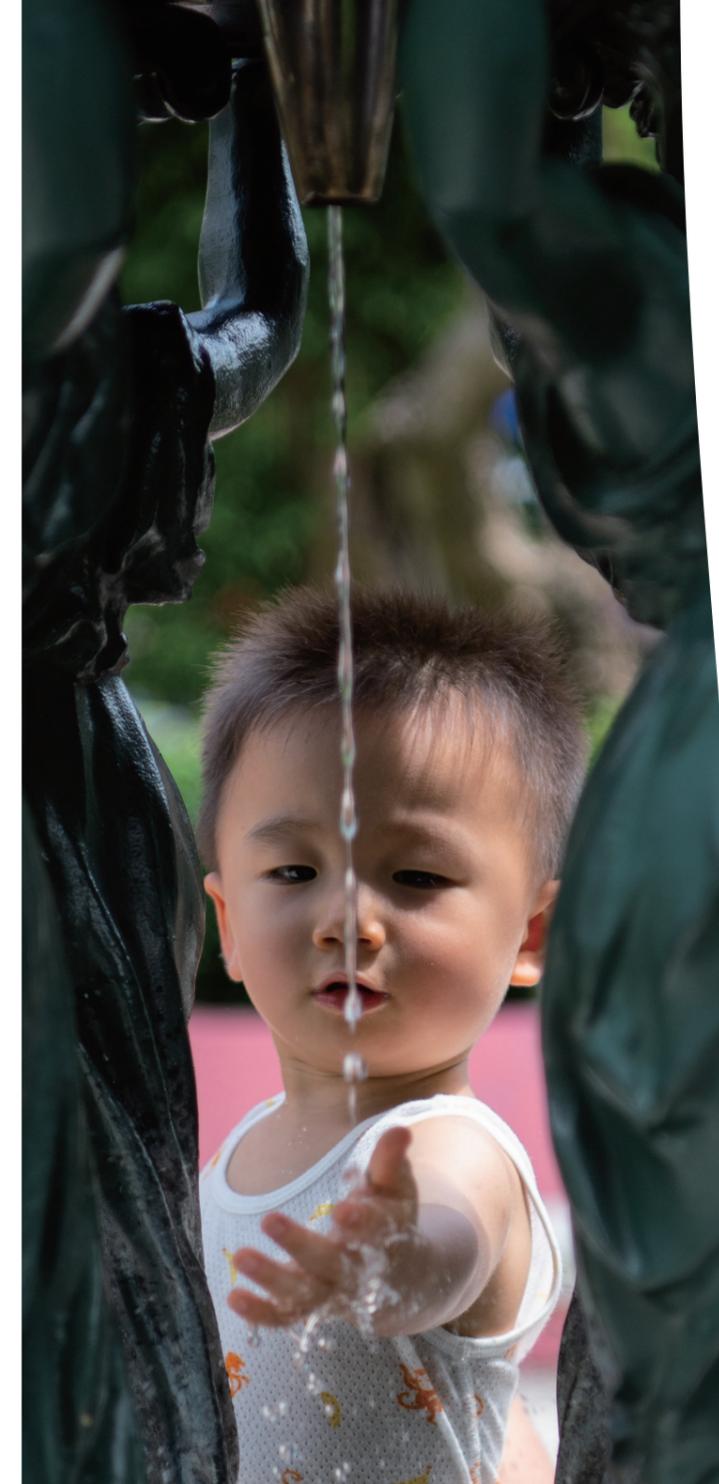
High-quality customer service is central to water management. To ensure customers get their issues addressed swiftly and have access to on-demand support, Macao Water links its WeChat service account to smart metering. In this way, we get accurate, up-to-date information on users' water consumption and water use habits.

Users with smart meters receive and pay their bills online, where they can also view water quality reports, manage multiple water accounts and schedule smart meter installations. Through this digital platform, they stay informed about the weekly variations in their water consumption patterns in a timely manner.

In addition to digital customer service, Macao Water set up a customer hotline, a customer service centre and a dedicated Customer Liaison Group consisting of the executive team members, customer representatives, and 23 groups from business, civil organizations and Consumer Council. Doing so has enhanced the efficiency of communications with the government, industry customers, associations and city residents. It also allows to deliver timely updates on continuous service improvements.

83.8%

Customer support rate in 2022, ranking first in Macao's public service



It's more than service it's a mission

Creating shared value for all

We're committed to this local community, not just as service providers, but as partners. This opportunity to contribute to the ecological transformation is the foundation of our mission at SUEZ, which is to preserve the fundamental elements of our environment.

In recognition of Macao Water's commitment to water conservation outreach, support for local community engagement, gender equality, women's career development, and attention to employees' work-life balance, the company is a multiple winner of the Most Socially Responsible Water Company in China Award, the Outstanding Corporate Volunteer Award on International Volunteer Day, and the Best Family-Friendly Employer Award.



89%

local employees



40%

women in management



Practice Base of the School of Environment, Tsinghua University



the **Medal of Merit for Professions** by the Macao SAR Government in 2022



Most Inspiring Climate Smart Case under the IWA's Climate Smart Utilities Initiative Recognition Program



Most Socially Responsible Water Company in China



Best Family-Friendly Employer

* figure of 2022



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