TERRA50

NEWater
High-Grade Water Reuse

ORGANIZATION / INITIATIVE LEAD

PUB Singapore — National water authority under the Ministry of Sustainability and the Environment, leading the development of NEWater as part of Singapore's diversified water-supply strategy.

TECHNICAL SOLUTION NAME

NEWater — High-Grade Water Reclamation

HIGHLIGHT TITLE

Turning treated wastewater into high-grade reclaimed water to strengthen water security in a densely populated, water-constrained city-state.

SHORT DESCRIPTION

NEWater converts treated wastewater into high-grade reclaimed water through membrane filtration, reverse osmosis and ultraviolet disinfection. Primarily supplied to industry, it also supports indirect potable reuse through reservoirs. Introduced in 2003 as part of Singapore's "Four National Taps" strategy, it provides a rainfall-independent resource that reduces pressure on conventional freshwater supplies.

EXTENDED DESCRIPTION

Limited land, freshwater resources and dependence on imported water have shaped Singapore's approach to water security. NEWater, introduced in 2003, addresses these constraints by reclaiming treated wastewater as a resource within the national "Four National Taps" strategy, alongside local catchments, imported water and desalination.

Following conventional wastewater treatment, water undergoes three purification stages. Membrane filtration removes suspended particles and microorganisms; reverse osmosis removes dissolved salts and other contaminants; and ultraviolet disinfection provides an additional microbial barrier. Monitoring and quality testing support the safety and consistency of the resulting water.

Most NEWater serves industrial and cooling applications, including processes requiring highly purified water, such as semiconductor manufacturing. A smaller quantity is introduced into reservoirs for indirect potable reuse, where it mixes with raw water before undergoing further treatment for drinking-water supply.

The approach connects wastewater management with water-supply planning, retaining resources within the urban water cycle. Its contribution extends beyond treatment technology: long-term investment, quality assurance and public education have helped establish reclaimed water as a dependable component of Singapore's supply. Production capacity has expanded progressively since its introduction.



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DEMONSTRATED METRICS

- Introduced into Singapore's water supply in 2003
- Reported capacity to meet up to 40% of national water demand
- 3 advanced purification stages: membrane filtration, reverse osmosis and UV disinfection
- 4 full-scale plants, according to the supplied information
- Water quality assessed against WHO drinking-water guidelines
- Supplies both industrial applications and indirect potable reuse

REAL IMPACT

NEWater has diversified Singapore's water resources by converting treated wastewater into a usable supply. Its production is less dependent on rainfall than local catchments, supporting resilience during dry periods and reducing reliance on other sources.

Industrial users receive a consistent supply of high-grade water, reserving more conventional freshwater for other needs. Indirect potable reuse also contributes to the wider drinking-water system through reservoir blending and subsequent treatment.

The programme demonstrates how advanced treatment, monitoring and public communication can support water reuse at national scale. Its transferability depends on wastewater collection, energy supply, technical capacity and sustained investment in safe operation and maintenance.

IMPLEMENTATION LOCATION & DATE

Singapore. Introduced in 2003, with production expanded progressively across multiple treatment plants during the 2000s–2020s.

TECH LEVEL

High Tech. Combines advanced membrane treatment, reverse osmosis, UV disinfection and water-quality monitoring.

MAIN CATEGORY

Primary: Energy & Environment
Secondary: Infraestructure & Building

COST OF THE SOLUTION

HIGH. Requires specialised treatment plants, membrane systems, energy, monitoring and maintenance. No specific investment or production-cost figures provided.

MITIGATION / ADAPTATION

Adaptation

BASE INFORMATION SOURCES

- PUB Singapore — NEWater
- PUB Singapore — NEWater Quality
- Project information supplied for the Terra50 profile

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