

# Powering Singapore’s Next Generation of Semiconductor Manufacturing

Xylem delivered a 700 m<sup>3</sup>/day ultra-pure water system with world-class purity, fast-track execution and built-in capacity for future fab expansion.

A global manufacturer established a new advanced semiconductor-focused manufacturing facility in Singapore to support growing demand across the Asia-Pacific region. The facility required a highly reliable ultra-pure water (UPW) system designed to meet stringent semiconductor process requirements and a tight delivery window.

## The challenge

The project presented several key challenges:

- High UPW demand of approximately 700 m<sup>3</sup>/day, with provision for 30% future capacity expansion
- Stringent water quality specifications, including resistivity, TOC, boron, silica, and trace contaminants
- Tight project timeline for design, delivery, installation, and commissioning
- Water efficiency expectations, aligned with Singapore’s regulatory and sustainability objectives
- Alignment of technical requirements and expectations across multiple project stakeholders

The customer required a partner capable of addressing these challenges through robust process design, integrated solutions, and strong execution support.

“Throughout the project, the Xylem team provided consistent technical guidance and strong cross-functional coordination, ensuring alignment across stakeholders and maintaining momentum against a demanding timeline.”



Image 1 Vantage® PTI Multimedia Filtration for pre-treatment.

## End user

Global semiconductor-focused manufacturing facility, Singapore.

## Solutions

End-to-end Ultra Pure Water system

## Project results

- Delivered on time with 30% expansion capacity
- Achieving stringent semiconductor-grade water quality
- 63% higher water recovery
- \$650K/year OPEX savings and long-term reliable performance

## The solution

Xylem Water Solutions and Services partnered with the customer to deliver a comprehensive, end-to-end ultrapure water (UPW) solution, combining process engineering, advanced treatment technologies, and lifecycle services.

The engagement began with a deep-dive technical audit of the facility's operating conditions and stringent purity requirements. This resulted in a scalable design featuring Vantage® PTI Multimedia Filtration and Vantage PTI Activated Carbon Filtration for robust pretreatment, followed by Vantage™ Reverse Osmosis (RO). To meet the extreme purity standards required for semiconductor manufacturing, we implemented Ionpure® VNX Ultra CEDI for advanced deionization, and ATG™ UV systems for TOC removal. To maximize sustainability, we integrated a dedicated RO reject recovery system, significantly reducing water waste and lowering long-term operational expenditure (OPEX).

Navigating a strict 14-month timeline during a period of global resource scarcity required a proactive procurement strategy. We leveraged our global network and long-standing vendor relationships to prioritize and secure long-lead items, such as PVDF piping and electrical components, well ahead of schedule. This global reach, combined with a phased delivery model, insulated the project from market volatility and ensured all critical hardware arrived on-site in time for commissioning.

Our commitment extends beyond the build via a comprehensive lifecycle service package, including a dedicated Operation & Maintenance (O&M) contract, ensuring the system maintains peak performance from day one.

## The results

Through a process-led solutions and services approach, the UPW system was successfully delivered and commissioned within the required timeframe.

Key outcomes included:

- A 700 m<sup>3</sup>/day ultra-pure water system, engineered with provision for 30% future capacity expansion
- Reliable and consistent achievement of stringent semiconductor-grade water quality, including resistivity up to 18.2 MΩ·cm, TOC at 1 ppb, boron less than 50 ppt, silica below 1 ppb, and ppt-level control of metals, ions, and other trace contaminants.
- Improved overall water recovery by 63%, reducing raw water consumption by 15 m<sup>3</sup>/h and yielding \$650K in annual OPEX savings
- A system designed for long-term reliability, operational flexibility, and maintainability
- Reduced project risk through early technical alignment and strategic phased execution model
- The customer required a partner capable of addressing these challenges through robust process design, integrated solutions, and strong execution support.



Multimedia filtration (Image 1) integrates with Vantage™ RO (left) and Ionpure® VNX Ultra CEDI (right) to deliver ultrapure water system.



“The project was successfully completed safely and in full compliance with requirements. We especially appreciate the leadership of the project management team and the continued support from the site and sales teams throughout execution.”

By focusing on process design, solution integration, and lifecycle services, Xylem enabled the customer to establish a reliable and efficient ultra-pure water supply critical to advanced semiconductor manufacturing, while supporting water efficiency and future growth objectives.