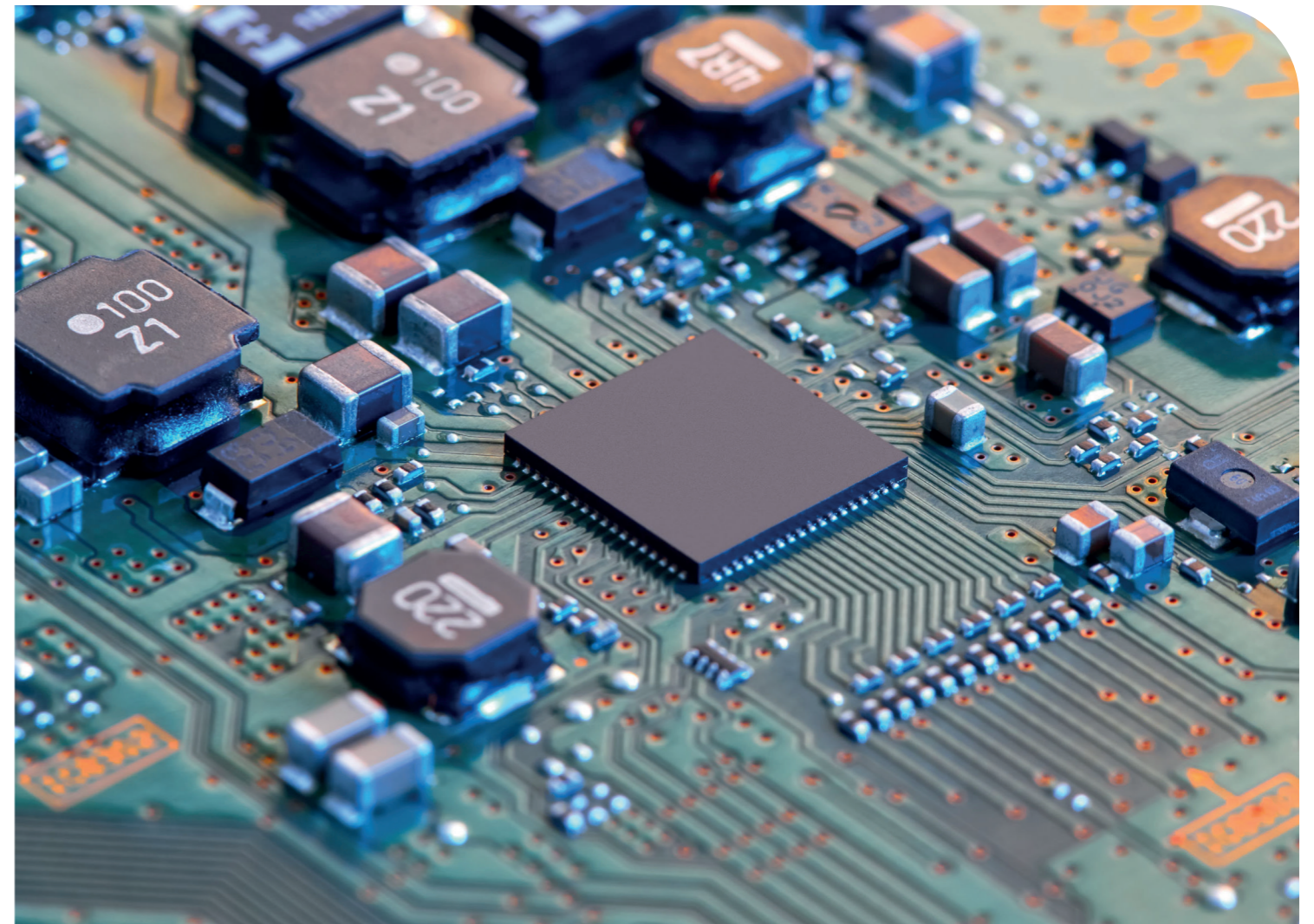


Resourcing the world



Sustainable Water Management for the Microelectronics Industry

Veolia Water Technologis Asia Pacific
[LinkedIn](#) marcom.apac@veolia.com
www.asia.veoliawatertechnologies.com

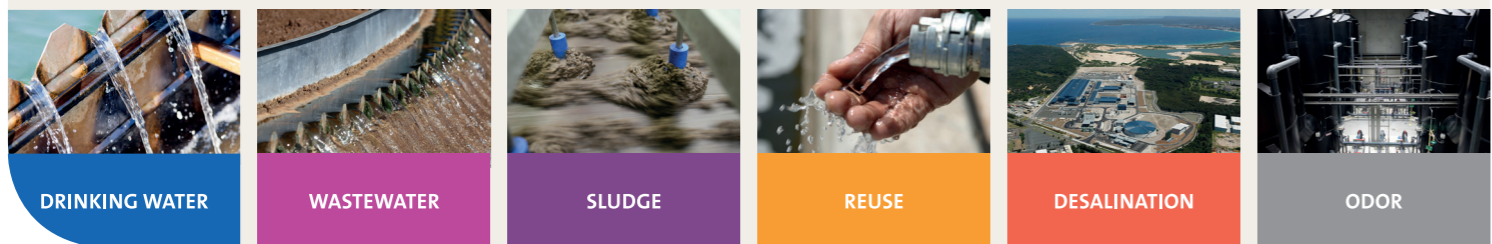
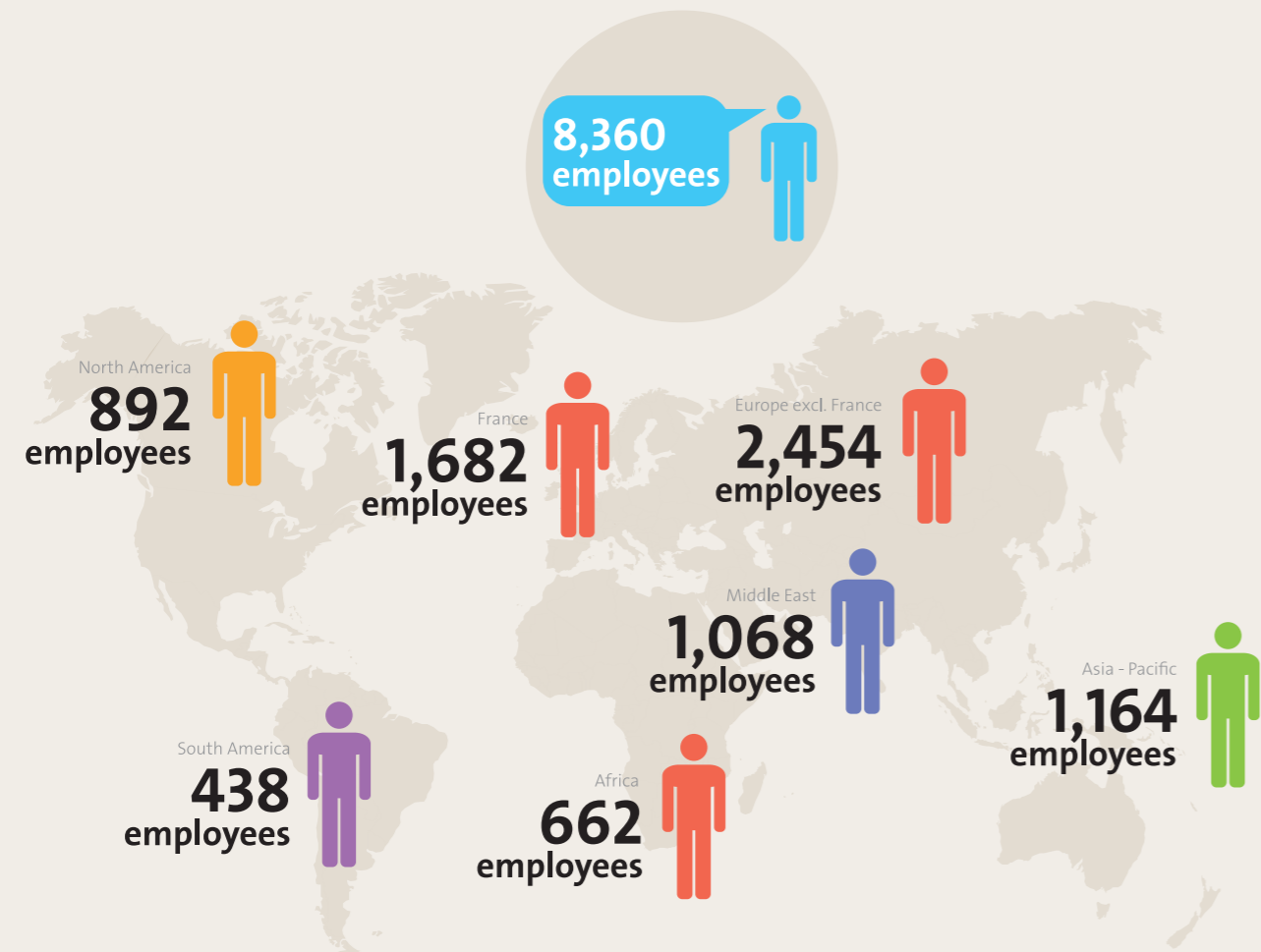
About Veolia Water Technologies

Veolia Water Technologies specializes in technological solutions, provides the complete range of services required to design, deliver, maintain and upgrade water and wastewater treatment facilities for industrial clients and public authorities.

Our portfolio features everything from online diagnostic solutions to evaporation and crystallization, energy-producing sludge treatment, state-of-the-art desalination, laboratory-grade water and mobile water services.

Our experts deliver the water treatment solutions that improve the quality of people's lives in communities around the world. The performance of these installations depends on the creativity and commitment of our more than 8,360 employees.

Our global expertise is within your reach through extensive local technical support adapted to local regulatory requirements and market needs.



Contact us

Veolia Water Technologies (SEA) Pte Ltd

6 Serangoon North Avenue 5 #05-05
Singapore 554910
Tel: +65 6 715 5200

Veolia Water Technologies Phils.inc.

#16 , Philcrest Compound, Km
23 West Service Road, Cupang, Muntinlupa City
1771 - Philippines
Tel : +632 809 4011 • Fax : +632 809 4017

Veolia Water Technologies SDN BHD & Veolia

Water (Malaysia) Holding SDN BHD
Unit 20-1 and 20-2, Level 20, Mercuri 3, No. 3,
Jalan Bangsar KL Eco City
59200 Kuala Lumpur, Malaysia
Tel: +603 2264 1818 • Fax: +603 2264 1881

Veolia Water Technologies Vietnam

Suite 9.2, 9th Floor, E-town 1 Building,
364 Cong Hoa Street, Ward 13, Tan Binh District,
Ho Chi Minh City, Vietnam
Tel: +84 (0) 8-38127757 • Fax:+84 (0) 8-38127759

PT Veolia Water Technologies Indonesia

Ventura Building 6th floor suite 605
Jl. R.A. Kartini 26,
Jakarta Selatan 12430
Indonesia
Tel: +62 21 750 4707 • Fax: +62 21 750 4708

Veolia Water Technologies Taiwan Corporation

4F, N° 14, Lane 609, Section 5, Chung-Shing
Road Sanchung, Taipei County, Taiwan
Tel: +886 2 2278 1006F • Fax: +886 2 2278 1002

Veolia Water Technologies (Thailand) Ltd.

No. 954/1724 The Metropolis Samrong Building,
Room 331, 3rd Floor, Moo 9, Sukhumvit Road,
Thepharak Samut Prakan 10270
Tel: +66 2 088 8496 Fax: +66 2 653 2208

www.veoliawatertechnologies.com/asia
Linked Veolia Water Technologies Asia
marcom.apac@veolia.com

Veolia Water Technologies (Beijing)

22/F, Office Building 1 & 2 Tower, Beijing Landmark
Towers, 8 North Dongsanhuan Road, Chaoyang
District
100004 P.R. - Beijing, China
Tel: +86 10 59532000
Fax: +86 10 6590 6822



Veolia Water Technologies (Shanghai)

Room 1201-1206 & 1210-1212, CITIC Square
1168 West Nanjing Road, Jing'an District
Shanghai 200001, P.R. China
Tel: +86 21 6193 8088
Fax: +86 21 6193 4499

Our Global Experience



One of the world leaders in semiconductors manufacturing Penang, Malaysia

- > Design, build & commission Ultrapure Water (UPW) treatment
- > Wafer fabrication application
- > Capacity of 175 m³/hr.
- > TOC: < 2 ppb ; SiO₂: < 1 ppb ; DO: < 20 ppb ; Na: < 10 ppt ; Cl: < 20 ppt
- > Primary mixed bed



Global leader in System-on-Chip (soc) and semiconductor solutions Singapore

- > Design, build & commission Ultrapure Water (UPW) treatment
- > Expedited project (4 months from award to water certification)
- > Wafer fabrication
- > Capacity of 160 m³/hr.
- > TOC<1ppb; Resistivity to 18.2 mega ohm; Boron<5ppt; Silica<0.5ppb; particle 0.05M<300c/l
- > Continuous De-ionization (CEDI) & UF membrane



Leading French Manufacturer Silicon-On-Insulator Wafers Singapore

- > Engineering, procurement & construction of total water management systems (UPW & WW treatment)
- > 24/7 operation
- > Wafer fabrication
- > UPW Capacity of 128 m³/hr; Acid waste neutralization capacity of 154 m³/hr
- > TOC<1 ppb; Resistivity to 18.1 mega ohm; Boron<20 ppt; Silica<1 ppb; particle 0.05M<300c/l; Dissolved oxygen < 20 ppb for Grade A water)
- > Continuous De-ionization (CEDI), MMF, ACF



Showa Denko Hard Disk Trace Hsinchu, Taiwan

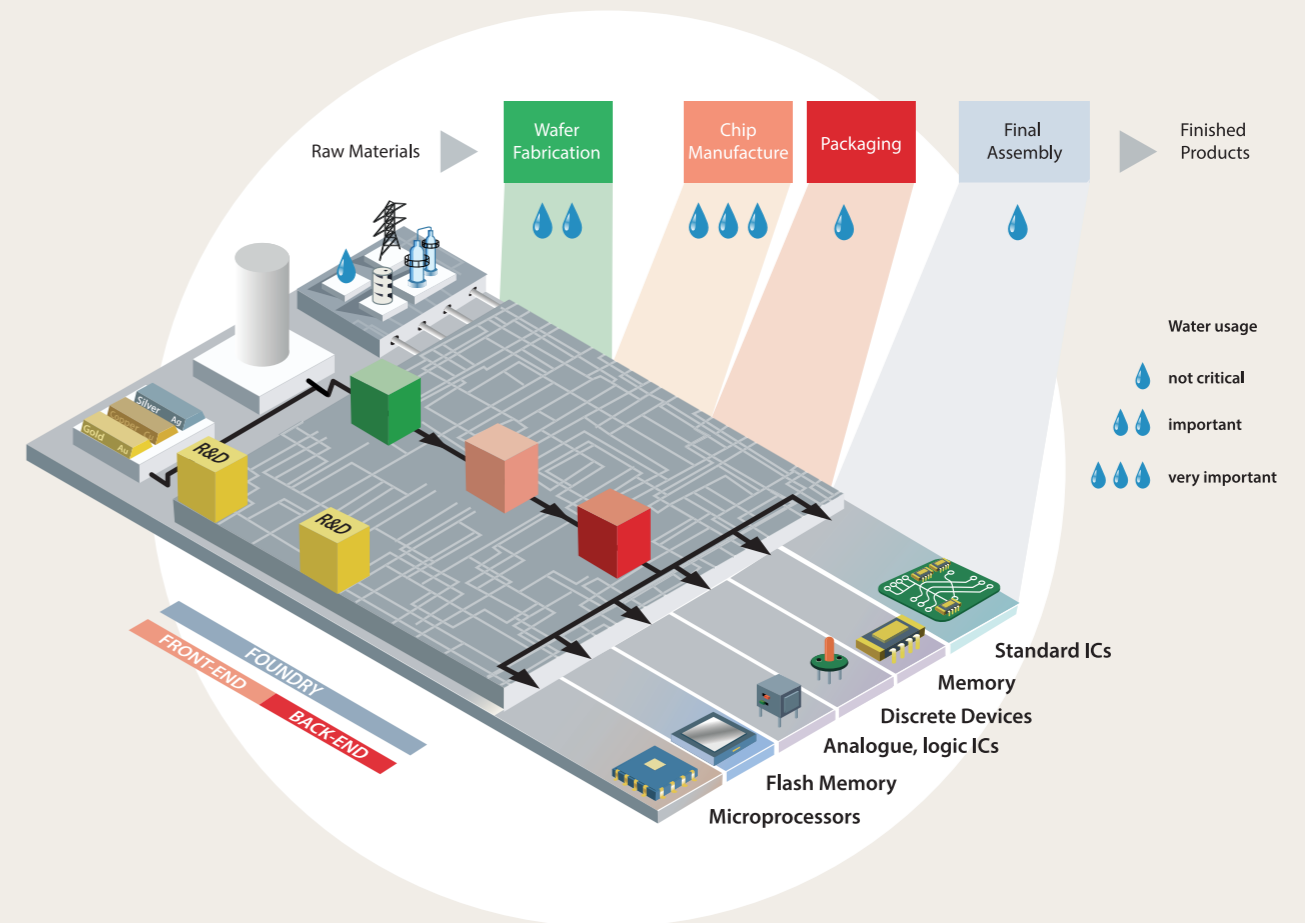
- > Build, operate & transfer industrial water reclaim system
- > Hard disk production
- > 24/7 operation
- > Capacity of 1,500 m³/day
- > 80% effluent quality recovery rate
- > Advanced Oxidation Process (AOP), Multi-media filter (MMF), activated carbon filter (ACF) & reverse osmosis (RO)



Webel SL Energy Systems Ltd Kolkata, India

- > Supply a deionization water treatment system and a wastewater treatment plant
- > Solar photovoltaic cells and modules
- > Neutralization (32 m³/hr) & slurry treatment (16 m³/hr)
- > Continuous De-ionization (CEDI), MMF, ACF

“We share your challenges”



Water in the Microelectronics Industry

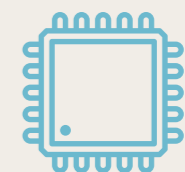
Among many of the industries, microelectronics process has one of the highest water consumption and withdrawal by volume.



Manufacturing a large integrated circuit requires approximately 8,328 litres of water in total, of which 5,678 litres is ultrapure water.



UPW flow rates for a fab plant can range from 500 to 2,000 gpm, and a complete system can cost between 1.0-1.5% of capital costs, or USD 25-40 million.

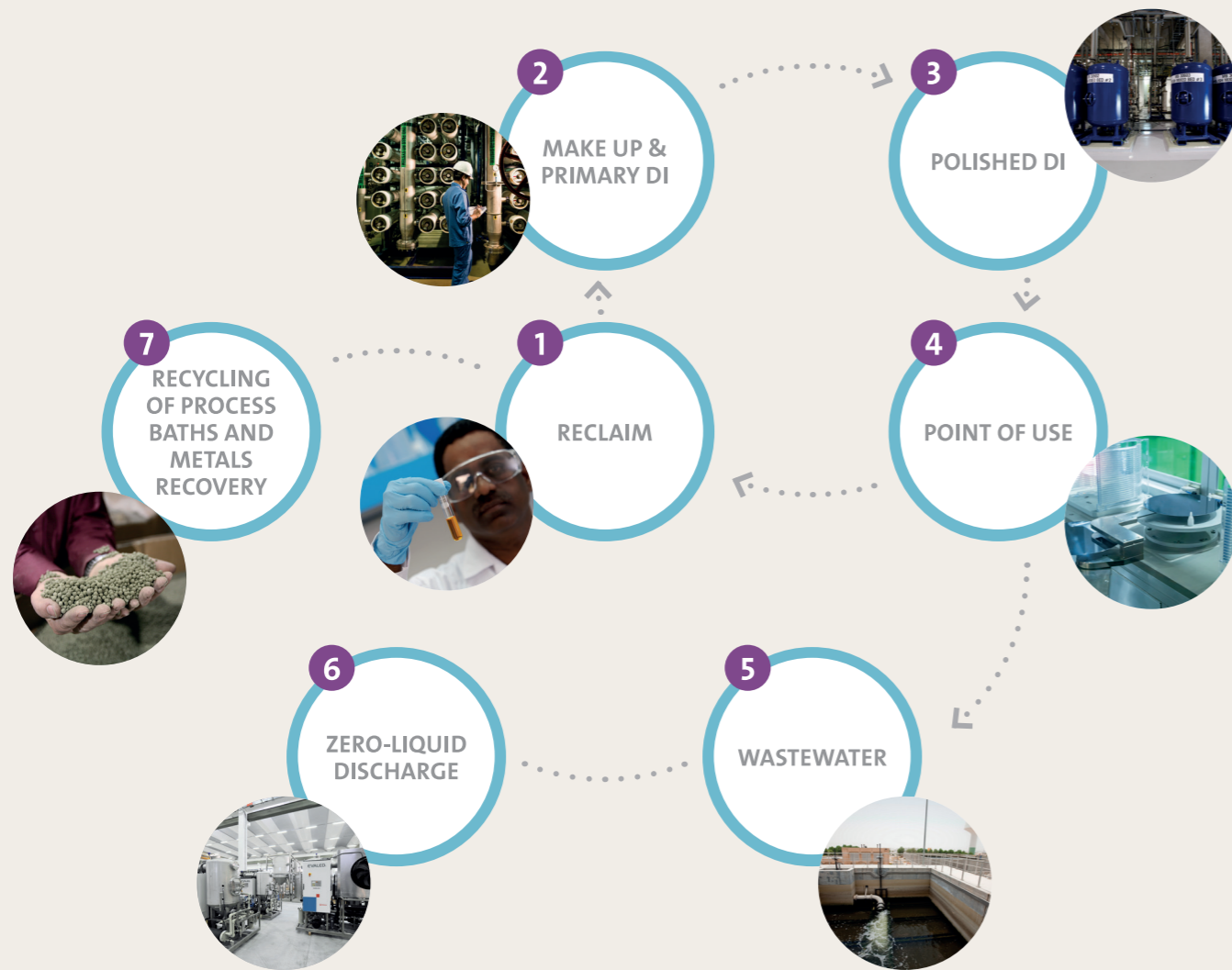


The semiconductor industry spends approximately \$1 billion on water and wastewater systems and services every year, around half of which is capital equipment purchase.

Source: Global Water Intelligence (2009) Pure Water, Semiconductors And The Recession

“Water solutions tailored to your needs”

Total Water Management Solutions



- | | | |
|---|---|--|
| <p>1</p> <ul style="list-style-type: none"> Organics removal Biotreatment Continuous microfiltration Selective Ion-exchange Membranes systems Advanced oxidation process | <p>2</p> <ul style="list-style-type: none"> Prefiltration: UF/MF/Media filters Organics removal Two pass RO with brine RO achieving > 90% recovery 2B3T with RO to achieve high recovery rate Continuous deionisation (CEDI, ultra pure and cylindrical series) Degasification using membranes technologies | <p>3</p> <ul style="list-style-type: none"> UV oxidation Degasification Low TOC polishing mixed-beds (externally, in-situ or offsite regenerated) Ultrafiltration |
| <p>5</p> <ul style="list-style-type: none"> pH neutralisation Biological treatment Physico-chemical treatment Micro/ ultrafiltration Sludge treatment | <p>6</p> <ul style="list-style-type: none"> AnoxKaldnes™ MBBR Actiflo® Fenton Ultrafiltration Reverse osmosis Evaporation Crystallisation | <p>7</p> <ul style="list-style-type: none"> Crystallisation Retardation Ion exchange Electrolysis |

Reliable Services

Service Deionization (SDI)

- Low CAPEX
- Strict quality control
- Easy and convenient cylinder exchange
- Small footprint, ideal for confined space.
- No chemicals handling or storage required
- No wastewater or effluent to drain
- Upgradable modular design to meet demanding quality or flow requirements
- Flexible delivery options



Hydrex™ Chemicals For Cooling Towers

Improves the efficiency and reliability of open, closed and once-through cooling water systems.

This product series includes:

- Scale inhibitors
- Corrosion inhibitors
- Dispersants
- Automated chemical dosing equipment with Hydrex Controller

Mobile Water Solutions

- Designed for emergency situations (e.g.: process failure)
- 24 hours, 365 days of the year
- Rapid response across territory
- Pure water quality to <0.1 µS/cm and <20 ppb Silica
- In-market off-site regeneration stations
- Localised fleet
- Flow rates 1-400 m³/h
- Diverse application base
- Stringent Health & Safety standards
- Technical expertise

Aquavista™ Digital Water Solutions

- Real-time remote monitoring of equipment data
- Dynamic alarm management
- Event notification, e.g. outstanding maintenance
- Automatic report generation
- Information on service contracts / reports
- Archive of all service and sales orders
- Access to equipment documentation, Performance document, calibration certificates,
- O&M manuals, parts lists and training videos, etc.

Engineering

- South East Asia Engineering Center based in Malaysia
- 3D modeling and AutoCAD capability
- In-house SCADA development and PLC programming

After Sales Service

- 24/7 and 365 days service coverage
- customized operation and maintenance contract
- Spare parts and consumables (chemicals, activated carbon, etc.)



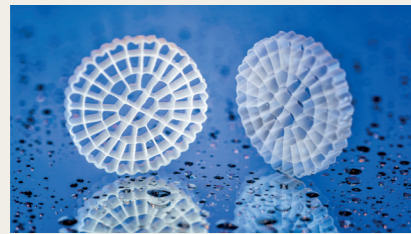
Proven Technologies

Actiflo®

- Eliminates up to > 99% turbidity, suspended solids and associated pollutants.
- Extremely small footprint, ideal for retrofitting existing basins for capacity expansion.
- Significant savings in civil costs due to extremely small footprint.
- Unique process stability that handles sudden flow and/or load variations.
- User friendly & minimum maintenance; easy to access

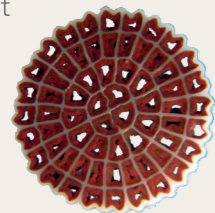
AnoxKaldnes™ MBBR

- Compact
- Robust
- Simple operation
- Low maintenance
- Enhances nitrification
- High tolerance to TSS influent



Anita™ Mox

- 660% savings on aeration compared to conventional processes
- No carbon source needed, reducing operating costs and environmental impact
- Compact and flexible process, suited to bring existing plants up to standards
- 90% reduction in sludge production compared to conventional treatment



Evaled®

- Disposal cost reduction
- Wastewater volume reduction
- Water recycling and reuse
- Valuable components recovery
- High quality outlet
- ZLD (Zero Liquid Discharge)
- Quality certification (ISO 9001/2008) Plug & Play (quick installation)



OPUS® Technology

- High Water Recovery Rate
- Low Waste Volume
- Reliable Operation with Minimal Downtime
- Effective Control of biofouling
- Effective Control of Scaling due to Calcium Salts, Silica and Metal Precipitates
- High Salt Rejection
- Continuous Clean-In-Place Process
- Low Energy Consumption



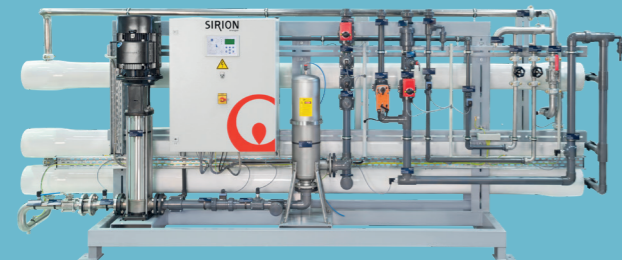
Rapide Strata™

- Regenerates in 30-80 minutes; minimizes down time
- Enhanced bacterial control, improves chemical usage efficiencies
- Continuous water production and increased production capacity
- Skid-mounted, standardized systems for quick installation and start-up

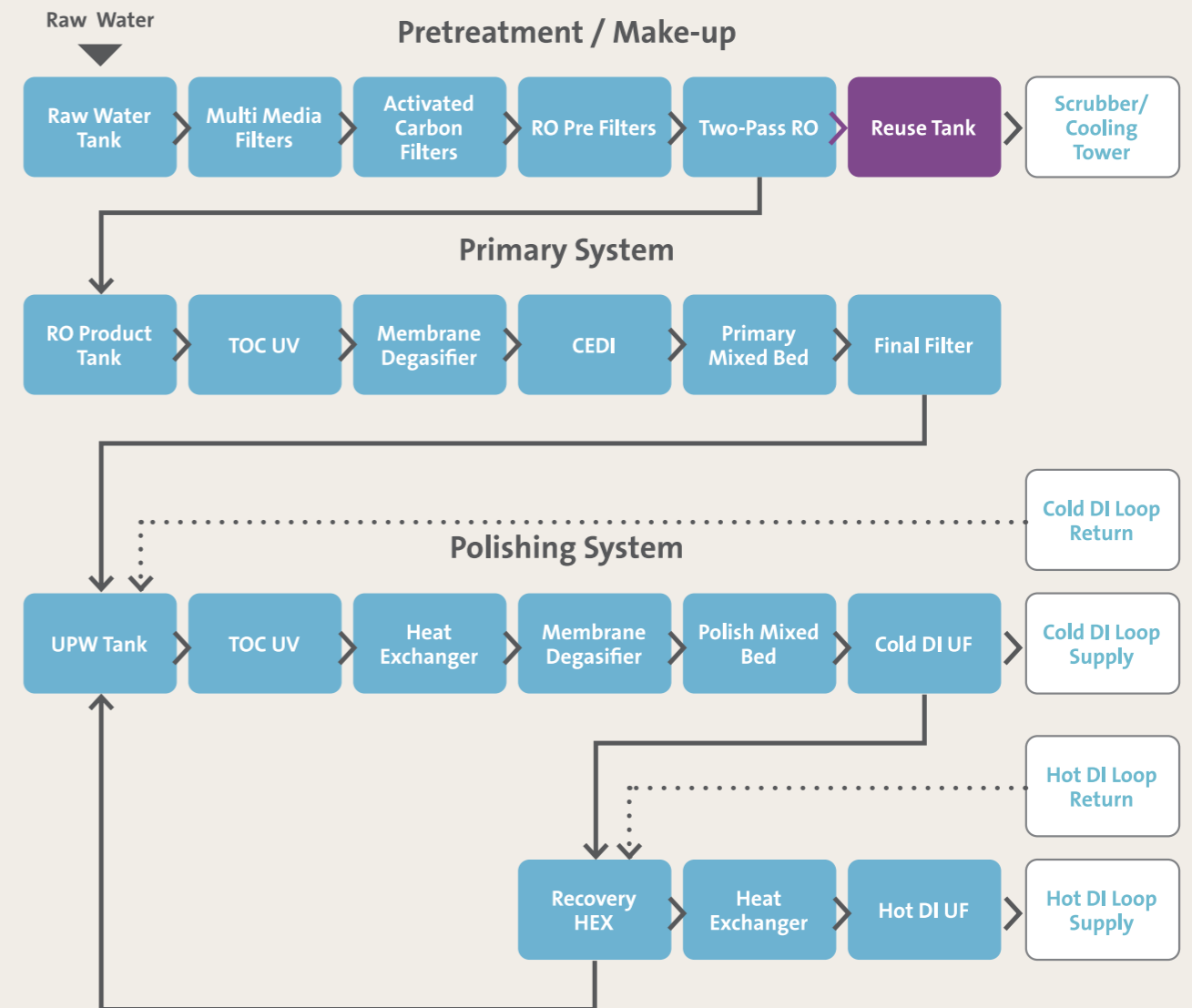


STANDARDIZATION

Veolia proposes a range of in-house standardized systems including Sirion™ RO and Rapide Strata™ Ion Exchange Deionization. Veolia also works with clients to develop duplicable solutions that can be designed once and deployed across many plants. Such approaches save time, reduce risk and offer cost advantages.



Ultrapure Water Treatment Process



- 1 PRE-TREATMENT**
 Suspended solids and organic carbon are removed through multimedia filter (MMF) and activated carbon filter (ACF) at this stage.
- 2 MAKE-UP SYSTEM**
 CO₂ is removed in 2 pass RO as carbonates. 2 Pass RO eliminates most ions & some TOC.
- 3 PRIMARY SYSTEM**
 The third stage removes ion elements and organic matter and eliminates dissolved oxygen (DO) using membrane degasifier (MDG) and CEDI process.
- 4 POLISHING SYSTEM**
 Relatively clean water enters through MDG, UV oxidation, mixed bed ion exchange, ultrafiltration, and POU process which further reduces extremely small quantities of total organic carbon (TOC), ions, and particles.

Solutions Tailored to Your Needs



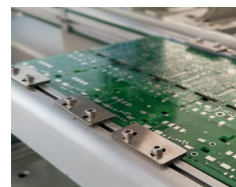
SEMI-CONDUCTOR

APPLICATION	INORGANIC		TMAH/AMMONIA WW			CU-ETCH		SLUDGE TREATMENT	
OUR SOLUTION	Multiflo / Actiflo / Actiflo Carb	Ion Exchange	UASB/EGSB	MBR / AOMBBR	ANITA Mox	MPPE / Ion Exchange	Multiflo	Dewatering	Sludge thickening



TFT-LCD

APPLICATION	TMAH/AMMONIA WW		ORGANIC WW		INORGANIC		PHOSPHATE REMOVAL		SLUDGE TREATMENT	
OUR SOLUTION	UASB/EGSB	MBR / AOMBBR	ANITA Mox	Sparthane (upon pilot)	MBR / AOMBBR	Multiflo / Actiflo / Actiflo Carb	Ion Exchange	Chemical Coagulation	Dewatering	Sludge thickening



PCB

APPLICATION	RINSE WASTE WATER		DISSOLVING CU WASTE WATER	CHELATING CU WW	ORGANIC WW	EFFLUENT POLISH
OUR SOLUTION	Multiflo	UF and RO	Electrolysis	Actiflo + Ion Exchange	MBR	Fenton / Actiflo Carb (Hard COD)



Wastewater Treatment & Reclaim Process

Treatment of wastewater from the microelectronics industry can involve several processes, including

