

SUSTAINABLE WATER MANAGEMENT FOR THE MICROELECTRONICS INDUSTRY

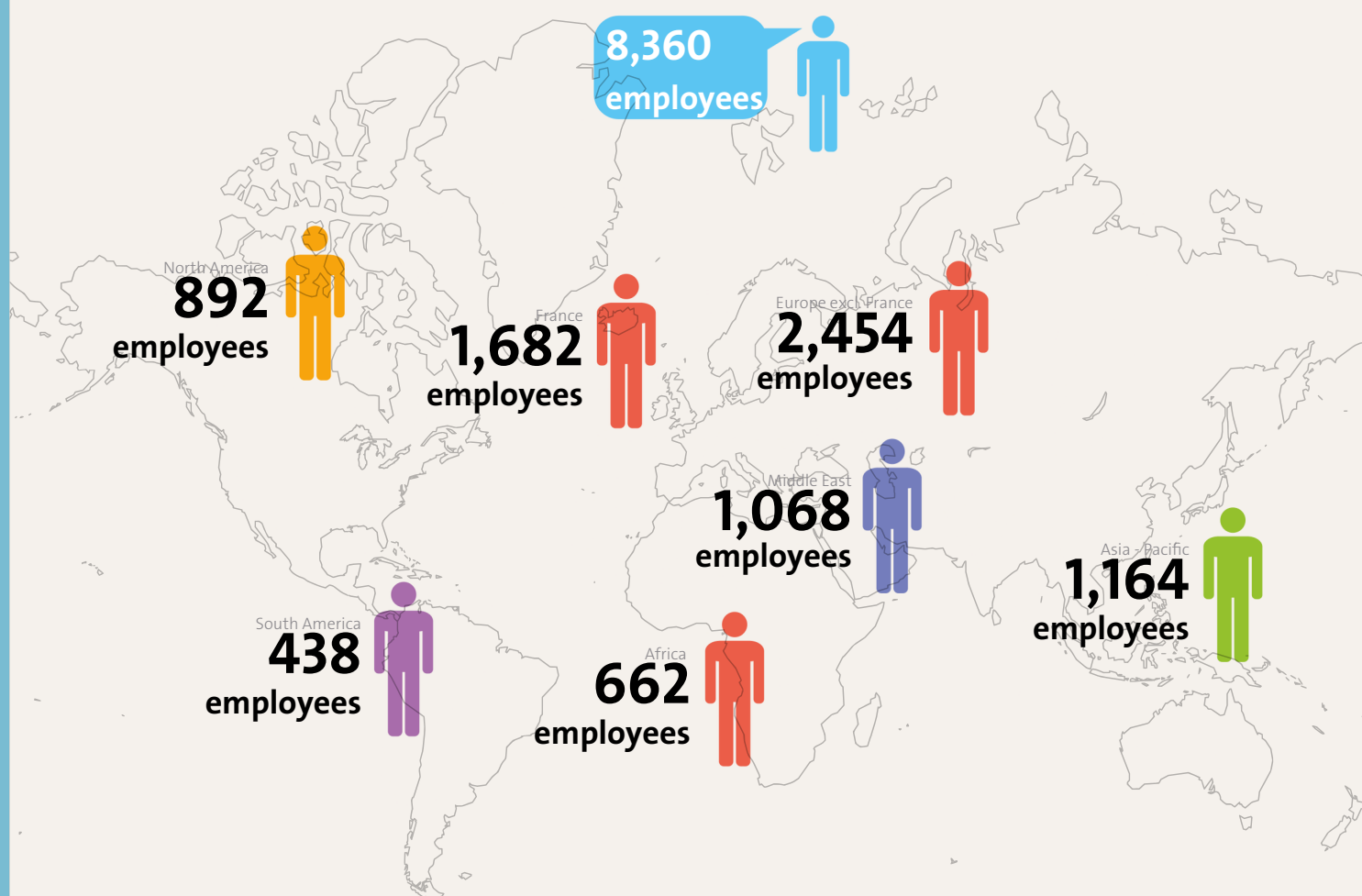
About Veolia | Water Tech

Veolia | Water Tech specialises 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 crystallisation, 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.

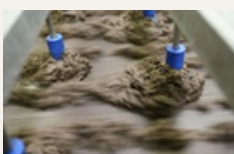
Our global expertise is within your reach through extensive local technical support adapted to local regulatory requirements and market needs.



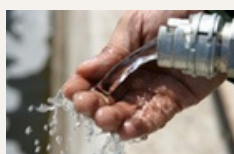
DRINKING WATER



WASTEWATER



SLUDGE



REUSE

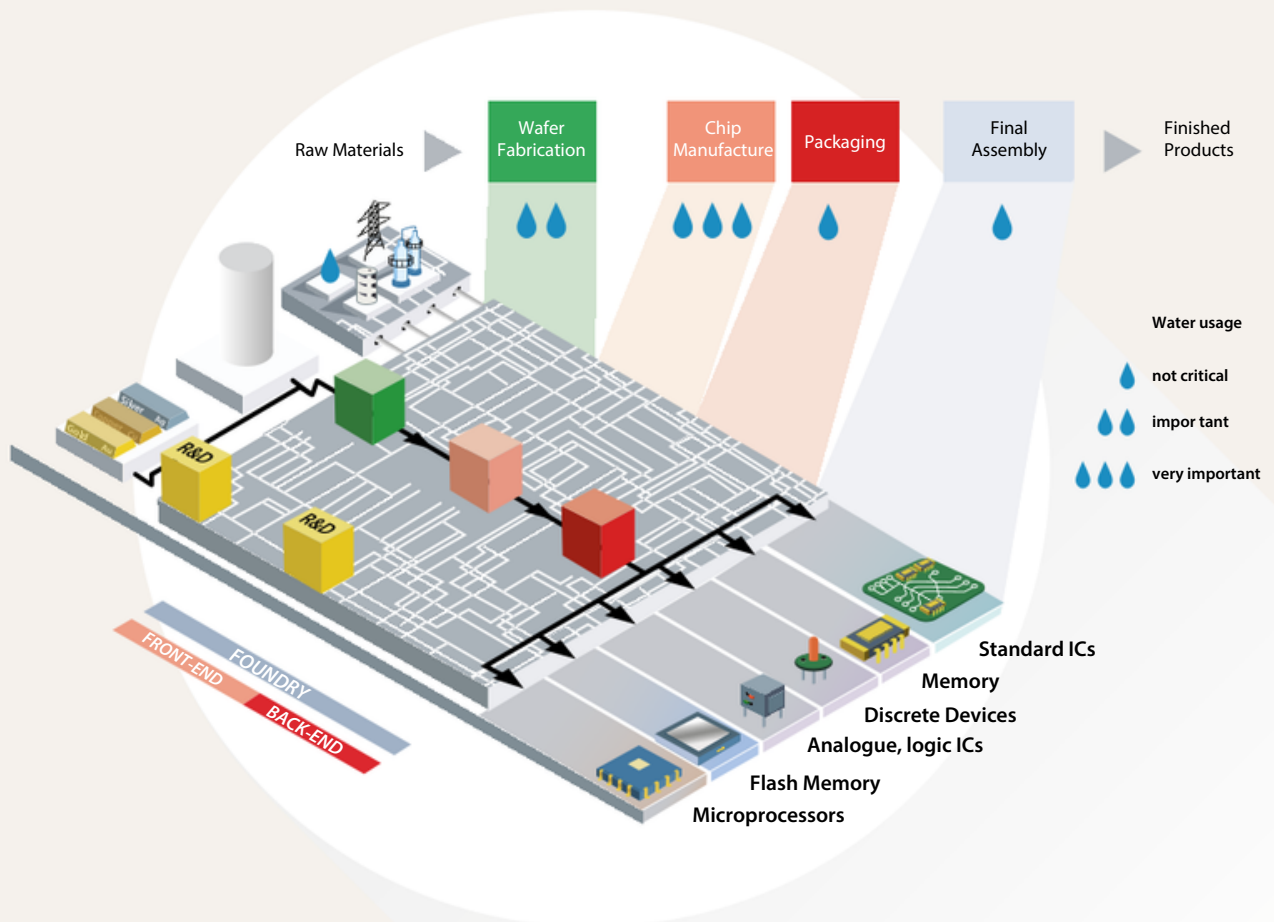


DESALINATION



ODOUR

“We share your challenges”



Water in the Microelectronics Industry

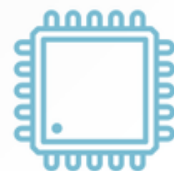
Among many of the industries, microelectronics process has one of the highest water consumption and withdrawal by volume.



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.

“Water solutions tailored to your needs”

Total Water Management Solutions



- 1**
- Organics removal
 - Biotreatment
 - Continuous microfiltration
 - Selective Ion-exchange
 - Membranes systems
 - Advanced oxidation process

- 2**
- 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

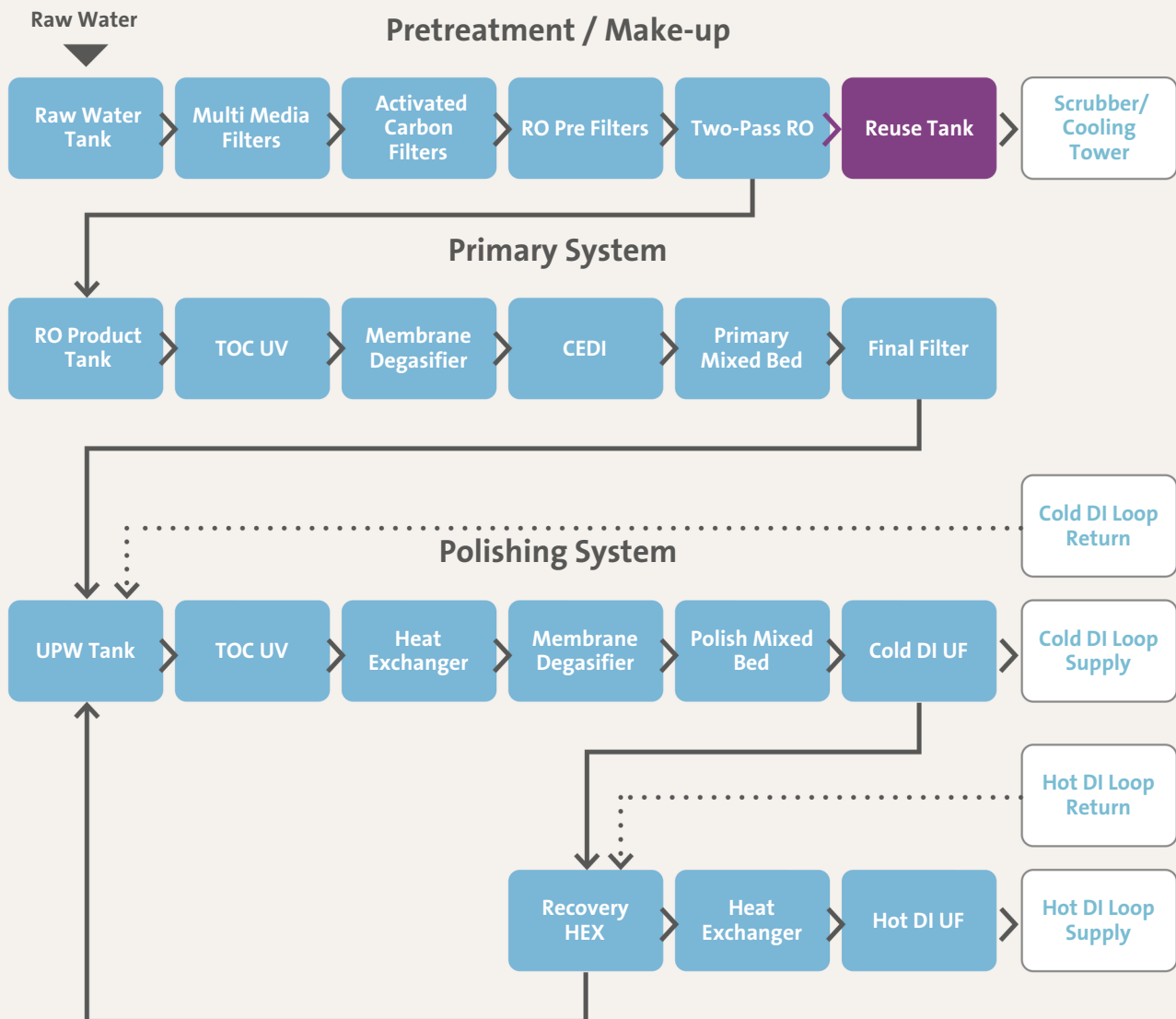
- 3**
- UV oxidation
 - Degasification
 - Low TOC polishing mixed-beds (externally, in-situ or offsite regenerated)
 - Ultrafiltration

- 5**
- pH neutralisation
 - Biological treatment
 - Physico-chemical treatment
 - Micro/ ultrafiltration
 - Sludge treatment

- 6**
- AnoxKaldnes™ MBBR
 - Actiflo®
 - Fenton
 - Ultrafiltration
 - Reverse Osmosis
 - Evaporation
 - Crystallisation

- 7**
- Crystallisation
 - Retardation
 - Ion exchange
 - Electrolysis

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



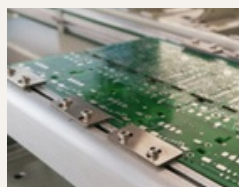
SEMI-CONDUCTOR

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



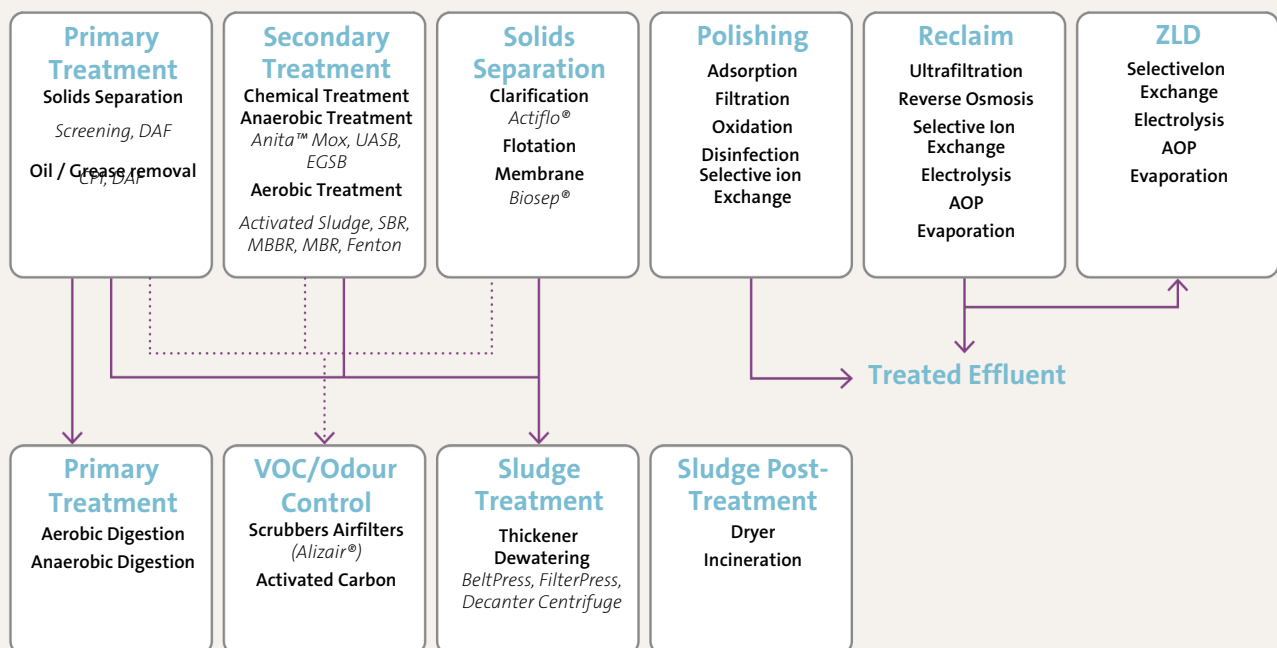
PCB

APPLICATION	RINSE WASTE WATER		DISSOLVING CU WASTE WATER	CHELATING CU WW	ORGANIC WW	EFFLUENT POLISH
OUR SOLUTION	Multiflo	UF and RO	Elec trolysis	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



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.

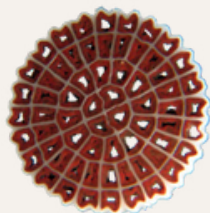
AnoxKaldnes™ MBBR

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



Anita™ Mox

- 66% 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 Precipitation
- High Salt Rejection
- Continuous Clean-In-Place Process
- Low Energy Consumption



Rapide Strata™

- Regenerates in 30-80 minutes; minimises downtime
- Enhanced bacterial control, improves chemical usage efficiencies
- Continuous water production capacity
- Skid-mounted, standardised systems for quick installation and start-up



STANDARDISATION

Veolia proposes a range of in-house standardised systems including Sirion™ RO and Rapide Strata™ Ion Exchange Deionisation. 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.

Reliable Services

Service Deionisation (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 temporary, containerised and skid-based water and wastewater treatment plant in a compact footprint & emergency situations (e.g.: process failure)
- 24 hours, 365 days of the year
- Rapid response across territory
- Pure water quality to $<0.1 \mu\text{S}/\text{cm}$ and $<20 \text{ ppb}$ Silica
- In-market off-site regeneration stations
- Localised fleet
- Flow rates 1-400 m³/h
- Diverse application base
- Stringent Health & Safety standards
- Technical expertise

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 Centre based in Malaysia
- 3D modelling and AutoCAD capability
- In-house SCADA development and PLC programming

After Sales Service

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



Resourcing the world

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