

# Water Solutions for Downstream Oil & Gas

# Solutions that ensure your productivity

Veolia Water Technologies is dedicated to serving the oil and gas industry globally.

With a wide array of processes, the hydrocarbon processing industry is facing major challenges for economies of scale, constant productivity optimization, safety and environmental constraints.

## Water is a major component in all phases of the hydrocarbon processing industry

That is why refining activities require the best guarantees and experience for their water needs to ensure:

- Safety and reliability of plant operations
- Productivity and performance of installations
- Environmental compliance
- Sustainable development towards clean production and brand awareness.

Veolia Water Technologies' capabilities cover all types of activities to fulfill the uppermost requirements of your water cycle.

- Oil refineries
- Natural gas processing plants
- Liquefied Natural Gas (LNG)
- Gas-To-Liquids (GTL)
- Coal-To-Liquids (CTL)
- Biomass-To-Liquids (BTL)
- Petrochemical industries



## Sludge and by-products



Veolia Water Technologies' approach to sludge and oily sludge treatment – from slop oil tanks, flotators, and biological treatment – focuses on opportunities for energy and product recovery:

- Sludge dewatering
- Triphasic centrifugation for oil recovery
- Thermal desorption to declassify
- Thermal drying before solids injection to coker
- Incineration allowing heat recovery and ash recovery
- Fluidized bed incinerator
- Produces stable and recyclable by-products
- Compliance with stricter emission standards
- Allows energy and by-products recovery



# Secure, safe and reliable water supply

The hydrocarbon processing industry is particularly water demanding. Nearly all process steps require water in various forms:

- Desalter washwater
- Boiler feed water for steam production
- Cooling water makeup
- Process water
- Utility water for cleaning, fire network and domestic needs



## Sea water desalination

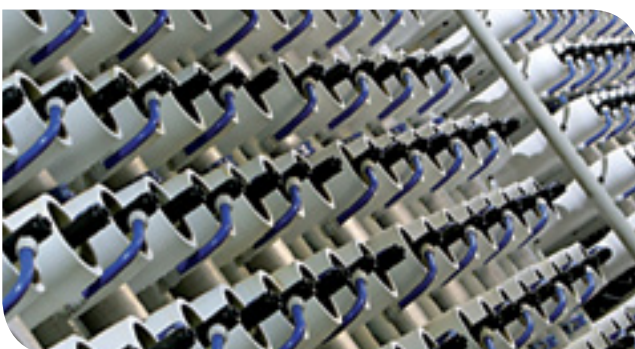
- **Thermal technologies**
  - Multi-Effect Distillation (MED)
  - Low Carbon Footprint
- **Sea Water Reverse Osmosis (SWRO)**
  - Hybrid Technologies

## Wastewater Treatment

Most processes generate wastewater that must be treated prior to discharge and/or reuse.

- Desalter wastewater
- Sour water from stripper
- Oily wastewater
- Spent caustics
- Boiler and cooling tower blowdown
- Condensates
- Site run-off

Many pollutants must be removed to ensure full compliance and appropriate quality. These pollutants are mostly oils and hydrocarbons, hydrogen sulfide, ammonia, phenols, COD, BOD, mercury, selenium, cyanides and chlorides.



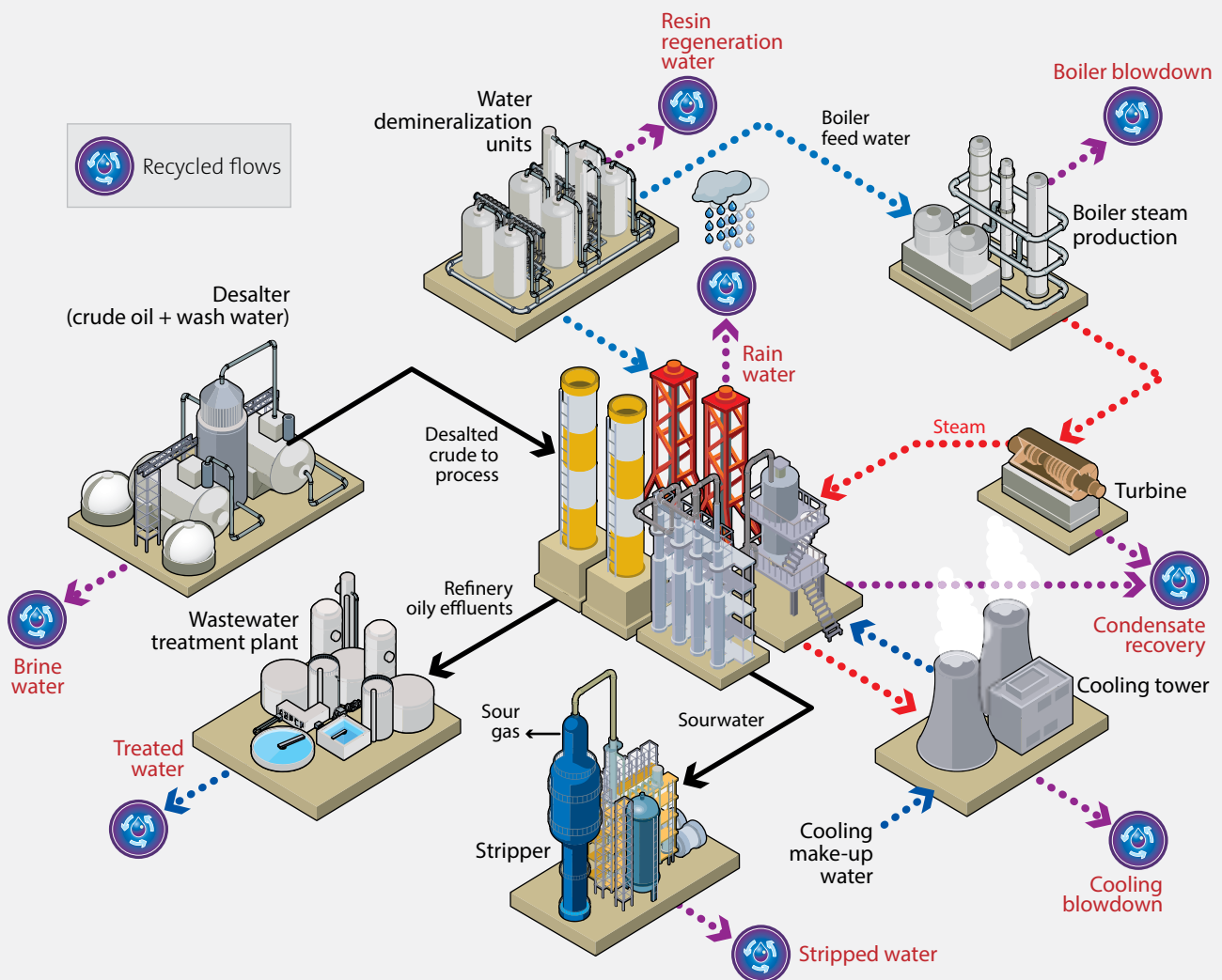
## Demineralized water

- Membranes: ultra-filtration (UF), micro-filtration (MF), nano-filtration (NF), Reverse Osmosis (RO)
- Ion exchange
- Deaerators
- Condensate polishing
- Water treatment chemicals

# Proven solutions for sustainable water management

Veolia is unique portfolio of oil and gas technologies provides solutions to specific problems, as well as complete wastewater treatment plants for the global industrial water cycle.

- Primary oil/water separation
- Secondary oil/water separation
- Biological treatment
- Clarification
- Recycling and reuse
- Sludge handling and treatment
- Zero liquid discharge



## Recycling & reuse

Recycling and reusing water from effluent treatment protects the environment and helps to achieve regulatory compliance while minimizing the need for fresh water.

Water can also be recycled for use onsite or for other beneficial uses.

# Dedicated experts at your service

## Specialized expertise

- Water needs assessment
- Effluent characterization
- Treatability studies
- Pilot plants and lab-testing (R&D center)
- Standard solutions and turnkey plants
- Engineering, procurement, construction, start-up, commissioning, training
- Manufacturing
- Boiler and cooling water treatment programs
- System upgrades
- In-house piloting
- In-field piloting
- Dedicated local teams worldwide
- Audit
- Feasibility studies
- Feed studies

## A full range of services

### After-sales services

- Spare-parts and consumables
- Filtration media refilling and regeneration
- Membrane diagnosis and control

### Support services and maintenance

- Audits and diagnosis
- Remote control and monitoring
- Technical support
- Preventive and corrective maintenance

### Temporary and emergency needs

- Mobile units
- Short and mid-term rental
- ALL-IN-PACK (leasing)

### Water treatment chemicals: Hydrex™

- Membrane protection
- Constant production optimization
- Sanitary safety
- Performance improvement
- Prevent risks of corrosion, fouling, odors...

### Water and waste cycle management services

- Operation of the water plants
- Quality and HSE integrated management system
- Commitment of resources for guaranteed results
- Outsourcing

## Global project management from a single partner

With more than 500 completed projects and decades of experience in the oil and gas industry, Veolia is your partner for developing and implementing the most reliable water treatment systems, providing an extensive range of technologies and services adapted to the oil and gas industry's requirements.

- Integrated health, safety and environment concerns
- Turnkey plants in a one-stop-shop approach
- Equipment supply, maintenance and operating services
- Oil and gas industry experts working together with water treatment specialists
- A portfolio of 350+ technologies including specific solutions for oil & gas



## Your concerns are our concerns

Veolia is committed to offering advanced solutions through secure, cost effective and lasting water treatment technologies to meet your expectations.

- High performance treatment lines
- Robust materials and reliable processes
- Quality water for all types of needs
- Intelligent combinations of technologies
- Proven and safe technologies
- Recycling and reuse, zero liquid discharge



# Proven Technologies for Downstream Oil & Gas



## CeraMem® Ceramic Membranes

Designed for high-temperature or harsh operating conditions; Microfiltration (MF) and Ultrafiltration (UF) with high membrane packing density ideal for enhanced wastewater treatment for reuse or disposal



## Immersed membrane bioreactor - MBR

- Compact design and environmentally safe.
- Reliable biological treatment
- High treated effluent quality.



## ANOXKALDNES™ MBBR

- Pre-treatment of overloaded activated sludge
- Suitable for high BOD/COD wastewaters
- Nitrification
- Denitrification
- Handles thermophilic conditions



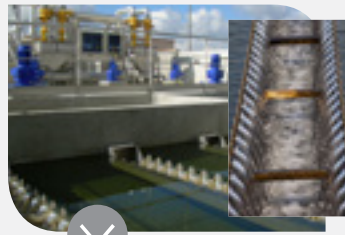
## CPI (Corrugated Plate Interceptor Systems)

- Oil and solids gravity separation of water from oily effluent treatment.
- Standard designs for quick delivery.
- Compact process for space saving.



## Zero Liquid Discharge (ZLD)

Evaporation and crystallization solutions minimize waste and recycle effluent with no aqueous discharge to the environment.



## Actiflo / Multiflo™

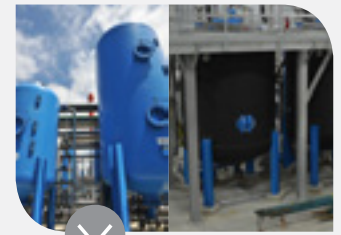
High rate settling technologies settlers to minimize space & optimize lay-out. Suitable for many types of raw water and wastewater treatment and reuse applications. Applicable to TSS separation, metals removal, softening and reuse.



## Disc filter

High performing compact filters

- Low TSS value at outlet
- Continuous operation minimizing water loss
- Application for effluent reuse as process water



## Demineralizer

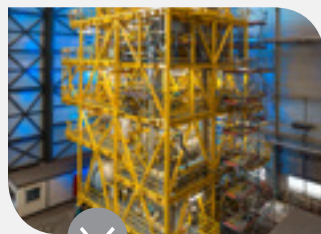
Mixed bed, ion exchanges for facilities from mobile unit to full size plant. Applications range from cooling to HP boilers feed.



## Reverse Osmosis

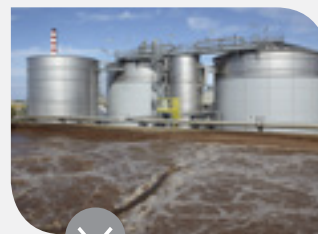
Treatment of any kinds of process water from sea water. Raw water, effluent for reuse or cooling tower blowdown.

- High recovery ratio up to 90% (function of application)
- From mobile units to full size plants



## MPPE

Removal and recovery of dissolved and dispersed hydrocarbons from (produced) water (BTEx, PAH etc.). Onshore, offshore & FLNG. Containerized or Skid mounted.



## Anaerobic Biethane petrochemical PTA plant

Suitable for high COD load, minimizing sludge production in pretreatment and saving energy. Application for numerous chemicals effluents.



## Flotation

- Removal of free oil through dissolved flotation, induced gas flotation or highly compact flotation design per O&G specifications
- Offered with highest safety standards and features to treat VOC

**Veolia Water Technologies is the leading global water and wastewater technology company and provider of a full range of services including engineering, project management, design-build, and maintenance services.**

## **Veolia Water Technologies Oil & Gas Centers**

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Resourcing the world

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