

exploration & production

service solutions for the offshore oil & gas industry

water is crucial for sustainable oil and gas production operations

- Sea water for reinjection
- Production of fresh water
- Produced water
- Gas treatment



SUEZ provides global offshore water and gas treatment solutions, designed to cover all the needs of offshore facilities; platforms and FPSO units.

► addressing sea water, produced water and gas treatment

- Sea water treatment for reinjection or desalting of crude oil.
- Production of fresh water for living quarters.
- Produced water treatment for discharge or reinjection.



SUEZ provides a wide range of water management services, ranging from one-off technical assistance, to full turnkey operation & maintenance solutions.

- **Technical assistance on water treatment facilities operated by your own teams on-site**
- **Full operation & maintenance of your existing water and gas treatment facilities**
- **Audits, revamping & upgrade of existing units**

► sea water for reinjection

Scaling of the hydrocarbon formation is one of the biggest issues faced by offshore oil production. Treating sea water before you inject it makes all the difference, as low salinity or chemical EOR processes require bespoke injection water quality.

This is why SUEZ offers solutions designed specifically for sulfate removal and further desalinization of sea water. With SUEZ, you benefit from a long standing, field proven expertise, without losing control over your assets.

SUEZ's technical assistance, using our proprietary MEMboard software tool, allows you to optimize your membranes' performance and extend their lifetime significantly.



Extend the lifetime of your membrane units thanks to MEMlab and MEMboard

MEMlab

MEMlab is SUEZ's state-of-the-art platform for off-site extensive analytical and laboratory testing on low and high-pressure membranes. The tool is used to streamline membrane selection and secure operations.

The platform provides 6 expert services:

- Quality control of newly released membranes, to support our clients in the membrane selection process.
- Fouling propensity to verify membrane adequacy to a given effluent.
- Failure diagnosis in case of fouling or breakage to draw up a cause-and-effect.
- Make recommendations for corrective actions on site.
- Cleanability tests to identify the best cleaning strategy before a full scale implementation.
- Accelerated ageing tests at miniature or full size scale to predict membrane life expectancy.

The platform has extended testing capabilities (MF, UF, NF and RO), provides a vendor neutral analysis and benefits from the operational insight of SUEZ as an end-user of membrane products for more than 25 years.

MEMboard

MEMboard is SUEZ's operational support software that keeps track of the key health indicators of membrane installations.

Accessible on tablets or computers, the tool provides operational teams with interactive record forms as well as tree views and dashboards, giving a clear picture of membrane conditions. The tool adapts to all types of facilities (from the simplest to the most advanced) and multi-membranes (MF, UF, NF and RO). The web-saaS format provides an evolutive tool, with a regularly updated feature set.

As a complement to SCADA, MEMboard assists operational teams in securing plant production in terms of volume and quality of produced water.

The tool allows to:

- Take a step back from day-to-day operations to diagnose fouling periods and proactively solve issues by adapting cleaning protocols and frequencies based on the historical trends provided by MEMboard;
- Systematize integrity controls of the membrane systems and monitor the trends through MEMboard in order to ensure a stable water quality adapted to offshore applications;
- Provide a multi-criteria analysis of membrane ageing, in order to identify the best end-of-life trigger. This allows to determine when to replace membrane modules while maximizing their service life.

AS AN OPERATING AID FOR MEMBRANE INSTALLATION, MEMLAB/MEMBOARD SERVICES CONTRIBUTE TO:

- protect your assets • achieve continuous and reliable performance on a long-term basis • minimize your OPEX

► production of fresh water

Generating fresh water reliably is one of the main prerequisites for a successful offshore oil production facility and for the essential needs of your operational teams on board.

- Crude oil desalting: we provide you with reverse osmosis modular units, for the supply of fully deionized water for crude oil desalting.
- Drinking water for living quarters: using advanced reverse osmosis modular units, each generating up to 100 to 200 m³ / day, SUEZ supplies your operational teams with the required volumes of drinking water.

Depending on your requirements, we may provide and install the necessary RO modules with a fully managed operation & maintenance solution or as a leased solution with remote assistance.

► produced water treatment

Rising water volumes from ageing oil fields is an issue that requires special attention from offshore oil producers. Without an adequate solution, managing produced water may generate unanticipated overheads.

To help offshore operations reliably address this issue, SUEZ offers offshore water treatment solutions, for either discharge at sea or reinjection.

Using advanced proprietary technology and systems, SUEZ designs tailor made solutions to revamp existing facilities with modular equipment.



SUEZ's Oil & Gas lab, a platform to develop innovative processes to treat produced water

Technology qualification

We assess and compare the performance of a wide range of processes based on in-house expertise, methodology and tools with a 'Best Available Technology' approach:

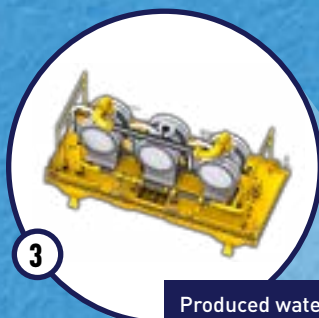
- membrane filtration
- gas stripping
- adsorption
- advanced oxidation
- coalescence

With the Lab's expertise you benefit from:

1. Oil & gas effluent **characterization**: the measurement of oil in water is essential for regulatory compliance, monitoring, process control and optimization.
2. **Integrated water management** for Chemical Enhanced Oil Recovery - handling of back-produced chemicals, site-specific injection water chemistry.
3. Ceramic and polymeric membranes **multi-criteria performance assessment** for produced water treatment.
4. Produced water toxicity reduction and Environmental Impact Factor (EIF).

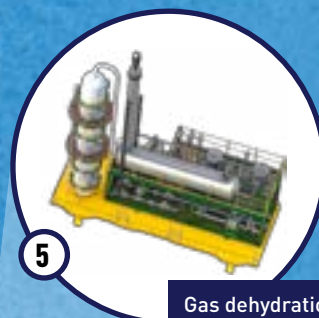


SUEZ's offshore services



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Produced water treatment



5

Gas dehydration and H₂S removal



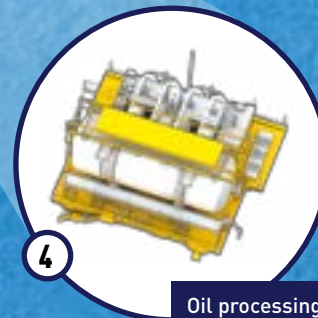
1

Sulfate removal unit



2

Fresh water production unit for crude oil desalting and potable use



4

Oil processing



SUEZ's offshore services portfolio:

	Sea water, Fresh water, Produced water	Gas	Oil
Technical assistance for commissioning, start-up and operation	●	●	●
Operation & maintenance with back to back onshore/offshore support	●	●	●
Local and remote monitoring, planning of offshore interventions	●	●	
Supply of spare parts and consumables	●	●	●
On-site, offsite training	●	●	●
Memboard tool for asset management and membranes life time optimization	●		
Membrane diagnosis, autopsies, establishing best cleaning procedure (Memlab)	●		
Oil & gas effluent characterization and assessment of best available techniques for produced water treatment and Enhanced Oil Recovery (EOR)	●		
Leasing of modular units with O&M support	●	●	
Slop oil treatment			●
Revamping and upgrade of existing facilities (engineering, construction, start-up, O&M)	●	●	●

benefits:

- Optimize performance and life time of your water and gas units thanks to our process expertise
- Higher productivity and lower costs
- Reliable and consistent water quality
- Continuous production
- Improve your environmental footprint
- Emergency support

Why SUEZ?

A worldwide international presence.
A strong health & safety culture and engagement.
A high level expertise and long-standing field experience in the upstream industry.
A highly skilled professional work force.
A reliable field proven technology. A strong R&D infrastructure.
An ability to design tailor made solutions.

SUEZ's profile

SUEZ, a worldwide leader in water and waste resources management.

Our goal is to ensure the most rational, efficient and sustainable management of today's and tomorrow's resources: optimizing processes, securing new alternatives for water supply, protecting the environment and recovering value from waste and by-products.

Committed to sustainable development, SUEZ is a key partner for industries and cities to support them in making the most of their resources. Focusing on environmental and economic performance, SUEZ provides solutions to manage the complete water and waste cycle – a core element of the circular economy.

SUEZ

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ready for the resource revolution

