asset lifecycle management

Managing the lifecycle of your water treatment equipment
summary

SUEZ AT A GLANCE
key facts & figures

OUR VISION
for your site’s performance

OUR OFFER
for assets’ lifecycle management

DETAILED EXPERTISE
our expertise in details

OUR REFERENCES
throughout the world
SUEZ at a glance
who we are

we are 84,000 employees
providing our customers (industries, local authorities and consumers), partners and stakeholders, all over the world, with concrete solutions to address new resource management challenges
key figures

- 15.3 billion € total revenues in 2016
- 400,000 industrial and business customers
- 74 million € in research and development
- 83,921 employees worldwide
- 70 countries where SUEZ is present
a world leader in water & waste resources management for industry

2,200 wastewater treatment plants built for industrial customers

1,800 process water production plants built for industrial customers

5,000 industrial sites equipped with a water systems

1.5 million tonnes of soil decontaminated

350 secondary raw material production facilities

9 hazardous waste incineration units

14 Mt industrial and commercial waste collected

46 incinerators for non-hazardous waste
our vision for your site’s performance
water management is critical to

- guarantee the quality of your production
- increase your financial performance
- manage your environmental footprint
... and should adapt to your production cycle

- water and wastewater installations should be able to adapt to your production cycle and face any circumstances, such as:
  - production increase or decrease,
  - a change in production conditions,
  - new environmental norms,
  - wear and tear,
  - any urgent situation.
anticipating and defining your asset lifecycle strategy is key to...
prevent unplanned production disruptions

extend the lifespan of your installations

provide you with autonomy and peace of mind

optimize safety, expenses & resource use
our offer
we guarantee you

**reduced complexity**
- reduce operating time
- focus on your core business

**minimized risks**
- avoid downtime
- improve safety

**cost control**
- maintenance costs
- operational costs

**maximized performance**
- consistent water quality
choose the best service plan

**ESSENTIAL**
Basic service coverage agreement

**PERFORM**
Long-term service agreement, including service coverage and performance guarantees

**CUSTOMIZED**
Tailor-made agreement suited to your specific needs
detailed expertise
## Start-Up Services
- Pilot Test with Mobile Units
- Commissioning

## Consumables
- Supply
- Installation
- Commissioning

## Spare Parts
- Supply
- Installation
- Analysis And Recommendations
- Refurbishment
- First-Aid Kit
- Conditioning Optimization
- Membrane Optimization

## Technical Assistance & Support
- Warranty Period Extension
- Ecoflow Guarantee
- Biomass Brokerage Service
- 24/7 Emergency On-Call Duty
- Mobile Unit Emergency Dispatch
- Local Assistance (d/y or h/d)
- Expert Support Assistance
- Remote Monitoring & Diagnosis
- Efficient Delegated Operations
- Real-time Mobile Alerts

## Audit, Consulting & Diagnostics
- Process & Hydraulic Assessment
- Energy Efficiency Solutions
- Equipment Audit
- Water Sample Analysis

## Training
- HSE Training
- Online Training Center
- Customized Training Center

## Revamping & Upgrade
- Revamping & Upgrade

## Maintenance & Repair
- Emergency Maintenance
- Preventive Maintenance
- Scheduled Maintenance
- On-Call Repairs

## End-of-Life Services
- Decommissioning
- Disposal & Recycling

### Legend:
1Y: one year / 2Y: two years
SUEZ ensures that all systems and components of your plant or equipment are designed, installed and tested according to your requirements.

**benefits**
- Make sure your installation works from day 1
- Optimize future performance and reliability
- Enhance safety and risk management
- Benefit from a turnkey solution
### spare parts & consumables

SUEZ supplies and installs the right parts and consumables at the best price to keep your plant running every day.

<table>
<thead>
<tr>
<th>consumables</th>
<th>spare parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>consumables supply &amp; installation</td>
<td>spare parts supply</td>
</tr>
<tr>
<td>water conditioning services</td>
<td>analysis &amp; recommendations</td>
</tr>
<tr>
<td>consumables optimization</td>
<td>refurbishment</td>
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</tbody>
</table>

**benefits**

- Avoid supply disruption and loss of production
- Make sure your asset is always operating at its fullest capacities
- Save time thanks to our optimized purchasing process

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Our qualified team of experts and technical staff performs a large array of services for parts and consumables, from analysis to complete refurbishment, for any kind of water treatment, such as:

<table>
<thead>
<tr>
<th>Decantation</th>
<th>Demineralization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacement of scraper bridges and lamellar modules, refurbishment of aeration tanks.</td>
<td>Replacement of ion exchange vessels and resins.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Filtration</th>
<th>Membrane Filtration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servicing open sand filters: replacing or strengthening concrete floors, interventions on enclosed metal filters, renovation of surface coatings, replacement of filter mass and nozzles.</td>
<td>Cleaning and replacement of ultrafiltration, nanofiltration and reverse osmosis membranes.</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Sludge Treatment</th>
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</thead>
<tbody>
<tr>
<td>Reconditioning or replacement of screen rakes, sludge drains, filter presses, etc.</td>
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</tbody>
</table>
conditioning optimization

aqualead® access

aqualead® access is a software that helps you centralize, monitor and manage all the data on the chemical treatment of your installations.

benefits
- Follow the various parameters online
- Receive alerts in case of failure
- Secure processes
- Achieve higher productivity

aqualead® watch

aqualead® access is a water scanner that regulates in real-time the injection of anti-corrosion and anti-scaling agents in cooling systems. It comes equipped with a self-cleaning system for maximum robustness.

benefits
- Optimize chemical use
- Protect your installations

21 | Asset Lifecycle Management
MEMboard® is a powerful tool to help you get the most out of your membranes. By implementing MEMBoard®, you can better manage membrane cleaning schedules, optimize energy use and achieve maximum membrane life.

**benefits**
- Quality Control
- Lifespan Predictions
- Cleaning Strategy
- Renewal Strategy
- Failure Diagnosis
technical assistance & support

Our expert technicians provide on-site and remote support at all stages of your asset’s lifecycle and share their knowledge with your teams.

- Warranty period Extension
- 24/7 telephone remote support
- Ecoflow® guarantee
- Biomass brokerage service
- 24/7 emergency on-call duty
- Mobile unit emergency dispatch
- Local assistance (d/y or h/d)
- Expert support assistance (d/y or h/d)
- Remote monitoring & diagnosis
- Efficient delegated operations (EDO)
- Real-time mobile alerts

benefits
- Minimize long-term risks
- Benefit from a rapid response
- Optimize operational and economic performance
- Comply with health & safety standards
edo is a performance contract, based on our operational teams and experts, with at least one contract supervisor on site.

SUEZ commits to **performance guarantees**, based on clients’ effluent specifications.

### benefits
- Budgetary control: Guaranteed Total Cost of Operations
- Environmental management: Guaranteed discharge levels
- Productivity: Guaranteed productivity gains
- Service continuity: Complete support (crisis management, on-call technical support…)

**edo**
Thanks to our aqualcalc™ software, our on-site expert track the performance of your plant and provides daily recommendations for improvement.

- Integration of all the documentation
- Set up of automatic information input in aquacalc®
- Integration and monitoring of KPIs
- Daily, monthly and annual reports
- Integration of recommendations with follow-up of realization
maintenance & repair

Our expert technicians provide regular maintenance and repair on all types of equipment to prevent wear and tear. In case of emergency, they quickly intervene to restore production.

- Emergency maintenance (h/y)
- Preventive maintenance (d/y)
- Scheduled maintenance (h/y)
- On-call repairs
- Maintenance management software

benefits
- Rapid and flexible response
- Reduce the risk of production disruption
- Extend your asset’s life expectancy
- Maximize long-term reliability
- Minimize maintenance costs
SUEZ takes a global view of your water cycle to optimize your assets’ processes and reduce your environmental footprint.

Benefits:
- Simplify and optimize processes
- Improve asset profitability
- Maximize energy and water use efficiency
- Minimize chemical consumption
- Reduce environmental impact and carbon emissions
- Avoid unexpected and costly surprises

Energy efficiency solutions
Equipment audit
Remote monitoring & diagnosis
Process & hydraulic assessment
Emissions solutions
Water sample analysis with mobile units
training

Our fully qualified professionals deliver targeted and interactive training to your operational teams for maximum efficiency.

- Increase operational performance
- Improve maintenance
- Comply with health and safety standards

benefits

HSE training
online training center
customized training center
SUEZ can revamp and upgrade every type of water treatment plant and equipment to restore or improve their working conditions.

**revamping & upgrade**

**benefits**
- Mitigate the effects of obsolescence
- Enhance the lifetime of your asset
- Adapt to changing production needs
- Conform with new water quality norms
- Avoid capital spending

**remote operation**
end of life services

SUEZ carries out decommissioning, dismantling and removal work for your plants and equipment safely and responsibly.

benefits

- Benefit from a turnkey solution
- Respect industry standards
- Comply with environment and safety rules and norms
our references
Food & Beverage
Pilot test with mobile units on 3 sites
Wastewater pre-treatment plant - France

issues

The client was experiencing problems with its aerobic digestion plant:
- Plant operating at full capacity limiting the client’s production
- Proliferation of filamentous bacteria inhibiting the decantation process
- Foaming due to overloading
- Excessive sludge production
- Excessive phosphorus discharge

solution

Pilot test of a pre-treatment unit to reduce the influent load and optimize discharge to the environment

benefits

- 70% reduction of influent load
- Reduced energy consumption
- Less foaming and filamentous bacteria
- Less sludge production leading to waste management savings
- Less phosphorus discharge
19 nuclear plants
Lifecycle Management
2 or 3 demineralization plants by site: total installed capacity ~5000 m³/h - France

issues

- Ensure production continuity
- Extend the lifetime of equipment

solution

SUEZ and EDF have signed partnerships that include:

- Mobile services: dispatch of water treatment mobile units during refurbishments to ensure production continuity
- Maintenance and expertise services

SUEZ also provides EDF with the following services when needed:

- Refurbishment works
- Supply and installation of spare parts
- Technical assistance

benefits

- Reduced operational and maintenance costs
- No production disruption
- Consistent water quality

Asset Lifecycle Management
Upstream Oil & Gas
Technical assistance
Onshore produced water plant - Azerbaijan

issues
Specific maintenance and technical assistance services at the Sangachal Terminal and the offshore rig.

solution
In 2007, after performing a pilot test, SUEZ designed and built the onshore produced water treatment plant of the Sangachal Terminal.

benefits
- Supervision of commissioning and technical support services since 2008
- Provision of analyser technician & ad hoc support services onshore / offshore since 2010
**Chemical & Pharmaceutical**

**Ecoflow® guarantee**
Wastewater treatment plants on 20 sites - worldwide

### issues
- Continue production whatever the circumstances
- Eliminate the risks from plant shutdown or overload
- Benefit from certified back-up treatment solutions in every situation all year round

### solution
Subscription to an annual Ecoflow® Guarantee covering 20 wastewater treatment plants sites across the world
(If for any reason the client is unable to treat its effluent, SUEZ ensures that it will be treated externally within 24 hours at a fixed price until the situation returns to normal)

### benefits
- Production continuity
- Peace of mind
- Regulatory compliance
Chemical & Pharmaceutical
Mobile units emergency dispatch
Process water treatment plant -

issues

- The client used permeated water, produced from decarbonate filtered drill water, in the manufacture of ion exchange resins.
- Due to a temporary peak in production, the client needed a temporary solution adapted to the site’s stringent quality requirements.

solution

- Dispatch in under 72h of a double-pass reverse osmosis mobile unit.
- The solution used reagents and membranes of similar quality than the client to comply with requirements.
- A dedicated team installed and commissioned the unit in the very short time and provided operational support.

benefits

- Speed of intervention
- Quality of service
- Production continuity
Pulp & Paper
Maintenance & Repair
Sand filtration

issues
- Deficiencies in the false bottom with problems in joints and sand leaks
- Cracks and breaks in the central channel

solution
- Installation of stainless steel top collectors and vertical downspouts for aeration
- Replacement of the false bottom with high density polyethylene blocks, allowing air and water distribution

benefits
- Very noticeable reduction in filter maintenance
- Increased conservation, by eliminating the problems caused by the raising of the bottom slabs and the joints
- Improved filter performance by decreasing the number of stops, avoiding clogging problems and dead spaces between inlet filters
issues

The client wanted to drastically reduce water consumption

solution

- In-depth assessment of the client’s assets along the entire water cycle
- Detailed recommendations for water consumption reduction: Water reuse, automation optimization
- Elaboration of two scenarios to treat effluents following water consumption reduction

benefits

- Elaboration of a strategy to achieve a 50% reduction in water consumption
- OPEX and CAPEX optimization of effluent treatment
Food & Beverage
Process and hydraulic assessment
Water & wastewater treatment plants - worldwide

issues
Adapt water treatment process of 29 sites across 15 countries in order to:
- Reduce costs
- Minimize water consumption

solution
After conducting a benchmark of all sites, SUEZ identified 2 actions:
1. Re-circulate cooling water instead of discharge
2. Re-use process water in cooling systems

benefits
Identification of a strategy to achieve a 15% reduction in water consumption
Chemical & Pharmaceutical

Energy and efficiency solutions
Water & wastewater treatment plants – Global (MSA)

issues

- Maximizing economic and environmental performance all over the value chain
- Improving the energy efficiency of 112 sites globally
- Conserving resources

solution

- Partnership and integrated offer with performance obligation
- Mobilization of a broad scope of SUEZ skills
- Efficient and transparent Open Book process

benefits

- Guarantee of compliance with environmental standards
- Optimized costs
- Reduced environmental impact
- Long-term partnership for environmental performance
**Downstream Oil & Gas**

Revamping & upgrade
Membrane bioreactors - Rotterdam

**issues**

The client needed to meet new stringent discharge regulations (TSS < 1 mg/l)

**solution**

- Revamping of existing wastewater treatment plant
- Upgrade of biological activated treatment by Membrane Bioreactors (MBR) to implement nitrification and denitrification using Zenon membranes.

**benefits**

- Environmental compliance
- Largest MBR plant operational since 2007
- One of the first MBR systems in a petrochemical complex
**Downstream Oil & Gas**

**Revamping & upgrade**

Dissolved air flotation (DAF) - Antwerp

**issues**

- The former Degremont® DAF tank built in 1980 was at the end of its life.
- Moreover, because of a corrosive water quality, the unit was leaking, compromising the safety of the plant.

**solution**

- Upgrade of the existing concrete installation with an automated and robust Duplex Stainless Steel Flotation to avoid leaking
- SUEZ designed, manufactured and installed a tailor-made unit of the same dimensions

**benefits**

- 23% capacity increase from 270 to 350 m³/h
- New DAF operational in just a few weeks
- Increased water quality
Chemical & Pharmaceutical
Revamping & upgrade
Ozonia® ozone systems – Los Angeles, USA

**issues**
- An Ozonia® Ozone system (3 x Ozonia® OF) was installed for wastewater treatment in 1992
- Total ozone production was 150 kg/h
- Due to increased demand the client needed to triple capacity
- The existing equipment footprint, piping, and infrastructure needed to stay consistent because no expansion was possible

**solution**
- SUEZ upgraded the Ozonia® ozone system with new technology 4 times over 24 years

**benefits**
- Maximum capacity increased 200%, from 150kg/h to 300kg/h using the latest IGS technology
- Ozone concentration was increased from 6 wt% to 12 wt% improving efficiency and lowering OPEX
- The existing footprint, piping, and infrastructure was used requiring very low capital investments for the upgrades

Asset Lifecycle Management
Food & Beverage
Decommissioning
Demineralization plant - France

issues

In 2001, the demineralization plant on the client’s site in Toulouse (France) was stopped following a large explosion.

solution

The plant was uninstalled then reinstalled on the VSPU industrial platform where SUEZ manages the water cycle for 3 chemical companies.

benefits

- Investment savings
- The demineralization plant is still in operation today