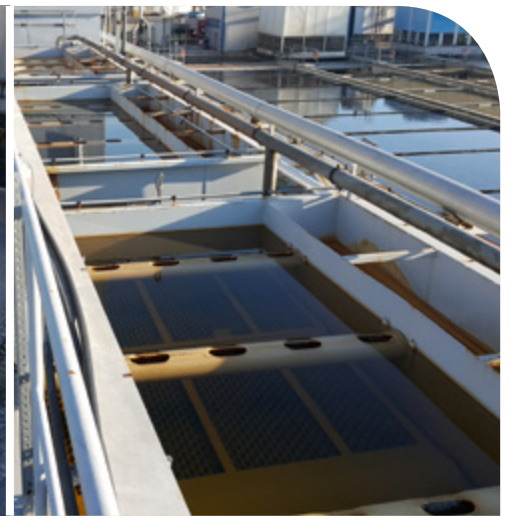




Water solutions for the Pulp & Paper industry

WATER TECHNOLOGIES



Creating Water Solutions for the Pulp & Paper Industry

Veolia Water Technologies has been meeting the process water, effluent and sludge treatment requirements of the Pulp & Paper industry since the 1960s and has hundreds of reference sites worldwide. Veolia is seen as a trusted supplier and as such has long term relationships with many of its clients.

Reliable and optimal solutions

The high flow rates and large volumes of wastewater used in paper mills require optimized solutions. Whatever your project may be, from the construction of a new facility to the upgrading of an existing one, we have the know-how and technologies to fulfill your needs.

Our solutions cover the entire water cycle from production to recycling: raw water treatment, production of boiler feed and process water, black liquor concentration and wastewater and sludge treatment. In addition, we undertake refurbishment and upgrade works.

Our portfolio of innovative solutions and technologies and operational experience mean that we can propose customized solutions which comply with stringent quality and safety standards. More generally, Veolia Water Technologies provides well designed, state-of-the-art facilities which are compliant with existing regulations while reducing and controlling costs related to water cycle management.

Protecting the environment

Protecting natural resources and limiting the impact of its activities on the environment are essential for the Pulp & Paper industry. Veolia Water Technologies accompanies each client in this process and constantly improves their environmental performance by implementing solutions that reduce water and energy consumption.

We continually innovate to meet the evolving regulatory standards and the energy and water savings needs of the Pulp and Paper industry.

1 INFLUENT WATER

Optimize influent water usage, thus improving plant efficiency and safe-guarding its licence to operate.

- Dissolved Air Flotation,
- Clarification (Actiflo®/Multiflo™),
- Sand filters / other media filtration
- Discfilters (Hydrotech®)

2 BOILER FEED WATER

Optimize energy produced per unit of fuel while avoiding power outages and ensuring plant uptime.

Boiler Feed:

- Reverse osmosis (Sirion™)
- CEDI
- Mixed beds
- Ion exchange resins

Condensate Polishing:

- Mixed beds with regeneration system (SepariX™ for external regeneration.)

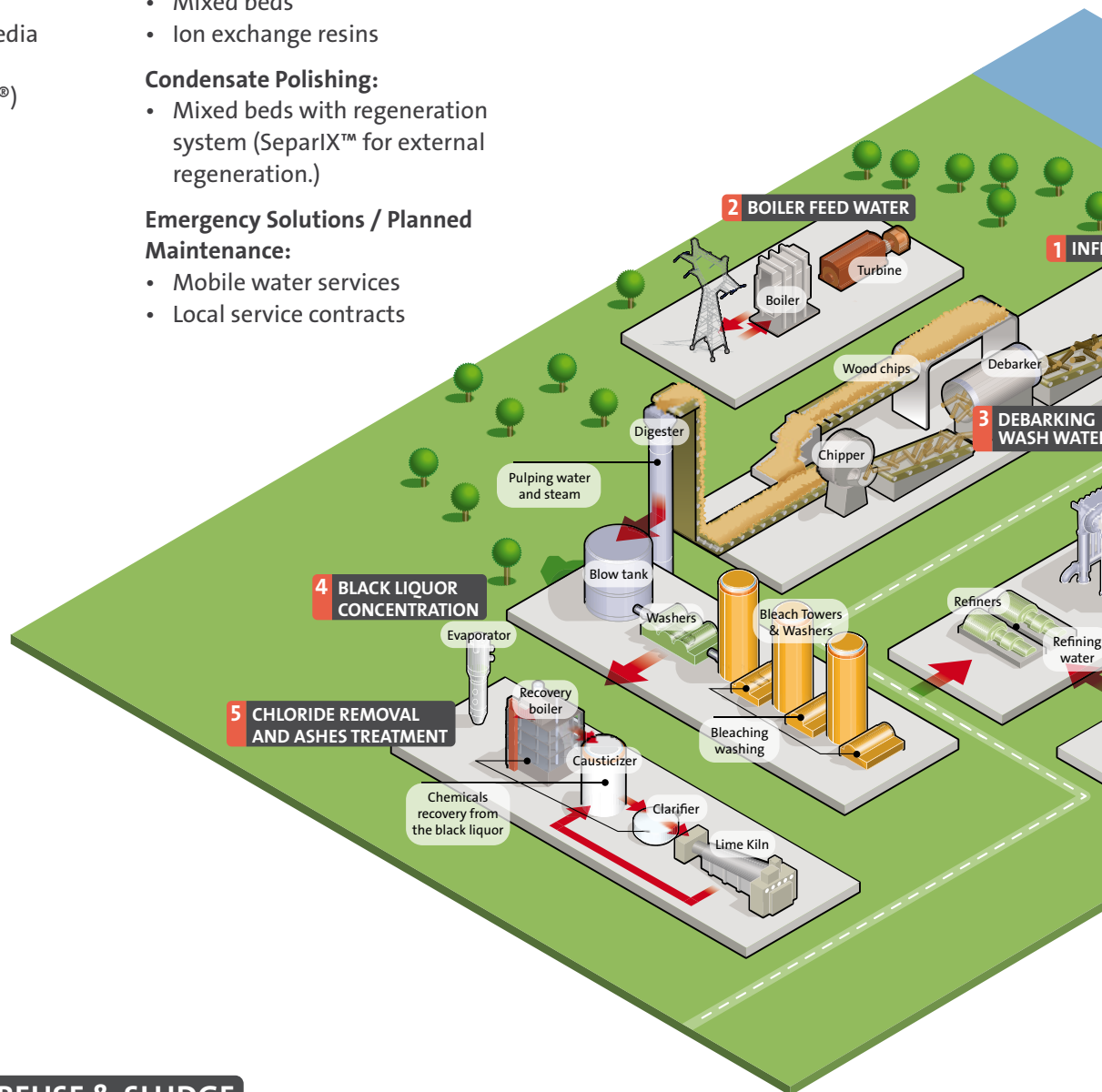
Emergency Solutions / Planned Maintenance:

- Mobile water services
- Local service contracts

3 DEBARKING WASH WATER

Reduce water consumption through recycling of the treated wash water.

- Actiflo®/Multiflo™



7 WASTEWATER, REUSE & SLUDGE

Reduce water usage by exploring all options for water reuse, including advanced treatments for color removal.

Optimize energy usage by recycling warm water back to the process line and generating biogas as a fuel from anaerobic treatment – particularly for recycled paper plants.

Reduce sludge volumes and improve sludge conditioning to widen reuse/disposal options.

Guarantee the plant's future through discharge compliance and water footprint optimization.

r Pulp & Paper Clients

4 BLACK LIQUOR TREATMENT

Optimize concentration of black liquor to ensure efficient operation of the recovery boiler while delivering a high quality condensate suitable for reuse applications.

Specialized Veolia Entity HPD®:

- Black Liquor Evaporation Systems
- Condensate Stripping & Segregation
- Methanol Rectification & Handling Systems

5 CHLORIDE REMOVAL AND ASHES TREATMENT

Ensure the efficient operation of the recovery boiler by removing scale forming chloride while reducing costs by recovering chemicals.

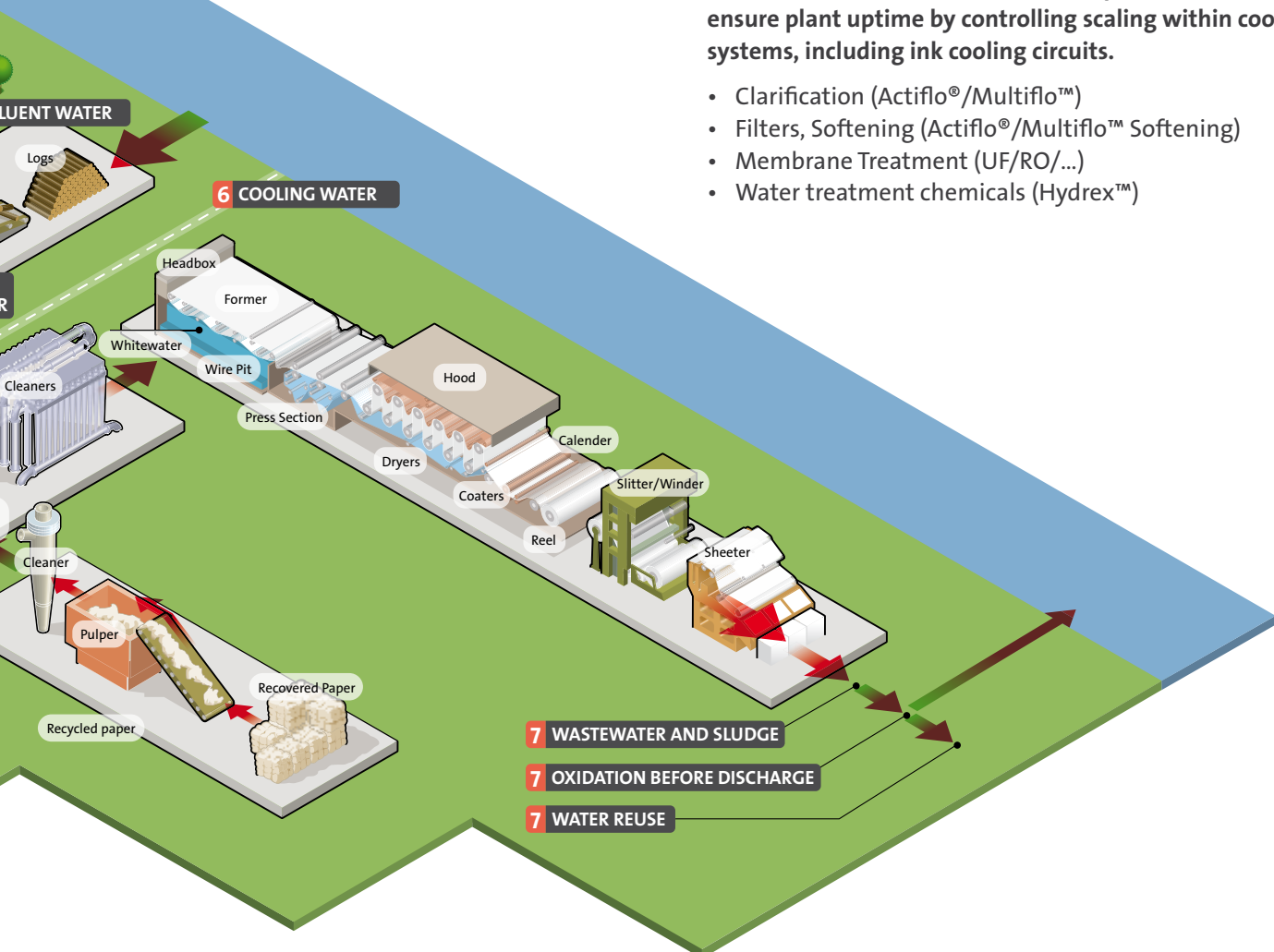
Specialized Veolia Entity HPD®:

- Chloride Removal Process (CRP™)

6 COOLING WATER

Ensure efficient heat transfer, reduce plant maintenance and ensure plant uptime by controlling scaling within cooling systems, including ink cooling circuits.

- Clarification (Actiflo®/Multiflo™)
- Filters, Softening (Actiflo®/Multiflo™ Softening)
- Membrane Treatment (UF/RO/...)
- Water treatment chemicals (Hydrex™)



Specialized Veolia Entity AQUAFLOW®:

Primary treatment:

- Screening
- Equalization
- Primary clarifier (or flotation)
- Biothane® Anaerobic treatment
- Biothane® Aerobic treatment (MBBR or Activated sludge).

Secondary treatment:

- Neutralisation
- Cooling
- Aeration
- Secondary clarifier

Tertiary treatment:

- Coagulation / Flocculation
- Flotation or Separation
- Sludge Management

Oxidation:

- Fenton
- Peroxide
- Ozone

Proven Expertise Throughout the World

Numerous Pulp and Paper manufacturers have placed their confidence in Veolia Water Technologies for the treatment of their water and effluents.

Modern Karton (2014)

Client: Major paper producer in Europe (1M ton/year), recycled paper plant based in Turkey (near Istanbul).

Needs: Refurbishment and upgrade of wastewater treatment plant of Paper Mill 3 (300t/y) + Construction of the new wastewater treatment plant of new Paper Mill 5 + Construction of Reuse Plant to treat the outlet of WWTP's (PM3, PM4 and PM5) to produce process water for PM3, PM4 and PM5.

Flow rate: PM3 WWTP: 5,000 m³/d to 9,000 m³/d, PM5 WWTP: 12,000 m³/d, Reuse Plant: 15.600 m³/day.

Value proposition: Having constructed the treatment plants for the full water cycle in the mills, the client is compliant with discharge legislations and also produces process water from its wastewater.

Technologies:

WWTP: Inlet Drum Screen + Lamella Settling + Cooling tower + Buffer Tank + Biothane® Anaerobic EGSB Reactor + Flash Aeration + MBBR + DAF.

Reuse: Multiflo™ Soft + ACF + UF + RO.



Veracel Celulose S.A. (2005)

Client: Pulp production plant in Brazil (Bahia)

Needs: Black liquor evaporator system to reach operational efficiency needed for the plant's production

Evaporation rate: 1000 T/h

Value proposition: Licence to operate, environmental legislation compliance

Technologies and complementary offer:

- Four-body, switching, HPD falling film concentrator
- Second effect evaporator
- Split body second effect
- Condensate stripper
- Methanol rectification system
- CRP™ chloride removal system

SCG Packaging (2015)

Client: Testliner, corrugated paper and board production plant in Thailand (Prachinburi).

Needs: Implementation of a water management strategy that relies on water impact assessment and water related risk evaluation.

Flow rate: 10,000 m³/d

Value proposition: Support to SCG Packaging water agenda with customized tools to proactively accompany their production expansion, anticipation of future discharge regulation, risk mitigation and corporate image.

Project: Audit (water and wastewater treatment plant) + Risk analysis (true cost of water) + Opportunities identification to optimize water treatments.

Fibra (2015)

Client: World leading eucalyptus pulp producer (5.3 million tons/year), based in Brazil (Sao Paulo).

Needs: Process water and wastewater treatment units for the second production line of the Três Lagoas plant (following expansion in 2017, it will produce 3 mt/y).

Flow rate:

Process water: 16,600 m³/d of demineralized water + 185,000 m³/d of raw water.

WWTP: 166,000 m³/d.

Value proposition: Keep licence to operate, costs efficiency with small footprint, water discharge regulations compliance.

Technologies:

Process water: RO + Condensate Polishing/Actiflo® + Filtraflo™ TGV filters.

WWTP: AnoxKaldnes™ BAS.

