Sustainable Water Management for the Power Industry
Creating Water Solutions

Water and Wastewater Treatment Specialist for the Power industry

Veolia Water Technologies has hundreds of power generation references throughout the world. Our local teams - present in over 60 countries - design, install, commission and service the complete power plant water cycle.

Your concerns are our concerns

Veolia Water Technologies engineers develop solutions for power generation clients by focusing on their key requirements:

- **Reliability** - avoiding costly downtime through proven technologies and local service
- **Efficiency** - developing solutions that help clients generate the maximum amount of electricity using the minimum amount of resources

With decades of experience in the power industry, Veolia Water Technologies is your key partner to develop and implement the most reliable water treatment systems, providing an extensive range of technologies and services adapted to the power industry’s requirements:

- Turnkey projects via a one-stop shop approach
- Custom, standardized and hybrid solutions
- Extended offering through maintenance and operating services
- Power industry experts working together with water treatment specialists at a local level
- Portfolio of 250 technologies including specific solutions for the power industry
- Risk Management (water supply, environmental compliance, revenue loss, safety)
- Solutions that address health, safety and environmental concerns
- Water Sustainability Management using tools such as Carbon Footprint evaluation and Water Impact Index to help our customers achieve their corporate sustainability goals.

- **Compliancy** - engineering systems that ensure compliance with environmental legislation while minimizing the plant’s water footprint
- **Dependability** - delivering the project on time through proven and often standardized technologies that avoid additional costs, reduce the risk of schedule slip and improving safety statistics
Proven technologies

**Actiflo®**
The Actiflo® process is an ideal solution for recycling valuable process water, providing boiler feed, product water and cooling tower makeup water to the power industry. Actiflo® has also proven to be very efficient for algae removal.

The main benefits to other clarification systems are:
- quick start-up (< 15 minutes); also for daily starts/stops
- better organic removal

Actiflo® Softening is a technological breakthrough in water treatment, offering some unique advantages over traditional clarification systems with the chemical precipitation of:
- Hardness
- Alkalinity
- Silica
- And other constituents (e.g., heavy metals)

**Demineralization units**
- Systems typically utilize ultrafiltration, nanofiltration, reverse osmosis, electro-deionization, and/or ion exchange
- Achieve ppb levels of TOC, ppt levels of metals, and > 18 MΩ-cm resistivity

**Zero Liquid Discharge (ZLD)**
- Reduced environmental impact
- Volume reduction, recycling of valuable water, and reuse
- CoLD™ Process to achieve ZLD on difficult coal-fired wastewaters

**Multiple Effect Distillation (MED)**
- Can be coupled with reverse osmosis desalination for an innovative, energy-saving hybrid solution
- World leader in thermal desalination through subsidiaries like Sidem and Entropie
- Veolia Water Technologies has provided more than 80% of the world installed capacity of desalination plants using the MED process

**Multiflo™ & DAF for seawater and other applications**
- Efficient process for removing total suspended solids (TSS), color, algae and heavy metal co-precipitates
- Suitable for treating water with an average to high turbidity level (10 - 4000 mg/l TSS)

**Condensate Polishing Plant**
- Custom and standardized mixed bed ion exchangers
- State-of-the-art external resin regeneration technology: SeparIX™
- Condensate filtration of suspended metals (iron and copper)
- Combination of filtration unit and SeparIX™ external regeneration allowing operation in the ammonia cycle

**STANDARDIZATION**
Veolia proposes a range of in-house standardized systems including Sirion™ RO and Rapide Strata™ Ion Exchange Deionization. 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.
Creating water solutions to meet your needs

Veolia Water Technologies designs, installs, commissions, operates, and services water and wastewater systems for all types of power plants, including Fossil, Nuclear and Solar Power Plants.

1. COOLING TOWER MAKE-UP
   - For all types of feed water including sea, ground, surface, reclaim (sewage) as well as reuse of power plant wastewater (recycling).
   - Typical applications include removal/reduction of suspended solids, hardness, silica, organics, iron and manganese.
   - High quality cooling water allows for high efficiency fill to be used in the tower, resulting in a lower heat rate and higher power plant efficiencies.

2. BOILER FEED WATER
   - Processes and technological solutions for all water sources.
   - Reduction of impurities entering the boiler system that cause reduced heat transfer, increased fuel consumption, steam contamination, carry-over, condenser corrosion, and turbine deposits which can all lead to a loss of production.

3. CONDENSATE POLISHING & FILTRATION
   - Removal of impurities from the condensed steam.
   - Reduction of suspended solids, iron and ionic impurities that lead to increased corrosion, downtime, and slower power unit start-ups.
RECYCLING AND REUSE SYSTEMS

Wastewater from power generation plants may be treated and recycled for use within the original application or for being reused in another application, either within the same plant or externally. We will help you to:

- Meet environmental regulations
- Reduce plant discharge and consumption levels (water footprint)
- Reduce the burden and costs for local water treatment plants

4. COOLING TOWER SIDESTREAM

Clarification, softening, filtration, water treatment chemicals and associated services to help power generation companies effectively manage their cooling towers.

- Reduce scaling and deposition, minimize microbial activity and more specifically legionella control

5. COOLING TOWER BLOWDOWN

Technologies to treat or minimize blowdown water, in order to avoid corrosion and organic material in cooling towers due to excess concentration of contaminants.

- Minimize water use by increasing cycles of concentration
- Zinc and chromates removal
- Silica and metals removal
- Using as raw water for demin water production

6. FGD WASTEWATER

Flue gas desulfurization (FGD) scrubber effluent from coal-fired power generation requires varying degrees of treatment depending on the type of coal, water sources, and environmental regulations, in order to reduce:

- Particle matters and gypsum de-saturation
- Heavy metals
- Environmental impact
- Volume reduction, recycling of valuable water, and reuse
- Zero Liquid Discharge (ZLD)
- Compliance with the higher requirements regarding heavy metals (e.g. METCLEAN™)

7. DRY ASH POND MANAGEMENT

- Pond management and dewatering
- Wastewater treatment suitable to discharge
- Mobile, very high rate clarification systems

已经成为一个拥有丰富经验的Lecturer, 在教学过程中, 对于不同类型的教材和教学方法, 你能够快速地做出适应并调整教学策略, 以确保学生能够有效地理解和掌握所学知识。你能够根据学生的学习特点, 以及不同学科的性质, 选择合适的教学方法, 从而提高教学效果。同时, 你注重学生的个性化发展, 充分考虑学生的兴趣和需求, 帮助他们在学习过程中找到自己的方向。
Reliable services

Outsourcing

Veolia provides outsourcing solutions that enable clients to remain focused on their core business. Outsourcing to a water treatment specialist leads to more efficient operations and thus cost savings.

Hydrex™ chemicals

- A complete range of products to improve the efficiency and reliability of cooling towers, condensers and boiler, by managing microbiology, scaling, odor and corrosion.
- Hydrex™ is ideal for use in recirculation, open and closed water cooling systems and once through applications.
- Hydrex™ will significantly improve the management of scaling and corrosion of your boilers.

Hydrex™ also provides green chemistry

- To minimize the impact of additives in the environment.
- To comply with tight environmental regulations.
- To meet societal preferences.

Aquamove™, Mobile Water Solutions

Applications

- Operational emergency
- Plant commissioning
- Plant downtime for maintenance purposes
- Delayed delivery of new plant
- Changes in raw water quality
- Peak demand
- Steam blows
- Ash pond treatment

Advantages

- Consistent treated water quality down to 0.08 μS/cm
- Off-site regeneration of resins
- Automatic monitoring
- Flow rates from 2 to 400 m³/h (10-1500 gpm)
- Maximum water yield
- Reliable contingency planning
- Mobile service network
- Fast delivery and commissioning
A world of experience

**Bayswater Power Station**  
*Baywater, Australia*  
> Design, Build, Operations and Maintenance  
> Capacity: 5,000 m³/h  
> Process: Lime softening, 8 Actiflo® clarification units, filtration, ion exchange, reverse osmosis, brine concentration, crystallization

**Redhawk Power Station**  
*Arlington, AZ, USA*  
> Design and build  
> Capacity: 102 m³/h of high salinity blowdown from the cooling towers  
> Process: Zero Liquid Discharge (ZLD) System

**Power Plant Gönyü**  
*Gönyü, Hungary*  
> Design and build  
> Capacity:  
  - Demineralization Plant: 2 x 16 m³/h  
  - Condensate Polishing Plant: 2 x 190 m³/h  
> Demineralization Process: Prefiltration, flocculation, ultrafiltration, reverse osmosis incl. CIP-station, degasifier, mixed bed exchanger, regeneration station and neutralization, chemical dosing and storage  
> Condensate Polishing Process: Cartridge filter, mixed bed exchanger with external regeneration

**Al-Hidd IWPP**  
*Al-Hidd, Kingdom of Bahrain*  
> Capacity: 950 m³/h  
> Process: 10 Multiple Effect Distillation (MED) units

**Hamburg Moorburg**  
*Hamburg, Germany*  
> Capacity:  
  - Service Water Treatment (Multiflo®): 2 x 240 m³/h  
  - Demineralization plant (Multimedia filter, Cation and Anion exchanger, Reverse osmosis, Mixed bed exchanger): 120 m³/h  
  - Condensate Polishing Plant (Cartridge filter and Mixed bed exchanger with external regeneration): 2 x 1,000 m³/h

**Seabank Power Station**  
*Bristol, United Kingdom*  
> TEMPORARY SOLUTION  
> Capacity: 25-60 m³/h  
> Process: MODI™ Mobile ion exchange deionization

**400MW Combined Cycle Plant**  
*Daegu City, South Korea*  
> Design and Build  
> Capacity: 2x198 m³/h  
> Process: Condensate Polishing, SeparIX

**FHI Limay Power Plant**  
*Limay, Bataan, Philippines*  
> EPC contract  
> Capacity: 100 m³/h  
> Process: Actiflo®, Zero Liquid Discharge (ZLD) System
Resourcing the world