

Elevating Combined Cycle Performance

Integrated Water Management Approach for Combined Cycle Gas Turbine Plants

Delivering greater efficiency, reliability and asset protection
across the combined cycle power plant



Experience That Delivers Measurable Impact

Combined Cycle Gas Turbine (CCGT) plants operate under intense pressure to maximize output, control costs and meet environmental expectations. Nalco Water brings decades of power industry experience, global expertise and continuous innovation to help CCGT operators meet these challenges with confidence.

With proven chemical programs, connected equipment, advanced digital intelligence and dedicated technical support, we help power producers improve plant performance while protecting critical assets and optimizing water use.

Our approach is built on:

- ✦ Deep experience supporting power generation facilities worldwide
- ✦ Outcome-based innovation combining chemistry, digital tools and service
- ✦ A relentless focus on efficiency, reliability, productivity and sustainability



Focused on Your CCGT Challenges

➤ Maximize Plant Efficiency

- Improve heat transfer and condenser performance
- Support stable, optimized operating conditions
- Help maintain peak efficiency across load changes

➤ Optimize Water & Chemical Use

- Improve water quality across plant systems
- Reduce overfeed, waste and variability
- Support sustainable water management goals

➤ Improve Reliability & Availability

- Protect assets from fouling, corrosion and scaling
- Cut unplanned outages and performance loss
- Extend the life of high-value equipment

➤ Drive Environmental & Safety Performance

- Help meet regulatory and discharge requirements
- Reduce operational risk and variability
- Promote safer, more predictable plant operations

A connected CCGT plant strategy

Nalco Water delivers an integrated strategy that connects key plant systems through chemistry, monitoring and advanced digital intelligence. By combining real-time visibility with targeted treatment programs, we help optimize performance across the entire combined cycle process.



Nalco Water's CCGT strategy brings together chemical treatment, digital intelligence and expert service into a single, cohesive program to help you:

- improve plant efficiency and heat rate performance
- reduce unplanned downtime and forced outages
- lower water, energy and chemical consumption
- extend life of critical plant assets
- boost operational confidence and predictability

3D TRASAR™ Technology

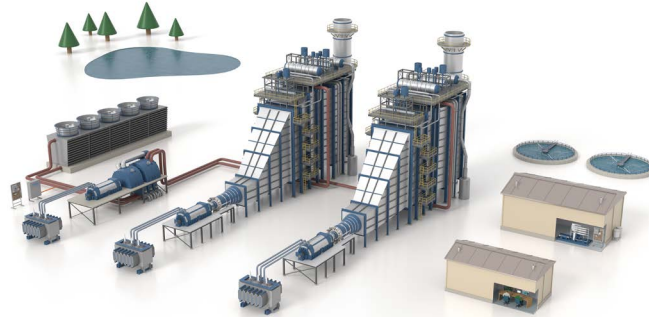
Delivers automated monitoring and control of water chemistry to help maintain optimal conditions, reduce variability and improve overall system reliability

POWERFILM™ Program

Broad portfolio of filming technologies and digital monitoring equipment helps protect steam and condensate surfaces by controlling iron deposition and fouling, supporting consistent thermal performance and improved reliability

PURATE™

On-site chlorine dioxide generation supports effective microbiological control while helping reduce chemical handling and unwanted byproducts



Ecolab® ThermoTwin IQ™

Digital twin technology recommends optimal operational settings to help increase production, improve efficiency and lower cost of operation throughout the water-energy circuit

ECOLAB3D™

Transforms operational data into actionable insights through advanced analytics, asset performance monitoring and proactive alerts, helping teams move from reactive to predictive operations

Ecolab® CondenserIQ™

Provides real-time visibility into condenser performance issues to help identify inefficiencies, support proactive decision-making and protect one of the plant's most critical assets

Value Delivered Across The Plant

PRETREATMENT

- 3D TRASAR™ Technology for Reverse Osmosis (RO)
- Reverse Osmosis (RO) Biocides and Antiscalants
- Coagulants and Flocculants
- Ecolab® Purolite™ Resins and Ion Exchange

EFFLUENT TREATMENT

- 3D TRASAR™ Technology for Effluent
- Coagulants and Flocculants
- Advanced Polymer Activation System (ADPAS)
- Zero Liquid Discharge (ZLD) Solutions

DIGITAL SOLUTIONS

- Ecolab® ThermoTwin IQ™
- ECOLAB3D™ digital platform
- Ecolab Global Intelligence Center (EGIC)
- Ecolab® CondenserIQ™
- Ecolab® Water Quality IQ™

COOLING WATER

- 3D TRASAR™ Technology Premium Plus with Proactive Deposit Detection
- PURATE™ Chlorine Dioxide Technology
- Oxidizing and Non-Oxidizing Biocides and Dispersants
- Non-Phosphorous Scale and Corrosion Inhibitors
- Rapid Bio Intelligence
- Cooling Water Optimizer and Once Through Optimizer
- Yellow Metal Corrosion Inhibitors

STEAM CYCLE CONDENSATE

- POWERFILM™ Filming Chemistries and Monitoring Program
- Solid Alkali Programs
- Food-Grade Programs for Co-Generation Facilities
- Flow Accelerated Corrosion Solutions
- Layup Strategies and Chemistries
- Ecolab® Purolite™ Resins

Proven Results in Power Generation



Ecolab® CondenserIQ™ program reduces fuel costs and improves plant efficiency

Combined cycle power plant
California, USA



POWERFILM™ program reduces corrosion under cyclical operation

Combined cycle power plant
600-MW 2x1 configuration | Air-cooled condenser

SITUATION:

The 825 megawatt (MW) combined cycle power plant monitored condenser performance but lacked insight into declining efficiency. Data showed the cleanliness factor had dropped below the 85% design specification, indicating a potential issue. Alone, the factor could not identify whether fouling, scaling or air in leakage was responsible, each requiring a distinct corrective action.

SOLUTION:

Nalco Water implemented the Ecolab CondenserIQ program, integrating plant historian and cooling water data with Electric Power Research Institute (EPRI)- and industry-standard condenser performance calculations. Advanced analysis provided insight beyond a single metric, identifying air in leakage as the cause of efficiency loss.

With this visibility, the plant conducted tracer gas testing, locating multiple air leaks in the low-pressure (LP) turbine hood. Leaks were prioritized and repaired in phases over 30 days, while Nalco Water continued monitoring condenser performance to validate and sustain improvements.

RESULTS:

Following repair of the air leaks, condenser performance improved rapidly and measurably:

- Average condenser backpressure **decreased from 3.2" Hg to 2.3" Hg**, an **improvement of 0.9" Hg**
- Plant efficiency **improved by 0.9%**
- Cleanliness factor **increased by 25.7%**
- Generating capacity **increased by 2.6 MW** during high-demand periods
- Estimated fuel **cost reduction of over \$500,000/year**

Routine review of condenser performance data now helps the plant to detect issues earlier, prevent efficiency degradation and maintain competitive operating costs.

TOTAL VALUE DELIVERED = \$681,000/year
in reduced fuel costs through improved condenser efficiency

SITUATION:

As power markets evolve, combined cycle plants operate more cyclically than designed, making chemistry and corrosion control in the air-cooled condenser (ACC) more challenging. Elevated iron levels in final feedwater indicate active corrosion, increasing the risk of equipment damage, forced outages and higher maintenance costs.

SOLUTION:

Nalco Water implemented POWERFILM 10000, a next-generation filming corrosion inhibitor formulated without filming amines or neutralizing amine solvents. The program protects metal surfaces during cyclical operation while avoiding drawbacks of traditional filming amine treatments.

A structured field trial, conducted with plant engineering staff, measured corrosion product generation using samplers. Results were correlated with operational and generation data to clearly assess performance.

RESULTS:

Compared to the incumbent filming amine program, the Nalco Water POWERFILM program delivered clear and measurable improvements:

- **40% reduction** in corrosion product generation at the same dosage rate
- **Reduced iron transport** throughout the system
- **Improved protection** of ACC and feedwater components
- **Lowered risk** of deposition, chemical cleaning and unplanned maintenance

The plant achieved improved corrosion control while supporting flexible, cyclical operation at a lower overall treatment cost.

KEY OUTCOME DELIVERED

40% reduction in corrosion products supporting improved asset protection and long-term plant reliability

A smarter path to CCGT performance

Nalco Water helps combined cycle power plants unlock greater efficiency, reliability and sustainability through an integrated, digitally enabled water management strategy.

Learn more about how Nalco Water supports CCGT operations:

[Gas-Fired Power Generation](#) | [Market](#) | [Nalco Water](#)

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