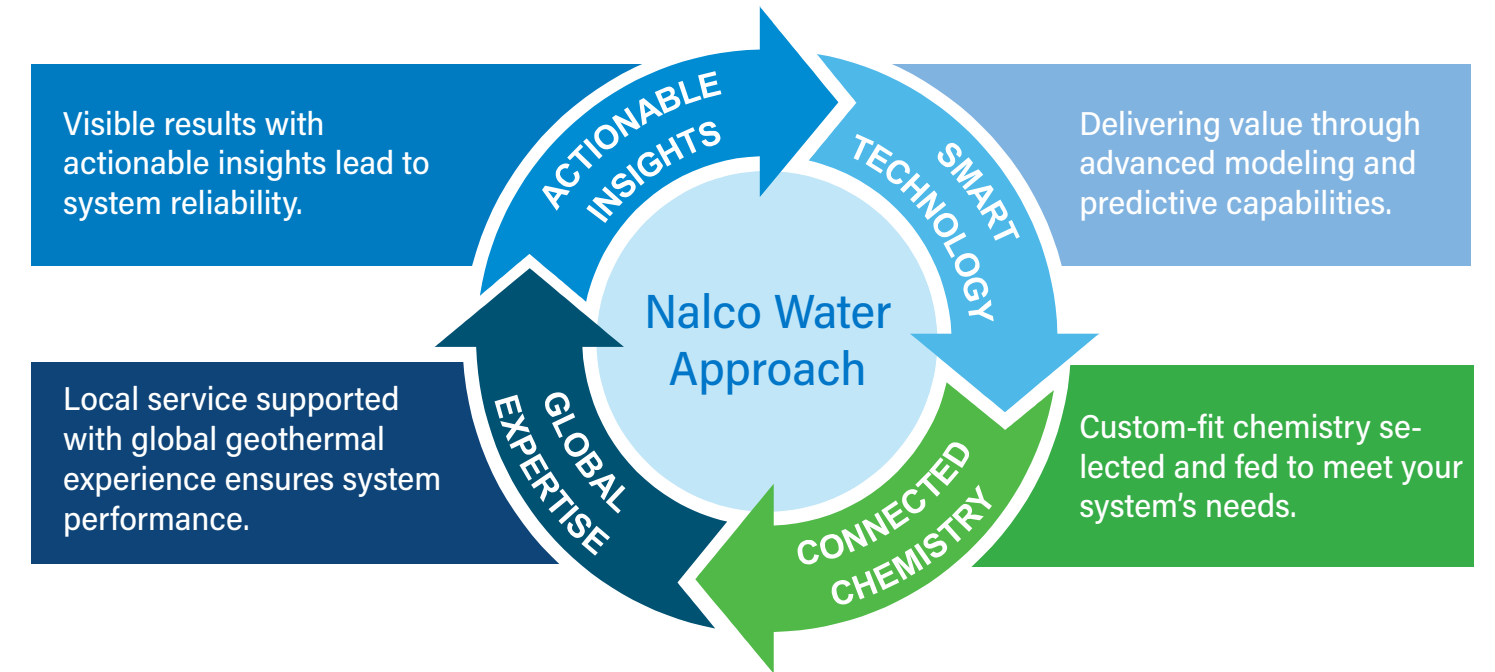


Your Partner for Sustainable Growth

in the Geothermal Power Industry

Your Total Solution Partner for Geothermal Power



We create and deliver value that aligns with your key business drivers.



PROFITABILITY



PRODUCTIVITY



HUMAN HEALTH
& SAFETY



COSTS



ASSETS

Ensure Your Plant's Consistent, Sustainable Performance

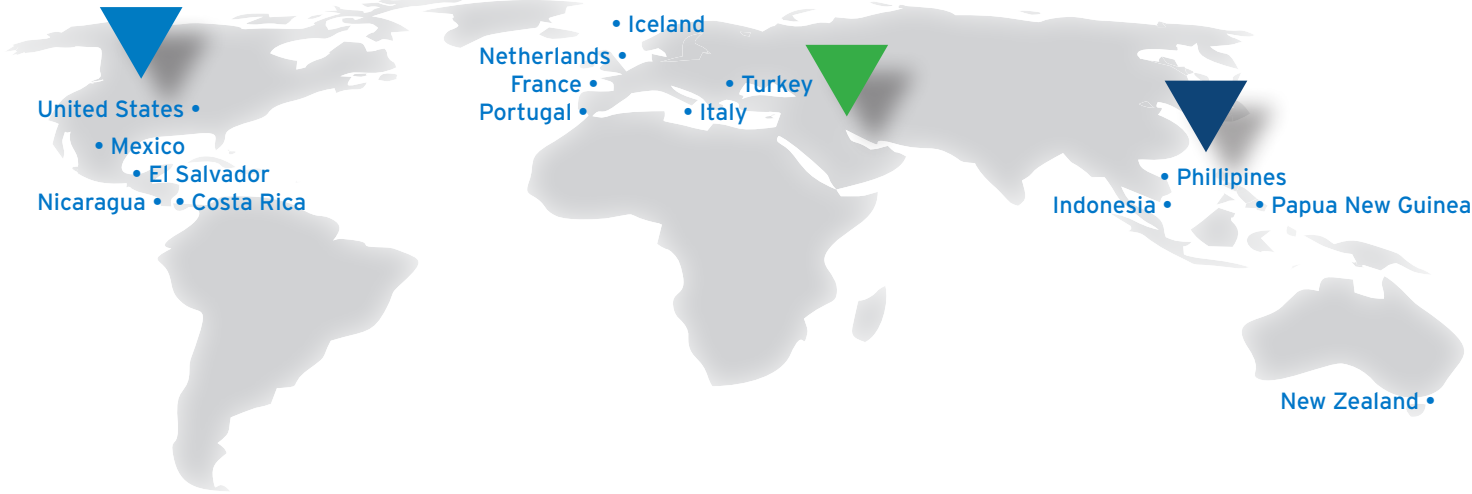
Digital Innovation

- Geomizer™ Modeling
- 3D TRASAR™ Geothermal
- OMNI™ Performance Monitoring

Comprehensive Solutions

- Scale Control
- Corrosion Control
- Deposit Removal
- Cooling Water Treatment
- H₂S Abatement

Nalco Water Global Geothermal Impact



ASIA/PACIFIC Scale Control

Problem:
A Philippines geothermal plant experienced near complete pipeline blockage due to scale formation at the mixing point of two wells. Scale accumulated at 0.7 inches per month and required manual removal. With no alternate diversion pipeline, productivity was down 15 MW causing lost revenue of US\$21,600 per day. The plant sought a scale control solution for amorphous silica and corrosion products.

- Solution:**
- Geomizer™ Scenario Modeling
 - Nalco Water Silica Inhibitor
 - Nalco Water Iron Sulfide Dispersant

NORTH AMERICA Online Well Cleaning

Problem:
A US geothermal plant experienced reduced electrical generation capacity due to a 75% reduction in injectivity to their injection well, which was constricted by deposit buildup. The facility endured ~\$1,200/day in lost revenue opportunity. After an unsuccessful offline acid clean, the plant sought ways to restore well capacity and remove restrictive deposits.

- Solution:**
- Geomizer™ Scenario Modeling
 - Nalco Water online chemical cleaning chemistry

MIDDLE EAST Corrosion Control

Problem:
A binary geothermal plant in Turkey experienced a total shutdown one year into operation due to severe corrosion. Investigations confirmed corrosive failure across the plant with equipment damage that took nearly two years of shutdown time to replace. After losing two years of revenue-generating productivity and equipment repair costs, the customer sought improved corrosion management.

- Solution:**
- Geomizer™ Scenario Modeling
 - Nalco Water corrosion inhibitor
 - 3D TRASAR™ Technology for geothermal corrosion monitoring

NORTH AMERICA Cooling Water – H₂S Abatement

Problem:
Release of H₂S gases from US geothermal plants presents both worker exposure and environmental emissions concerns. The Hudson Ranch power plant must meet an H₂S limit of 3.8 lb/hr—equal to an H₂S removal rate of at least 90-95%. Since typical H₂S treatment systems are capital intensive, maintenance intensive and unreliable, Hudson Ranch sought a different solution to meeting their H₂S limit.

- Solution:**
- Nalco Water Patented H₂S Abatement Program



PRODUCTIVITY

US\$7M / year savings in revenue generating capacity of 15 MW header
US\$300,000 / year savings in revenue generation through avoiding 14 days mechanical cleaning downtime



COSTS

US\$20,000 / year savings through avoiding mechanical cleanings



ASSETS

Protected 15 MW header from scale deposit buildup and corrosion risk



PRODUCTIVITY

US\$400,000 / year increase in revenue generating capacity through restoring 1 MW productivity in injection well
US\$7,200 savings in revenue generation through avoiding offline shutdown time for typical cleaning methods



COSTS

US\$100,000 / year savings in reduced maintenance cost compared to acid cleaning of the injection wells



HUMAN HEALTH & SAFETY

Improved safety and handling compared to acid cleaning and hazards of mechanical cleaning



PRODUCTIVITY

US\$1M productivity in MW generation through avoiding 4 months additional corrosion-related shutdown



COSTS

US\$500,000 savings in avoided equipment cost replacement of heat exchanger tubes + 600m pipeline
US\$50,000 savings in avoided labor and maintenance savings in corrosion repair



ASSETS

Protected binary plant equipment from corrosive failure and replacement



AIR

262 tons / year reduction in H₂S emissions



COSTS

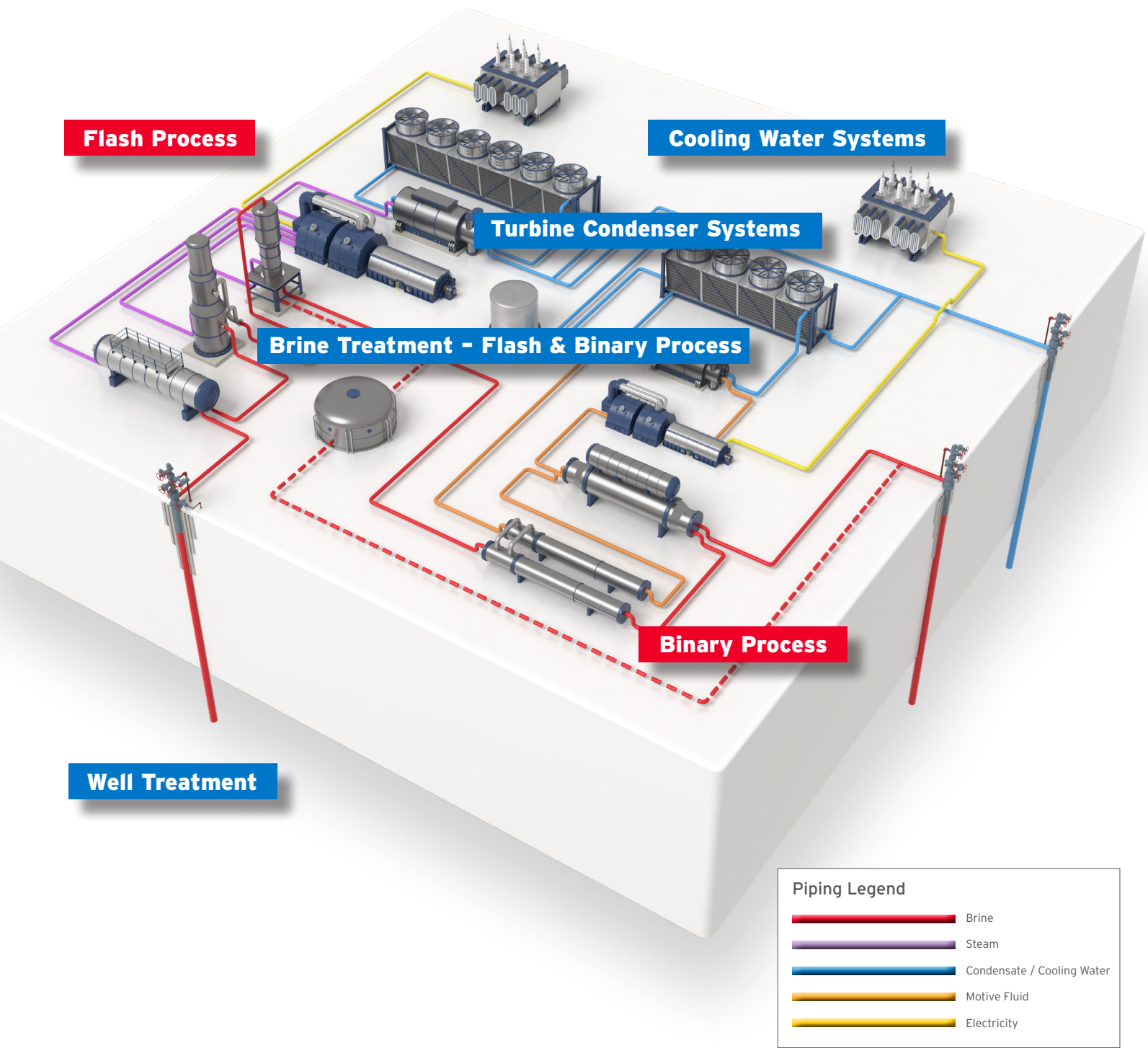
\$100,000 / year in net total cost of operation for H₂S compliance



HUMAN HEALTH & SAFETY

Improved air quality for employees and local environment

Total Solution Partner to Meet Your Geothermal Needs



WELL TREATMENT

Flow restriction in production or injection well systems decreases production and increases operating costs. Nalco Water optimizes well flow by removing deposits using safe, proprietary on-line/off-line strategies and by maintaining system cleanliness with advanced scale-inhibition technologies.

Nalco Water Offerings:

- Scale inhibition – CaCO_3 , CaSO_4 , BaSO_4 , SiO_2 , Metal Silicates, and Metal Sulfides (Al, Fe, Mn)
- Corrosion inhibition
- On-line / off-line deposit removal
- Geomizer™ predictive modeling
- 3D TRASAR™ Geothermal corrosion monitoring

BRINE TREATMENT - FLASH & BINARY

Nalco Water's proprietary Geomizer modeling tool predicts brine solubility throughout the plant—informing advanced chemistry treatment strategies to inhibit scale deposits and corrosion.

Nalco Water offerings:

- Scale inhibition – CaCO_3 , CaSO_4 , BaSO_4 , SiO_2 , Metal Silicates, and Metal Sulfides (Al, Fe, Mn)
- Corrosion inhibition
- Geomizer™ predictive modeling
- 3D TRASAR™ Geothermal corrosion monitoring
- On-line deposit removal
- Steam system protection

TURBINE/CONDENSER SYSTEMS

Nalco Water can help optimize the power output of your geothermal turbines while keeping you in environmental compliance.

Nalco Water offerings:

- OMNI™ advanced analytics for surface condensers and heat exchangers
- On-line cleaning – silicate compounds, calcite
- H_2S abatement
- Steam system corrosion protection
- Turbine cleaning

COOLING WATER SYSTEMS

Nalco Water's expertise in controlling scale, corrosion, and microbial growth in cooling water systems optimizes system performance at the lowest total cost. Our solutions save water and energy by proactively managing your cooling water processes with real-time data that prepares water for optimal condenser performance with increased cycles of concentration in both flash and binary operations.

Nalco Water offerings:

- 3D TRASAR™ Cooling Water Technology
- Cooling Water Optimizer modeling tool
- Scale control
- Corrosion control
- Microbial control
- H_2S abatement – patented
- Treatment of condensate make up water sources (high ammonia / dissolved gases)

*Green indicates digital offerings

Nalco Water, an Ecolab Company

North America: 1601 West Diehl Road • Naperville, Illinois 60563 • USA

Europe: Richtstrasse 7 • 8304 Wallisellen • Switzerland

Asia Pacific: 52 Jurong Gateway Road, #16-01 Jem Office Tower, Singapore 608550

Greater China: 18G • Lane 168 • Da Du He Road • Shanghai China • 200062

Latin America: Av. Francisco Matarazzo • nº 1350 • Sao Paulo – SP Brazil • CEP: 05001-100

Middle East and Africa: Street 1010, Near Container Terminal 3, Jebel Ali Free Zone, PO BOX 262015, Dubai UAE

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