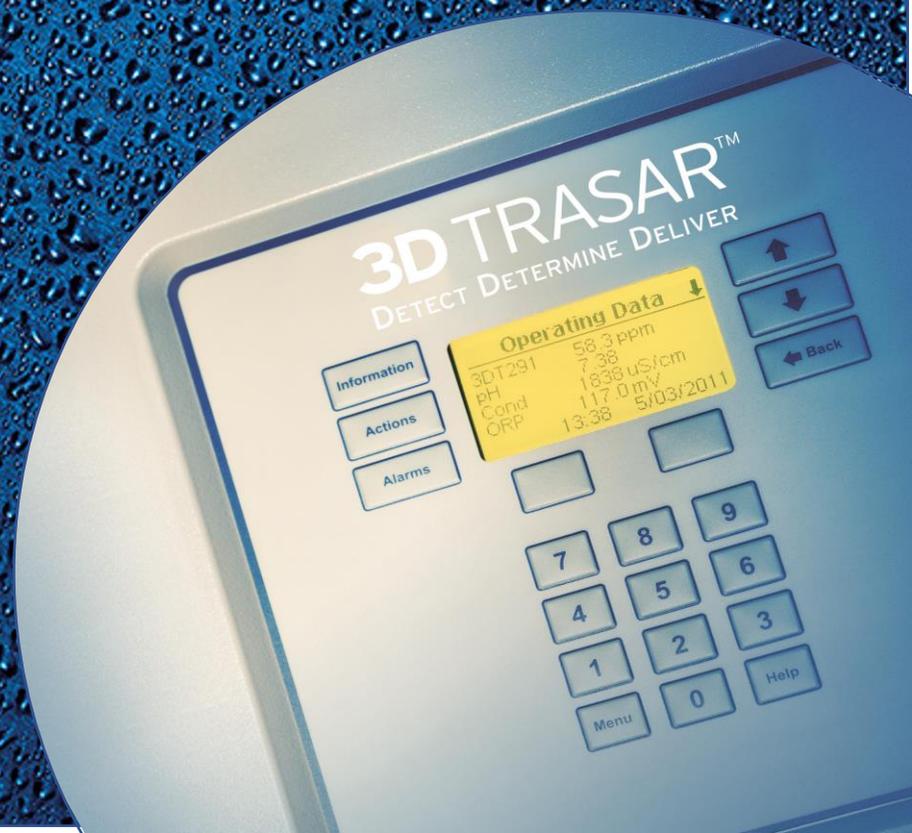




YOUR PARTNER FOR SUSTAINABLE GROWTH

In Hotels, Commercial Buildings, Hospitals
and Institutions

NALCO  **Water**
An Ecolab Company



YOUR GOALS ARE OUR GOALS



In today's business environment, Hotels, Hospitals, Data Centres, Offices spaces and other Commercial Buildings and institutions are constantly striving to meet their sustainability goals by reducing total cost of operation, water and energy consumption, improving operation efficiency, minimize health and safety concerns while improving environmental performance.

Fresh indoor air quality, comfortable room temperatures, and safe water are critical factors in building positive brand image and driving guests and occupant's satisfaction, loyalty and safety.

Nalco's proven innovative solutions in water, process and air treatment can help you achieve these goals.

Nalco has partnered with Institutional properties worldwide to develop reliable, cost effective and safe solutions through transformational practices in the mechanical, chemical and operational areas to help the industry achieve economic, environmental and social objectives.



Water Saving

- Increase cycles of boiler and cooling water
- Water recycle and reuse
- Improve efficiency of water purification / softeners

Energy Saving

- Increase boiler efficiency
- Increase and maintain chiller efficiency
- Improve and maintain HVAC system efficiency
- Increase condensate return recovery
- Boiler blowdown heat recovery

Enhance Reliability

- Maintain design COP (Coefficient of Performance) rating
- Avoid unscheduled system shutdown
- Reduce maintenance cost
- Extend the equipment life

Green Building & Environment Commitment

- Support LEED / Green Building certification
- Decrease pathogen related risks and liabilities
- Decrease grey water discharge
- Reduce carbon footprint
- Comply with regulatory guidelines

Improve safety

- Legionella analysis, auditing and technical support
- Technical and operator training
- Safe chemical storage and handling solutions

WHO WE ARE

19
global Tech Centers

48,000+
global associates

8,700
patents

FORTUNE 250
company

119
Manufacturing Locations

1M+
Customer Locations

Serving customers in **170+** countries



COMPLETE SOLUTION TO YOUR SUSTAINABILITY GOALS




Water system solutions that help reduce energy & water costs, and extend asset life



Actionable data and remote monitoring to drive process improvements and system reliability



World-class service and consultation when and where you need it most



Legionella risk reduction expertise to maximize patient & employee safety, and support regulatory compliance



Cooling systems
Solutions

- Scale, corrosion and micro-bio control programs, including low or no phosphate chemistries
- TRAC program for chilled water loops
- 3D TRASAR Cooling Water Technology
- Nalco 360™ Service

Benefits

- Reduced water consumption
- Increased chiller energy efficiency
- Increased condenser and cooling tower life
- Control waterborne pathogen activities
- Reduced maintenance cost



Boiler water and hot water loops
Solutions

- NexGuard® boiler program
- TRAC program for hot water loop
- 3D TRASAR™ Boiler Technology

Benefits

- Improve boiler efficiency
- Improve control over boiler blowdown in terms of quantity and quality
- Increase boiler life
- Improve steam and hot water quality
- Reduce water, fuel and emission



Domestic Water System
Solutions

- Legionella Water Management program
- ChloroSafe Secondary Disinfection

Benefits

- Improved water safety
- Improved guest, patient & employees' safety
- FDA approved for potable applications
- Safe handling solid chemistry
- Comply with applicable guidelines and regulations



Water Recycle & Reuse
Solutions

- Water treatment process solutions and equipment design
- Water treatment plant financing
- Total project management from concept to commission
- Testing and benchmarking plant performances
- Water treatment plant operation and maintenance

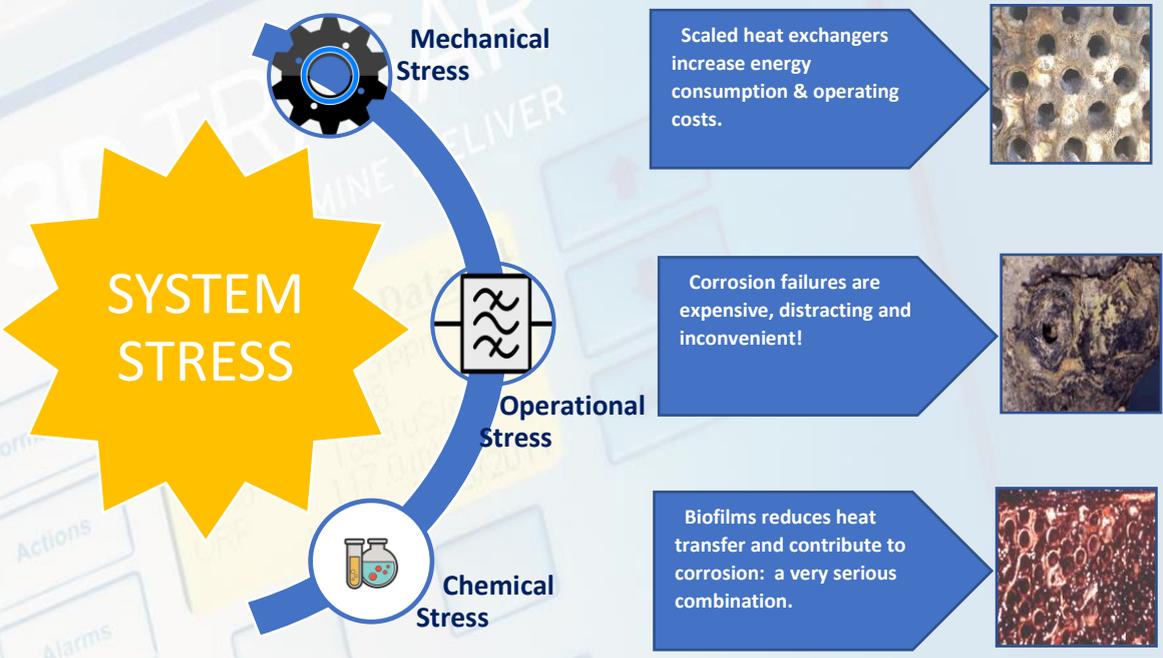
Benefits

- Reduce total cost of operations due to improved water management
- Reduce dependence on fresh water
- Improve discharge quality and consistency

3D TRASAR™ Cooling Water & Closed Loop Solutions

Optimizing System Efficiency Through Advanced Cooling Tower Program for HVAC System

Most HVAC systems operate 20-50% below design capacity due to scaled open water loops, dirty cooling towers, fouled coils and poor filter management. The Nalco HVAC cooling water programs include innovative technologies and services to maintain your HVAC system to peak performance. The process includes an audit of all critical performance points (CPP), best in class chemistries, and advanced monitoring systems. Nalco has the expertise to help you meet your operational sustainability goals.



3D TRASAR™

DETECT DETERMINE DELIVER



- DETECTS** potential risks & changes
- DETERMINES** corrective action
- DELIVERS** measurable results

What it is

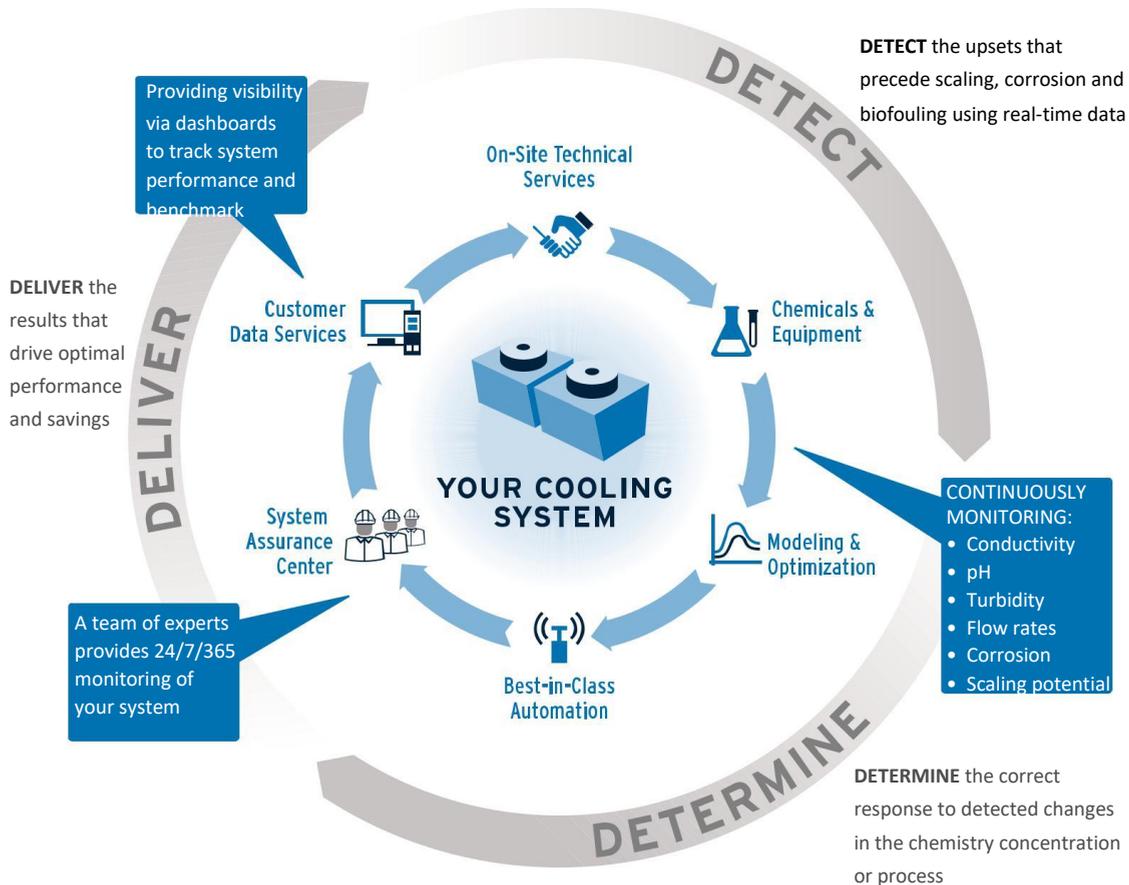
- ✓ Direct monitoring and control
- ✓ Data management and value communication
- ✓ 24/7 monitoring support
- ✓ Automated Inventory Management

What it does

- ✓ Enhancing plant safety, minimizing risks
- ✓ Saving water and energy costs
- ✓ Increasing production reliability
- ✓ Lowering operating Costs
- ✓ Extending asset life
- ✓ Reducing maintenance
- ✓ Minimizing wastewater generation
- ✓ Increasing labor efficiency
- ✓ Providing peace of mind

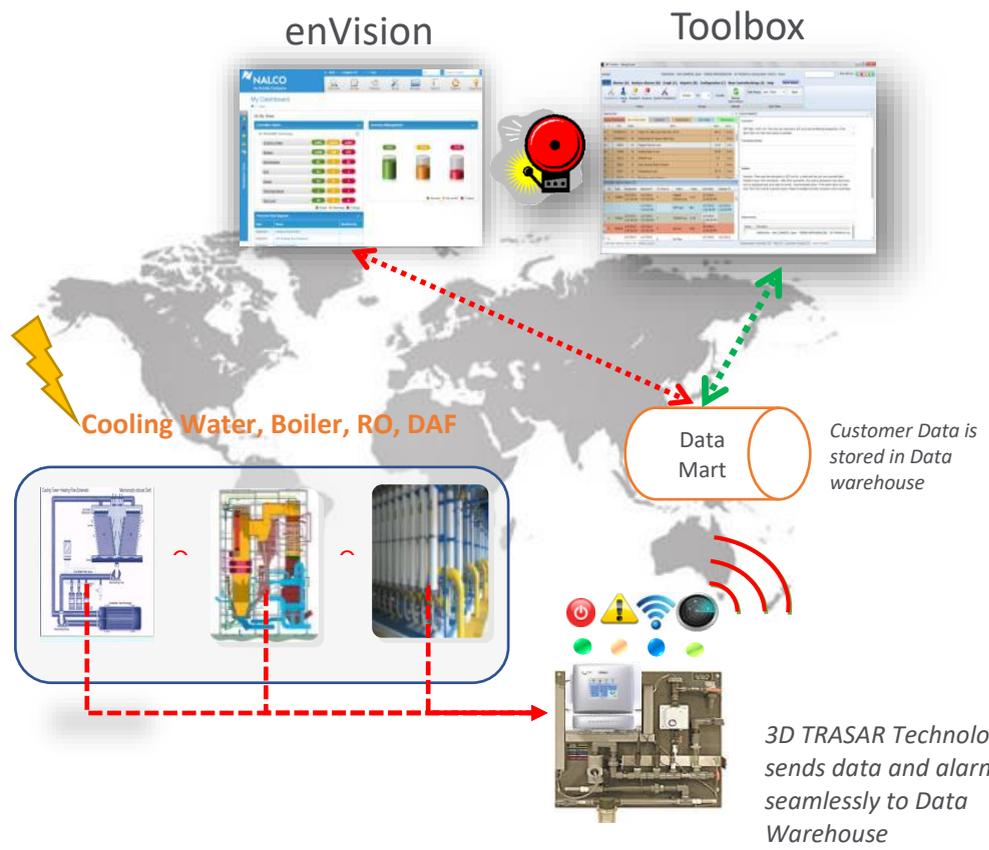
WE COMBINE NALCO EXPERTISE WITH THE INDUSTRY'S MOSTADVANCED TECHNOLOGY TO ADDRESS YOUR KEY BUSINESS DRIVERS.

Mechanical, Operation, Chemical Audit



THE POWER OF DATA ON DEMAND

SYSTEM ASSURANCE CENTER



14,000 SYSTEMS GLOBALLY <small>IN 100 COUNTRIES</small>	WORLD-CLASS CLIENT SATISFACTION
9 YEARS PROVEN SUCCESS	100 CHEMICAL ENGINEERS <small>TROUBLESHOOTING ALARMS</small>
BEGAN AS THE NALCO 360 EXPERT CENTER IN 2007	ON DUTY 24/7/365 <small>INCLUDING WEEKENDS/HOLIDAYS</small>
1.1 MILLION SYSTEM ALARMS HANDLED PER YEAR	64,000 CRITICAL SYSTEM UPSETS AVERTED PER YEAR <small>MOST COMMON IS pH LOW</small>



MEASURABLE eROI - PROVEN PERFORMANCE

Creating and maintaining value (CMV)

We understand and address the unique needs of the Institutional Industries.

Through the CMV process, our local sales and service team work with you onsite to deliver maximum performance from your existing applications. We design, develop and implement solutions specifically tailored to your operations and key business drivers.

2,272,449 kWh in Annual Energy Savings for Leading Financial Planning Corporation

NALCO
An Ecolab Company

CASE STUDY - INSTITUTIONAL
CH1543

BACKGROUND
A diversified financial services group operates in one of the largest office buildings in the US (over 4 million square feet of office space) requiring 90,000 tons of refrigeration. Over the past several years, the customer has taken substantial steps to reduce energy consumption and the impact on the environment by lowering over 20% of the energy supply to renewable energy sources. In continuing their effort to reduce energy consumption and emissions, the customer requested that Nalco and their consultant HVAC filter supplier survey their campus to determine what, if any, energy improvements could be made with the HVAC system. Recommended program changes will be evaluated and pursued based on their merit.

CURRENT FILTRATION PROGRAM
The current filtration program consists of a pre-filter and final filter arrangement. 50% - 90% efficiency 90% - 95% efficiency: non pleat filter which will be replaced to repair both the existing pre-filter and primary filter. The filter will amount double the filtration efficiency while increasing the time between changes to once per year. The new filter recommendation will save based on their merit.

NALCO RECOMMENDATION
Nalco recommended a low pressure, high efficiency MERV 14 pleated filter 90% - 95% efficiency: non pleat filter which will be replaced to repair both the existing pre-filter and primary filter. The filter will amount double the filtration efficiency while increasing the time between changes to once per year. The new filter recommendation will save based on their merit.

Common Sense	eROI	Economic Results
2,272,449 kWh per year in Energy Savings		\$180,000 savings per year
90% less per year reduction in CO ₂ emissions		Significant improvement in indoor air quality (IAQ)
Reduction of 208 cubic yards of landfill waste per year		\$50,000 savings per year from reduction in space disposal expenses

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3D TRASAR™ Technology protects valuable asset and restores HVAC operations from corrosion problems for a luxury hotel in Thailand

NALCO
An Ecolab Company

CASE STUDY - INSTITUTIONAL
CH183AP

SITUATION
During 2002, a major luxury hotel in Thailand had tremendous challenges maintaining its chiller plant asset due to serious corrosion in the HVAC pipelines and the chiller condenser tubes. This problem was caused by a lack of control of the key cooling water parameters such as pH and conductivity, and the level of failure of the existing cooling water chemical program. Guest satisfaction was also being reduced as the hotel had to operate with significantly decreased refrigeration capacity.

SOLUTION
Nalco was invited to support the hotel's engineering team in evaluating the current water treatment program. A Mechanical, Operational and Chemical (MOC) survey of the cooling water system was conducted, after which Nalco recommended the implementation of its state-of-the-art 3D TRASAR-based program.

System Overview

Parameter	Unit	Value
Refrigeration Rate	ton/Power	2402
Feed up Volume	m ³ /hr	78
Makeup	M ³ /Cu	M ³ /Cu
Source to be Used		STP Treated Water
Capacity of Cooling System	TB	400
Delta T	°C/°F	4
CO ₂		5
Blow Down Rate	m ³ /Power	0.54
Evaporation Rate	m ³ /Power	2.04
Make-up	m ³ /Power	2.08
Water Loss Rate	m ³ /Power	64.26

Common Sense	eROI	Economic Results
Reduction by 9% in electricity consumption, equivalent to 14,520 kWh per year		Annual energy savings of US\$24,700
Total 20% of fresh water saved, equivalent to 14,520 m ³ per year		Water savings of US\$20,000 per year
No downtime or downtime		US\$200 maintenance cost savings
Avoiding US\$ 1 million up to M4 for one year due to fresh water saved		Equivalent to 1,900 trees absorbing CO ₂ per year

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Nalco 3D TRASAR™ Technology Helped a Luxury Hotel in India Reduce Total Cost of Operation by Achieving and Maintaining Optimal Operating Conditions

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CASE STUDY - INSTITUTIONAL
CH183AP

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1.2 Million kWh Reduced A Washington DC Hotel Realizes Energy Savings, Air Flow Increases, and Improved Customer Satisfaction

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CASE STUDY - INSTITUTIONAL
CH1536

SITUATION
A Washington DC Hotel recently completed a \$9 million project to replace all the guest room windows with new energy efficient units. The next step was to improve the air quality inside each guestroom.

BACKGROUND
The challenge for Nalco was to find a way to get the building's 35-year-old fan coils clean and operating efficiently for a few more years while still supporting the hotel's key business drivers. Coil cleaning in the past had some positive results, but they began to notice that the guest rooms seemed to feel humid and have a musty odor.

SOLUTION
The Nalco team knew they needed to dig in and think creatively in proposing a solution that was going to provide a new, fresh feeling in every guest room.

RESULTS
After the team completed an investigation and agreed upon proposed solutions to any obstacles, they completed a few sample floors using the Nalco COIL-FLIP program for advanced coil cleaning.

RESULTS
The hotel staff members immediately noticed the difference in freshness in these test rooms, even with the intense heat experienced in the summer of 2015. The customer was so pleased that it contracted Nalco to clean the rest of the hotel's rooms so that they would be ready for the summer of 2015.

RESULTS
The hotel's key business drivers have a musty odor.

- Reduce program cost
- Reduce energy 15% by 2015
- Reduce waste 20% by 2015
- Guest Satisfaction
- Environmental and Sustainability Initiatives

Common Sense	eROI	Economic Results
Energy savings of 1,225,000 kWh		\$133,440 in annual energy costs
637 ton reduction in greenhouse gases annually		Emissions reductions equivalent to the annual emissions of 173 cars annually
8 ton reduction per landfill pull		8000 savings per landfill pull

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A top IT facility in India recycles wastewater to reduce 40% in fresh water consumption due to Nalco's successful Operation & Maintenance of its MBR plant

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CASE STUDY - INSTITUTIONAL
CH1537

BACKGROUND
A top IT facility in Chennai with around 2700 staff members, operating on a 24x7 basis in a sprawling 20,000 sqd facility (office + landscaping area), implemented a Membrane Bioreactor (MBR) plant as part of the advanced solution for treating wastewater coming from its sewage. Mixers, canisters, cooling tower blow-downs and RO plant reject streams in order to recycle the water back into the facility for landscaping.

SITUATION
The MBR was part of the initial design of this mega green project from 2009 but did not perform up to the desired permeate generation efficiency due to frequent membrane pollution and the subsequent reduced membrane life in operations.

SOLUTION
Nalco's Integrated Water Management (IWM) team was summoned to conduct plant surveys and offer suitable Operation and Maintenance (O&M) solutions with the improved KPIs such as -

- Increased permeate flow
- Clear guidelines for Cleaning in Place (CIP)
- Training for facility supervisors
- Improved follow-ups on any contingency actions

RESULTS
Nalco undertook the O&M offer and successfully handled the plant from May 2015 with the following practices incorporated for enhanced operations:

- Introduction of trained operators and supervisors to operate and maintain the plant systems
- Introduction of customized log sheets
- Introduction of monitoring practices
- Clear communications within facility management with regular reviews on the action checklist
- Conduct preventative equipment maintenance

Common Sense	eROI	Economic Results
25,500 m ³ of water savings per year		USD 15,300 savings per year
Protect membranes from pollution and damage for longer life		USD 38,000 savings for membrane replacement per year

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Upgrading HVAC Maintenance Program Helps Commercial Building Reduce Energy Cost and CO₂ Generation

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An Ecolab Company

CASE STUDY - INSTITUTIONAL
CH1537

BACKGROUND
Many building managers are turning to facility maintenance companies to help them improve the best practices while at the same time improving operating efficiency in this building, maintaining the HVAC program was a challenge due to reduced labor resources. The staff struggled to maintain filter changes and coil-cleaning maintenance. It was difficult to track the progress of the maintenance program, also there was no means to analyze what effect maintenance had on the HVAC operation.

SITUATION
The building manager decided to complete an HVAC project with the following goals:

- Improve airflow and holdback resistance in tenant offices

SOLUTION
Nalco was invited to survey the air handler units (AHUs) and to review HVAC project goals. The survey revealed that AHU filters were not being changed regularly leading to dirty coils and reduced efficiency from heating building temperature set points. Based on time constraints, coil cleanings were infrequent and 80% of no documentation existed.

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Common Sense	eROI	Economic Results
Projected Annual kWh savings: Data = 590,430; Plans = 508,200		Projected Annual Savings: Data = \$50,087; Plans = \$34,000
Projected CO ₂ avoided annually: 523 tons to 460		Equal to carbon sequestered by 47 acres of US forests

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