



The University of Virginia sought opportunities to improve energy efficiency in plant utilities.

Installation of the Helios TCS throughout the University resulted in \$1.05 million in energy savings.

2014-2021

CASE STUDY

UNIVERSITY OF VIRGINIA

Over a 7-year period, UVA improved energy efficiency in plants serving 10M+ square feet and 27,000 tons of cooling capacity from 20 chillers, and created a new "Best Practice" for chiller management.

★ HELIOS TCS™

HELIOS TCS™ INNOVAS TECHNOLOGIES



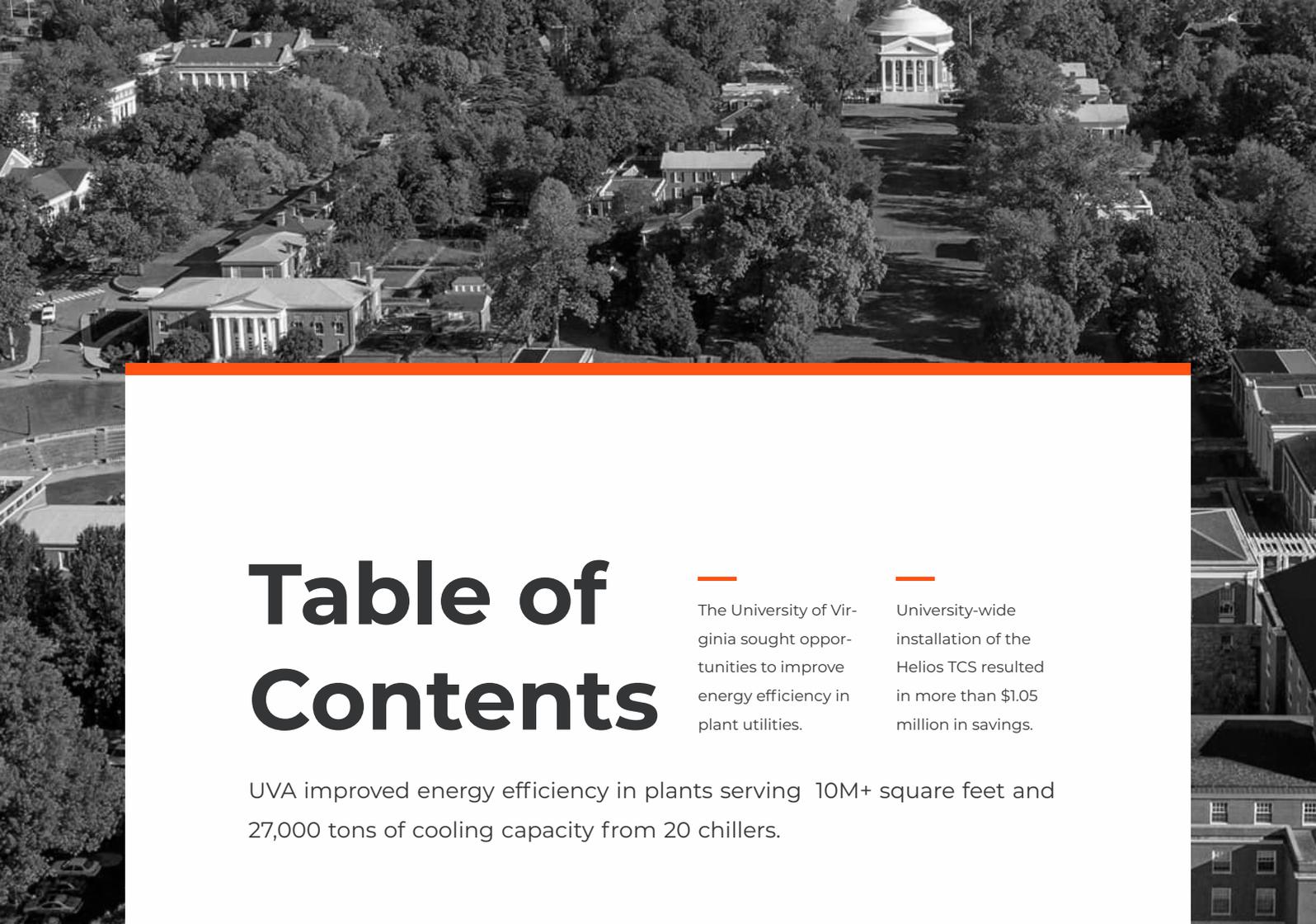


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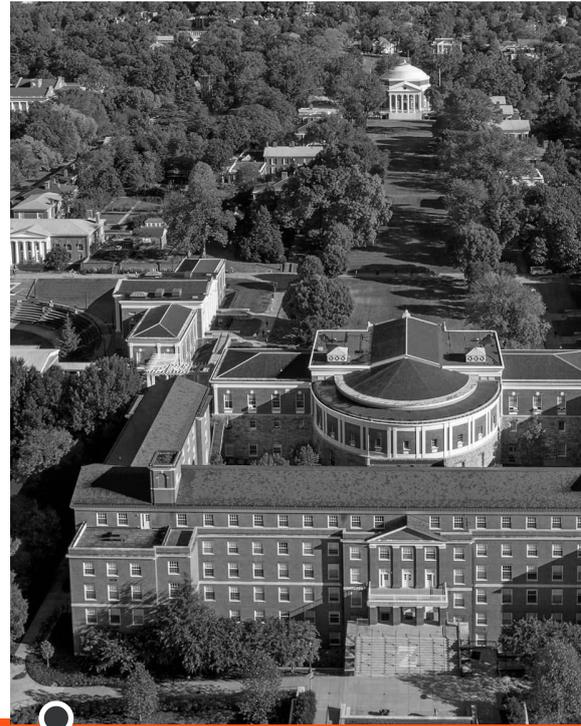
University-wide installation of the Helios TCS resulted in more than \$1.05 million in savings.

UVA improved energy efficiency in plants serving 10M+ square feet and 27,000 tons of cooling capacity from 20 chillers.

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Customer Profile

The University of Virginia (UVA) is a leading public university located in Charlottesville, Virginia. Founded in 1819 by Thomas Jefferson it is one of the oldest and most respected public universities in America and known for excellence in all aspects of its operations and academics. UVA serves over 24,000 students and employs over 30,000 people.



EVALUATION

Helios TCS was installed on an initial chiller condenser unit and two years of data was recorded.

ANALYSIS

Temperature related data points were plotted and a shift in performance curves were analyzed.

RESULTS

University-wide installation has resulted in over \$1,051,431 in total savings and 10K+ tons of CO₂ emissions.



UVA sought to achieve energy savings within their campus utility operations and facilities.

In 2014, a test plan was set up to compare systems operating with, and without the ATCS.

The brick and mortar infrastructure supporting these people is comprised of 560 facilities that range from buildings over 200 years old to new construction. District level utility systems serve the more than 18M square feet and include 11 central cooling plants, 6.27 miles of utility tunnels, and 220 miles of underground distribution lines. Centralized cooling plants serve 10M square feet from more than 45,000 tons of cooling capacity comprised of 39 chillers.

Analytical Method

In 2014, the first priority for UVA was energy savings so they set up a comparative test plan for the first system against a duplicate system operating without the ATCS. This process has been repeated elsewhere since UVA's industry-first integration, resulting in a broader adoption of the Helios TCS within additional UVA facilities. As a summary, the following methods were used to evaluate energy savings performance.

"At first we thought the Helios system might be too good to be true. Now, nearly 10 years later, we can't imagine our operation without it." - Justin Callihan - Chiller Plants, Associate Director

1

Trends in the approach temperature in the heat exchangers were monitored to measure cooling efficiency and chiller performance.

2

Multiple factors affecting chiller efficiency were considered and plotted over 2 years to measure the Helios Impact on efficiency.*

3

1. Install Helios on Test Chiller condenser unit.
2. Record Chiller Data.
3. Compare pre and post Helios data against control chiller.

**Multiple Factors Affecting Chiller Efficiency were utilized including; ¹Chiller Load, ²Chilled Water Supply Temperature (CWT), ³Entering Condenser Water Temperature (ECWT), and ⁴Chiller Tube Fouling.*



Evaluation & Test Plan

To achieve energy savings, UVA set up a test plan to measure efficiency gains from the Helios TCS against a control chiller.

Energy Performance Results

The initial chiller install ran for 3000 hours and performed 4-8% more efficiently, demonstrated no approach temperature rise, and required no manual cleaning. UVA independently verified this by analyzing detailed metering and chiller performance data. Despite UVA's very high quality makeup water, the analysis indicated that the system's simple payback would be approximately 5 years making the system financially beneficial, especially on assets with a 20 plus year life cycle.

\$1.05 M

To date, UVA has realized in excess of \$1 million USD in energy cost savings.

Net Savings

Maintenance Culture Change

Maintenance staff appreciate the elimination of manual tube cleaning. UVA estimates labor cost savings at more than 2,000 man-hours worth \$150,000.

Successfully Integrating the new technology was one of UVA's highest priorities to ensure the system was operated to its highest potential. To assist with the Helios integration Innovas Technologies worked closely from the beginning with UVA operators and maintenance personnel ensuring quick adoption of the technology. It didn't take long for UVA personnel to become self-sufficient in Helios system operations.

From the beginning of the first ATCS integration, UVA was evaluating energy performance data, but they were equally evaluating the workload involved with operating the Helios system. Specifically, they were

measuring any unplanned failures, time needed to repair components, time and skill needed to complete a ball changeout, cost of replacement balls, and ease of operating system controls. Would condenser tube cleaning still be required? Would the condenser require opening to inspect visual cleanliness? After several years the answers were clear. The maintenance was simple and tasks like manual cleaning and opening condensers for inspection were eliminated from the organization's job list altogether. Furthermore, the reliability and quality of the Helios Systems proved to be so good that the systems required, and still require, virtually no maintenance. Changing the balls

takes about 20 minutes for one person. That means a total of 1 hour and 40 minutes for the whole season, and 33 total hours per season for all 20 systems. And when a rare maintenance occurrence does arrive, it is usually immediately repairable at the basic skills level. And in the few instances over the last 8 years when technical support was needed, it has been met with immediate and effective support from the manufacturer. The technology is simple to operate and requires minimal maintenance.

The results? UVA now operates 20 Helios systems constituting over 27,000 tons of cooling while actively pursuing installation on remaining systems. The systems have run for over 250,000 hours and over 1,000,000 injection cycles with no Helios caused chiller process interruption. Furthermore, no manual cleaning has been required for Helios served chiller condensers saving over 2,000 man hours of labor, and freeing up skilled maintenance teams for higher value-added projects.



 MGR / CENTRAL PLANT.

“We can’t imagine life without the Helios now. Elimination of manual chiller cleaning has been a great development and fouling related maintenance is virtually non-existent.”



“WE CAN’T IMAGINE OUR OPERATION WITHOUT THE EQUIPMENT. THE FINANCIAL BENEFIT MADE THE SYSTEM AN EASY SELL”

JUSTIN CALLIHAN PLANT ASSOC. DIR.

One of the benefits from implementing new technology was the elimination of manual tube cleaning.

This allowed skilled maintenance staff to focus on higher return work needed by the University.

TOTAL ENERGY SAVINGS

Sustainability equivalent to planting over 250,000 trees or 26,000 acres of forest.

26K
acres of forest



250K
trees planted



13.02 MM: kW-hrs

Energy efficiency measured in kilowatt hours significantly increased with more efficient chiller operation.



1.05 MM: \$USD

With greater efficiency UVA's electricity costs resulted in significant savings expediting project ROI.



10,689: CO2 tons

Sustainability targets were supported by reducing over 10K tons in carbon emissions reductions.



266,885: hrs

Helios equipped chillers have run for 266,885 hours without process interruption.

KW-HRS	13,029,437
\$USD	1,051,431
TOTAL	\$1,051,431

Projected Savings :

The projected energy savings attributed to the Helios adoption over the next 7 years equates to \$1,425,000 in hard dollar savings.

Reduced costs from eliminating manual cleaning is estimated at \$150,000.

MAN-HOURS	2,000
\$USD	150,000
TOTAL	\$150,000

Reliability :

The Helios program has also performed at an exceptionally high degree of reliability without any interruptions to chiller operation caused by the Helios.

The systems have run for over 250,000 hours and over 1,000,000 injection cycles.

Data

Summary

The broad installation of Helios TCS throughout UVA central utility plants has resulted in a broad spectrum change regarding chiller operations, maintenance and efficiency. The energy savings attributed to the Helios adoption ranges between 4 and 6% equating to \$1,051,431 to date.

1 ENERGY SAVINGS

Improved Chiller Energy Efficiency. The positive impact to overall energy efficiency is between 2-4% which translates to roughly \$210,000 annual savings on energy cost alone.

2 CHILLER CAPACITY

Enhanced Chiller Capacity resulted in a 10% improvement equating to 2700 extra tons of cooling from the same chiller network without incurring additional energy cost.

3 REDUCED MAINTENANCE

Installation of the Helios TCS eliminated the manual cleaning requirement for installed chillers. This allowed skilled maintenance staff to focus on higher priority tasks and projects.

Manual cleaning of chiller condensers has been eliminated and the estimated labor savings equals \$25K/year. In addition to the financial savings, the Helios program has also performed at an exceptionally high degree of reliability. There have been no chiller shutdowns caused by the Helios and operations costs have not risen in 7 years. We estimate the entirety of the ATCS (Helios) install performs with reliability rates better than 99.75% - an exceptional number over time.

4 IMPROVED PERFORMANCE

The Helios TCS eliminated chiller fouling which reduced the overall maintenance required to keep cooling plants operational. Operations costs have not risen in 7 years.

Also, UVA holds minimal parts stock, (less than \$4500.00) to support all 20 Helios systems. The energy savings and cleaning related labor savings are compelling and demonstrate a very high performing program. Furthermore, fewer maintenance activities (From chiller tube cleaning) has enabled UVA to redirect thousands of skilled man hours towards higher value plant related maintenance moving UVA further toward its pursuit of operational excellence.

<i>Reliability & Sustainability Metrics</i>	<i>2014-2021</i>
Number of Helios Systems Installed	20
Startup Date	2014
Estimated Annual Operating Hours	27,500
Helios Chiller Tons Refrigeration Treated	19,490
Annual Energy Savings (kW-hrs / yr)	3,770,532
Annual Cost Savings (\$ / yr)	\$379,348
Annual GHG Emissions Reductions (tons / yr)	1,527
Annual Cars Removed from Road (cars / yr)	601
Annual Trees Planted (trees / yr)	35,714
Average Annual Acres of Forest Saved (acres / yr)	3,714
Total Energy Savings (kW-hrs)	13,029,437
Total Cost Savings (\$)	\$1,051,431
Total GHG Emissions Reductions (tons)	10,689
Total Cars Removed from Road	601
Total Trees Planted	250,000
Total Acres of Forest Saved	26,000
Total Operating Hours	250,000
Total Cycles Completed	1,000,000
Total Maintenance Man-hours Saved	2,000

GET IN TOUCH



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