CASE STUDY

ChemTreat Sustainability Audits Uncover Water and Energy Savings at Multiple Data Center Facilities

Overview

Improving water usage effectiveness (WUE) and power usage effectiveness (PUE) is a key component of operational and conservation goals for data centers.

To support these efforts, ChemTreat offers sustainability audits to our data center customers.

Sustainability audit reports include:

- An impact summary of findings based on the facility's operational and sustainability goals.
- An evaluation of water treatment chemistry programs, chemical feed equipment functionality, deposit sample results, and more.
- Training and educational opportunities for data center staff.
- Recommendations and best practices to help facilities reduce water and energy usage, save costs, and maintain system efficiency.

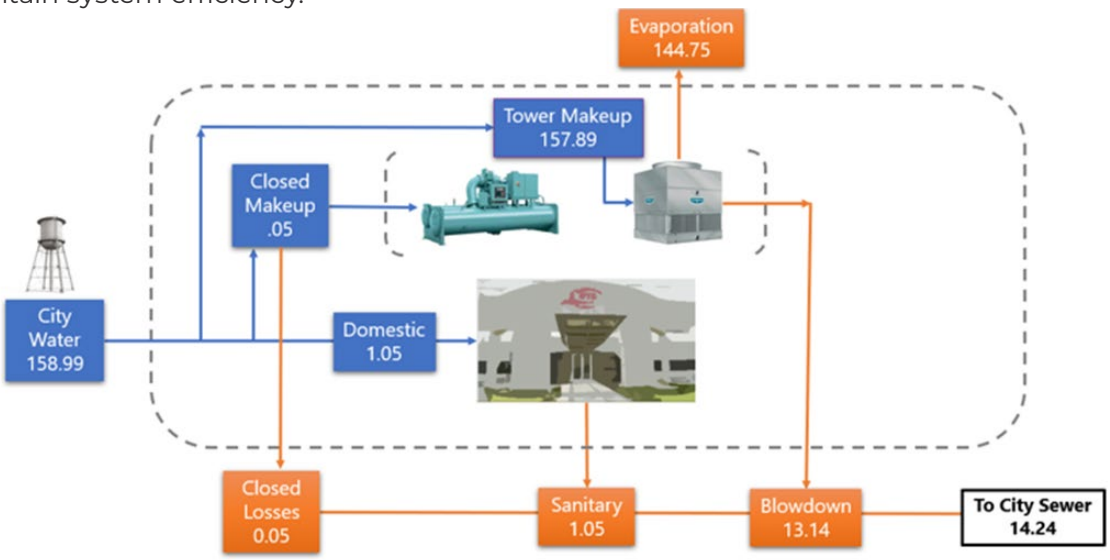
Auditing Process

A data center company has several sustainability goals associated with water and energy, including:

- Conserving at least 10 million gallons of water per year (5% WUE reduction)
- Procuring 100% of their power from renewable energy sources
- Pursuing green building certifications

With these goals in mind, ChemTreat's experienced water treatment team performed sustainability audits at 7 data center sites.

The audit reports start with an evaluation of the facility's current state, including a water balance diagram.



Water in Millions of Gallons

Results are examples only. They are not guaranteed. Actual results may vary.

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The reports outline recommendations for improving water treatment programs and include estimated savings associated with the recommendations.

AHU Condensate Recovery

Water/Energy

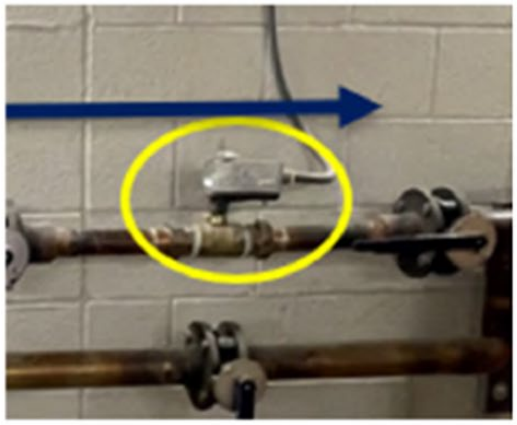
Impact (Total Annual):
$ 17,872
Water & Energy Savings

Problem Statement: AHU Condensate is currently sent to drain

Recommendation:
Condensate from the outside air AHU's is currently sent to drain. Because it is high quality, low conductivity water that can be recovered and utilized as supplemental cooling tower makeup we recommend investigating whether the cost to collect and recycle AHU Condensate fits, current ROI requirements.

*See Appendix d. – Condensate Recovery Deep Dive

Outcome Details:	
$ 5,213	521,295 gallons per year
$ 10,926	521,295 gallons per year
$ 1,732	73.909 MMBTU, Reduced Energy Consumption from using cool water.
$18,000	Estimated cost for Condensate receiver and pump for each air handler plus associated plumbing.



Cooling Towers Blowdown Location

Water Treatment

Impact (Total Annual):
$ 24,661*
Energy Savings

Problem Statement: Blowdown coming from cold water side of the condenser loop removes mechanically cooled cold from the system.

We recommend moving the tower blowdown to the high-temperature side of the condensers.
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Operating Data

1. Hot Return Header Avg. Temperature = 94 °F.
2. Cold Supply Header Avg. Temperature = 80 °F.
3. Average Total Refrigeration Tonnage Run = 15,900 Tons (6 X 2,650 ton chillers run at any given time, throughout the year).
4. Average Evaporative Heat Load % = 70 %
5. Evaporation Factor, E_f, for Cooling Towers = 0.85
6. Recirculation Rate = 6 X 3,600 gpm = 21,600 gpm
7. Current Avg. Cooling Tower Cycles of Concentration, C = 16 (From last 23 Service Reports)
8. Plant Energy Cost as provided by plant personnel = $0.08 per kW-h.

* Appendix b. – Tower Blowdown Location Deep Dive

Outcome Details	
$ 24,661	Energy cost savings by sending hot return header water to drain, in lieu of cold supply header water, thus avoiding sending water just cooled by the cooling tower, to drain.
$ 1,500	Move Blowdown to the hot water side of condenser

The reports provide a full list of proposed projects with estimated savings broken down by water, sewer, and energy costs

TOTAL EST. ANNUAL SAVINGS		Annual Savings Totals				Annual Dollar Savings Totals					Costs
$210,073		CO2	GPY	GPY	kWh	$ Per Year					
		1513.3	665,295	-4,734,705	3,783,248	$6,653	$99,239	$0	$302,660	$210,073	$21,500
#	Project Description	Category	Water	Sewer	Energy	Water $	Sewer $	Costs Avoid	Electric $	TOTAL $	Costs
1	Condenser Approach Analysis	Sustainability			3,453,328	$0	$0	$0	$276,266	$276,266	$0
2	Tower Primary Biocide Feed	Water Treatment				$0	$0	$0	$0	$0	$0
3	Primary Biocide Location	Water Treatment				$0	$0	$0	$0	$0	$0
4	Tower Secondary Biocide Feed	Water Treatment				$0	$0	$0	$0	$0	$0
5	Cooling Tower Cycles of Concentration	Water Treatment	-5,256,000	-5,256,000		-$52,560	-$110,166	$0	$0	$162,726	$0
6	Traced Inhibitor/tagged Polymer	Water Savings				$0	$0	$0	$0	$0	$0
7	Cooling Tower Blowdown Location	Water Treatment			308,264	$0	$0	$0	$24,661	$24,661	$1,500
8	AHU Condensate Revovery	Water Savings	521,295	521,295	21,655	$5,213	$10,926	$0	$1,732	$17,872	$0
9	Rain Water Capture	Sustainability	5,400,000			$54,000	$0	$0	$0	$54,000	$20,000
10	Data Management - CTVista+	Sustainability				$0	$0	$0	$0	$0	$0
11	Legionella Risk Management Plan	Sustainability				$0	$0	$0	$0	$0	$0
12	Cooling Tower Cleaning	Sustainability				$0	$0	$0	$0	$0	$0

Results

The ChemTreat team uncovered many opportunities to reduce water, energy, and greenhouse gas usage across the water systems at these facilities. The proposed projects included:

- **Identifying new sources for cooling tower makeup water, including condensate recovery, rainwater capture, and well water**
- **Changing cooling system biocide and scale inhibitor programs**
- **Cleaning chillers to improve heat transfer efficiency**
- **Increasing cycles of concentration in cooling towers**
- **Adjusting chiller condenser approach temperatures**

Proposed Savings from Sustainability Audit Recommendations Across 7 Data Center Facilities

Water Savings	Electricity Savings	Greenhouse Gas Reduction
55,135,564 gpy	9,036,602 kWh	3,615 tons

If the projects proposed by ChemTreat are implemented, these facilities could annually save the equivalent of:

The water usage of 504 homes[1]
The energy usage of 825 homes[2]

ChemTreat's field specialists work closely with data center personnel on-site to create action plans for project implementation, track progress, and quantify savings. Our local teams are assisted by highly experienced technical staff to offer industry-leading technologies and solutions to help these facilities achieve their environmental goals.

1 Assuming average household water consumption of 300 gpd
2 Assuming average household energy consumption of 30 kWh/day

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