

Start Date: July 9th, 2018
Address: 200 N Main St.
Los Angeles, CA

Cooling Tower System:
4x 750-ton towers
UET Reactor Sizing:
2x 4x4 UET Reactor

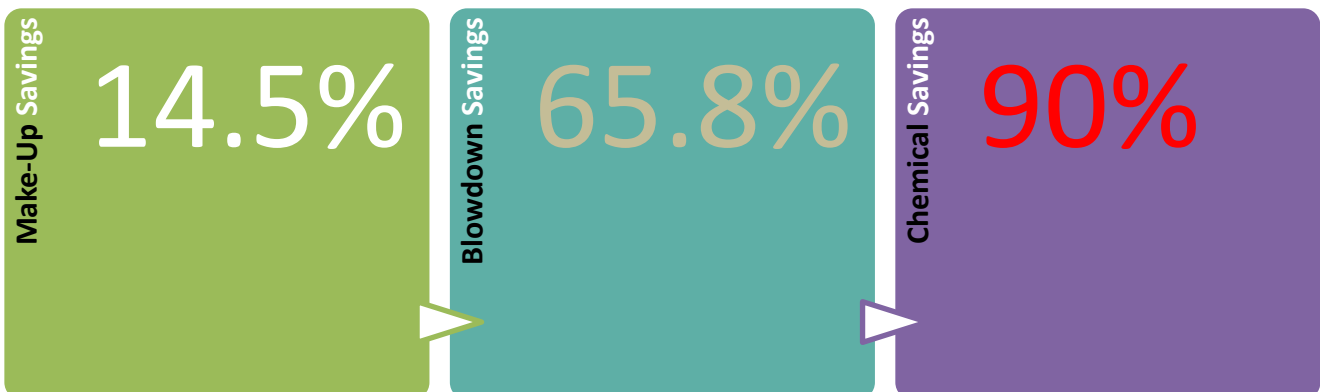
The Client:

The City of Los Angeles completed their city hall in 1928 as the center of government for the city of Los Angeles, California. It is home to the mayor's office and several meeting chambers and offices of the Los Angeles City Council. The East Hall, named James K Hanh City Hall East after former mayor James K Hahn, is home to the HVAC plant which supplies cooled water to both the East City Hall and the adjacent building. It is 18-stories, approximately 530,000 ft², and is home to the first Dynamic Water UET reactor system used for the City of LA.



Savings:

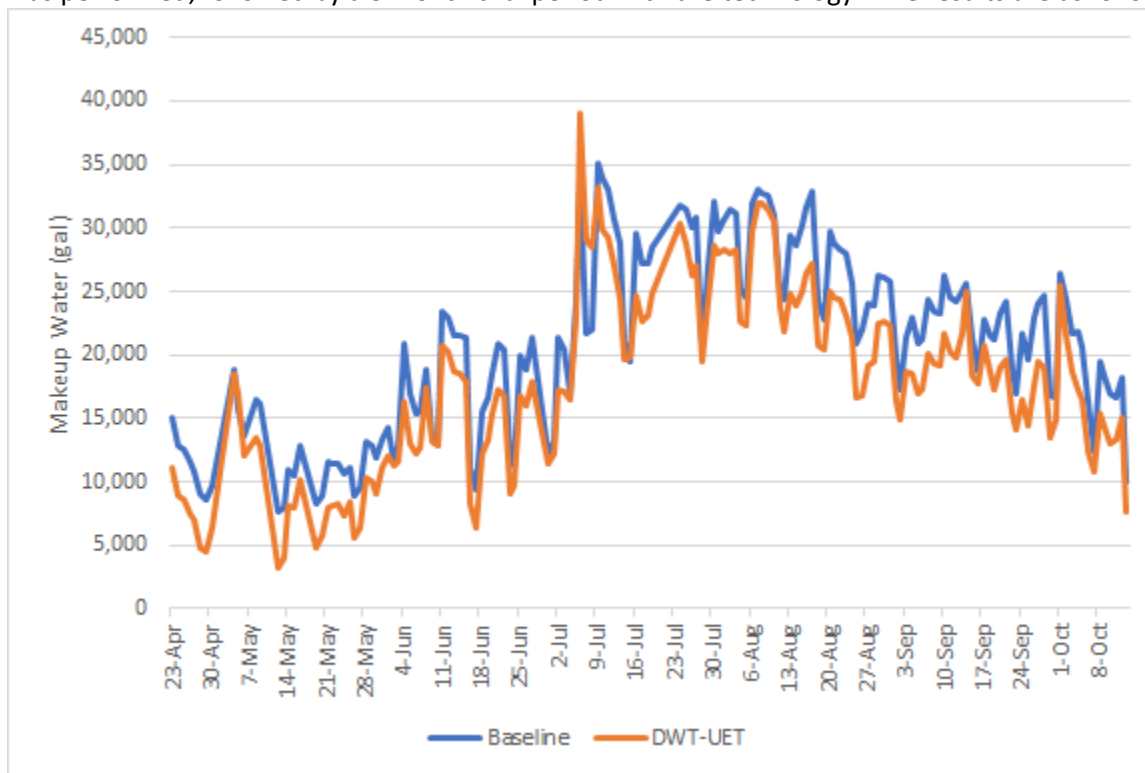
	Before UET	After UET
Cycles	3 – 5	> 10
Conductivity Setpoint (µS/cm)	3,400	5,500 - 6,500
Annual Make-Up Water Usage (gallons)	8,934,000	7,639,000
Annual Blowdown Water Usage (gallons)	2,234,000	764,000
Calculated Savings	N/A	



Accomplishments:

- The project was heavily monitored and analyzed by the National Renewable Energy Laboratory, with funding provided by the U.S. Department of Energy’s High Impact Technology Catalyst Program.
- The results of the studies are shown below:

Water Savings – Using a linear regression model, taking into account water usage, heat load, ambient temperature, and water composition, NREL developed a model for water usage with Dynamic Water’s UET to compare against a baseline linear regression model. The test was conducted from April 2018 to October 2018. A 3 month baseline was performed, followed by a 3 month trial period with the technology. The results are as follows:

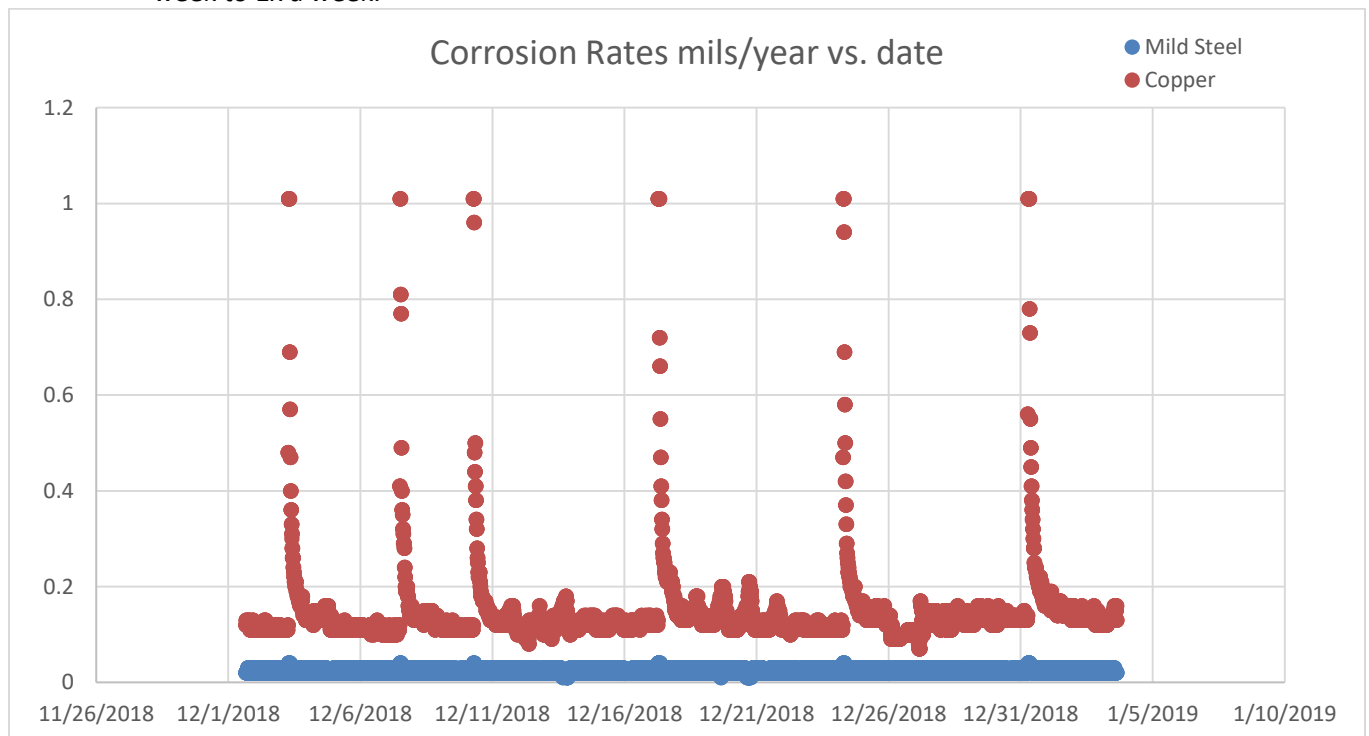


Model Over 3 Months	Value
Baseline Performance (gal)	3,368,954
DWT-UET Performance (gal)	2,879,508
Savings (gal) in 3 months	489,446
Savings %	14.5%

- Scale control – A chiller inspection was performed on June 22nd, 2018 before the UET treatment was started. A second chiller inspection was performed on October 30th, 2018 several months into UET operation. The inspection yielded either similar or better conditions than the inspection prior to UET startup, with scale either being neglected to form or having been removed completely.

Approach temperatures for the chillers have remained steady.
The videos can be made available upon request.

- Corrosion control - No signs of corrosion
 - Chemical tests showing 0.00 ppm iron and copper in the water consistently.
 - Corrosion monitoring results using real time corrators for mild steel and copper indicate that the corrosion rates are below the “Good” CTI standards.
 - 0.3 mils/year for copper
 - 3.0 mils/year for mild steel
 - Peaks of corrosion are due to biocide injection. Each datapoint below indicates a minute of data. This shows the corrosion values over the month of December, where the biocide was reduced from 3x a week to 1x a week.



- Bio-contamination control – No algae bloom has been present in the basin at any time since operation.
 - Regular dip slide results indicate that the towers have been maintained below the “Acceptable” CTI standard of 10,000 CFU/ml.

Month	CFU/mL Aerobic Content
July 12, 2018	10 – 100 CFU/mL
August 13, 2018	100 – 1,000 CFU/mL
September 15, 2018	10 – 100 CFU/mL
October 29, 2018	100 - 1,000 CFU/mL
November 28, 2018	10 - 100 CFU/mL
December 7, 2018	< 10 CFU/mL
December 15, 2018	100 – 1,000 CFU/mL
December 22, 2018	< 10 CFU/mL

Chemical dosing using bleach has been reduced from 3x a week to once a week starting December 10th, 2018. Dynamic Water plans to have bleach turned off completely by January 2019.

- Chemical savings – Addition of acids, inhibitors, and surfactants were halted indefinitely.
 - Biocide application into the towers is through UET system that generates hypochlorous acid 24/7.
 - Bleach is available onsite for emergency and/or scheduled dosing.
 - Dosage of bleach is drastically reduced in comparison to legacy chemical treatment
 - Dynamic Water plans to halt bleach indefinitely by January 2018.