



# UPGRADE COOLING TOWER EQUIPMENT AND OPERATION

According to industry experts, cooling towers, on average, account for 40% of a building's water demand, and in some buildings, may account for far more.

## RECOMMENDATIONS

Due to the many variables of cooling tower equipment, operational oversight, space limitations and budgets, it is important to obtain site-specific guidance for your cooling tower(s). LABBC Technical Advisors can provide information and resources tailored to your water saving and budget goals. As importantly, they can provide step-by-step guidance to aid in implementation of your customized cooling tower upgrades.

## OPPORTUNITY

Existing towers can be cost-effectively upgraded with **improved controls, monitoring, and water treatment** to dramatically reduce water use. If a cooling tower is operating at 2 or less cycles of concentration (COCs) the water savings opportunity is extremely large. More often than not, optimal COCs is in the 5 – 6 cycle range. The ROI tends to diminish with COCs over 8 cycles, however, depending on the size and cooling load there could be significant savings over 8 cycles.

## RECOMMENDED OPTIONS

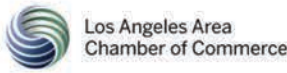
There are a number of water efficient operational and retrofit modifications that can be made to an existing cooling tower. Below is an informational overview of cooling tower modifications most typically recommended for a given scenario.

### Conductivity Controller Upgrade

Description	Price Range	Ideal Tonnage Range	Available Incentives	Savings and Payback
Upgrade conductivity controller and maximize cycles	\$500 - \$2,500	Up to 1,000 Tons	\$625 per controller	Immediate depending upon current COCs

**Considerations:** Best for sites without an on-site staff and smaller systems.

See back side for more options.



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## RECOMMENDED OPTIONS (CONT.)

### pH Control with Acid-Based Treatment

Description	Price Range	Ideal Tonnage Range	Available Incentives	Savings and Payback
Treat water with acid, such as sulfuric or hydrochloric acid, to increase COCs to 4	\$1,500 - \$4,000 for controller only	500 – 2,000 Tons	\$3,000 per controller	Immediate – Less than 2 months

**Considerations:** Acid and increase in site visits can double service fees. Easiest upgrade with quickest payback. Requires automatic or variable injecting system which may add costs. Requires pH controller to ensure pH stays within control points. Acid overdose can severely damage cooling system. Acid is hazardous material and requires workers to be fully trained in the proper handling of acids.

### Pre-Treatment Water Softening

Description	Price Range	Ideal Tonnage Range	Available Incentives	Savings and Payback
Apply water softener prior to entering cooling tower. Removes hardness and increases cycles to 6-8 COCs.	Estimated \$25,000 per tower	Over 2,000 Tons	\$1.75 per 1,000 gallons for 5 year life from LADWP	4 years

**Considerations:** Technology commonly available. Requires on-site space for water softeners and resources to monitor system and add salt. Uses additional water to flush brine. Environmental impact of discharging brine to sewer system – may at some time be prohibited.

### Reverse Osmosis

Description	Price Range	Ideal Tonnage Range	Available Incentives	Savings and Payback
Install reverse osmosis system and increase cycles to 8 or more COCs.	Prices range depending on size and design	Over 2,000 Tons	\$1.75 per 1,000 gallons for 5 year life from LADWP	4 – 8 years

**Considerations:** Can achieve very high cycles. Allows for reuse of blowdown to achieve greater water savings. Higher up-front capital costs. Protects longevity of cooling tower.

### Non-Chemical

Description	Price Range	Ideal Tonnage Range	Available Incentives	Savings and Payback
Create zero bleed by utilizing non-chemical precipitation type treatment with micro filtration to increase cycles to 25 – 50 COCs.	Estimated \$20,000 per tower	Over 1,000 Tons	\$1.75 per 1,000 gallons for 5 year life from LADWP	2 - 3 years

**Considerations:** Systems that are fool-proof are considerably expensive. Water quality is an issue with most systems —not designed for hard water. Uses additional energy to evaporate or crystallize wastewater and produces solid waste (vs. liquid).

Cooling tower treatment such as magnets, radio frequency, electro magnets and similar devices have not been proven to have long term water savings and are therefore not currently incentivized by LADWP.