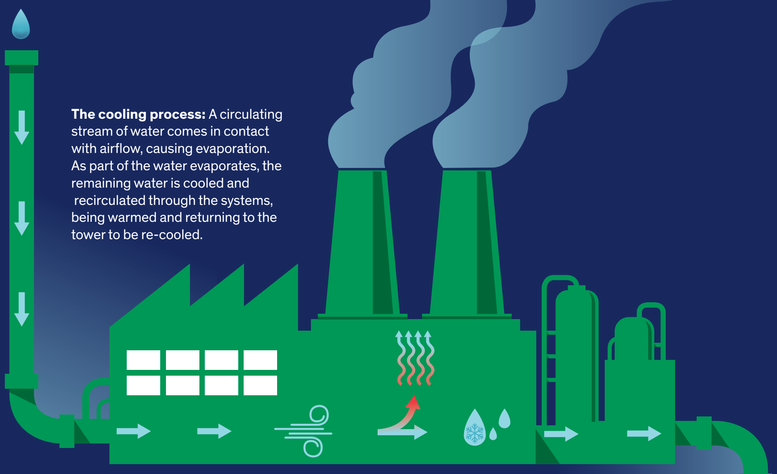
COOLING TOWER
WATER TREATMENT

With expected global water demand in manufacturing to increase by 400% from 2000 to 2050, manufacturers are looking to advanced water treatment technology to help alleviate resource stress.[1]

The cooling process: A circulating stream of water comes in contact with airflow, causing evaporation. As part of the water evaporates, the remaining water is cooled and recirculated through the systems, being warmed and returning to the tower to be re-cooled.



A typical coal-fired power plant cooling tower circulates about **315,000** **U.S. gallons of water/min.**[2]

A large refinery processing 300,000 barrels of crude oil per day circulates about **21,000,000** **U.S. gallons of water/hour** through its cooling tower system.[2]

Most of the water then evaporates or is discharged, but reusing water through ***advanced purification*** is an **untapped source of freshwater.**

50% Of the freshwater taken into a refinery, about **50% goes to cooling.**[3]

41% In 2005, **thermoelectric freshwater withdrawals** accounted for **41%** of all **freshwater withdrawals.**[4]

90% Plants using advanced treatment technology have **returned up to 90%** of previously wasted water back into their cooling systems.

Advanced Water Treatment Technologies Can Help Plants Increase Operating Efficiency

Challenges:
Corrosion
Scaling
Fouling
Contamination
Resistive Fouling

Challenge: Scale deposits can cause heat transfer loss and downtime.

Solution: ***Antiscalants*** help operations run free of deposits to avoid heat transfer loss and downtime.

Challenge: Bacteria in wastewater can form biofilms on surfaces and harmful pathogens.

Solution: ***Microbial control*** solutions can help reduce biofilm formation which helps to reduce microbial induced corrosion and reduce pathogens to meet local regulatory requirements.

Challenge: Soluble impurities must be removed before treated wastewater can be effectively reused.

Solution: ***Ultrafiltration, reverse osmosis*** and ***ion exchange*** resins can remove contaminants to produce high purity clean water for reuse.

Challenge: Cooling tower make up water with high suspended solids can cause fouling along with increased maintenance, downtime, and consumables costs.

Solution: Advanced self-cleaning ***particle filtration*** treats difficult feedwater to remove suspended solids to reduce fouling.

Challenge: Total Dissolved Solids contaminant removal can be expensive.

Solution: ***Reverse osmosis*** and ***nanofiltration*** provide efficient contaminant removal and demineralization to reduce water intake and the need for chemicals.

Challenge: Water can contain colloids, particles and bacteria.

Solution: ***Ultrafiltration*** reduces colloids, particles and bacteria to deliver high reliability and lower maintenance with a smaller asset footprint compared to conventional filtration equipment.

Industrial cooling towers remove the heat absorbed in circulating cooling water systems in:

Industrial manufacturing
Petrochemical and chemical plants
Natural gas processing plants
Petroleum Refineries
Power plants

Advanced Cooling Water Treatment Technology Will:

- Increase operating efficiency
- Save money
- Protect assets and equipment
- Maximize heat exchange and process efficiencies
- Cut chemical and mechanical cleaning costs
- Reduce water usage
- Minimize process upsets and downtime
- Comply with local regulations

For more information, visit www.coolingwater.dow.com

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[1] Source: United Nations
[2] Cooling System Retrofit Costs, EPA Workshop on Cooling Water Intake Technologies. By John Maulbetsch of Maulbetsch Consulting. May, 2003.
[3] Encyclopedia of Chemical Processing and Design: Volume 65--Waste: Nuclear. Edited by John McKetta Jr., Copyright 1998.
[4] Estimated Use of Water in the U.S. in 2005. Joan F. Kenny, U.S. Dept. of Interior, U.S. Geological Survey Circular 1344. http://pubs.usgs.gov/circ/1344/pdf/c1344.pdf