Cooling Towers are Not the Problem - *Or at least they don't have to be.*

By Rick Myer, Magna Imperio Systems Corp

Water quite literally flows through every facet of life, being the key element for everyone and everything on Earth. The world's population is increasing at 1.1% (roughly 83 million) every year, an incredible and alarming rate straining the world's fresh water supply. The increasing pressures between what humanity demands and what is currently available emphasizes the importance of conservation. With increased competition for domestic, industrial, and commercial uses, efficiency is required across markets. We must boldly declare the deployment of new strategies, in this case addressing inefficiencies in cooling tower operation.

The iconic white cloud overhead large cement hyperboloid shaped towers are perhaps the most recognizable image associated with cooling towers. Columns of water vapor can be seen in the sky for miles, reminiscent of perhaps the most crucial part of any industrial process. The largest user of water in industrial and commercial applications, cooling towers can be used wherever a need for heat rejection exists. Powerplants, high rise buildings, hotels, hospitals, and schools are a few named places that utilize cooling towers to support daily operations. Large and small, cooling towers can account for over 90% of the volume of wastewater sent to the sewer system, a century old process which remains firmly imbedded within the industrial framework of the developed world.

How can we improve upon our current model? In order to understand how to improve on the cooling tower process, one must understand how the existing process works. Cooling towers use evaporative cooling, a process in which water reduces the temperature of another object, evaporating as a result. Water is introduced to the system through the makeup flow which showers cooling fins. These blades are designed to break up the water into smaller droplets, increasing its overall surface area of the w which provides more efficient cooling. The water used in this process cycles back through the system for reuse, a process called, "cycling up". Each cycle provides additional evaporation which concentrates the total dissolved solids (TDS), leading to an increased scaling potential within the tower. If scaling is not controlled, the cooling fins would become insulated, and the water would no longer provide it's intended cooling effect. Once the dissolved solids reach a certain level, they are ejected from the cooling tower, in a process called the blowdown. Cooling tower operators can mitigate scaling and increase the water cycle counts through the use of antiscalant chemicals and acids, but at an added cost.

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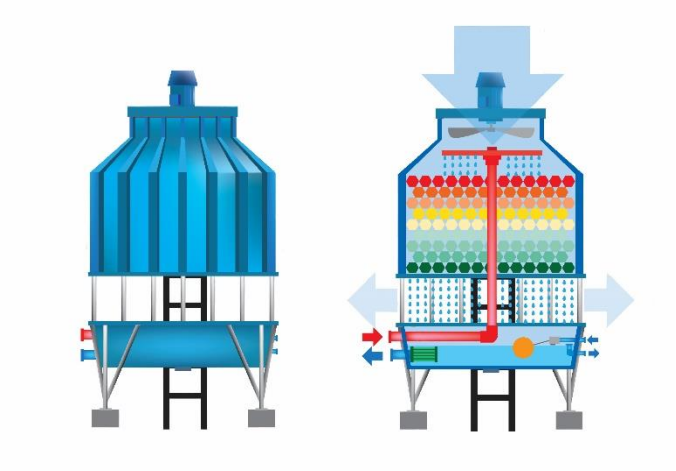

Improvements can be made to the makeup and blowdown flows to conserve water and reduce chemical usage, leading to lower operational costs. MI Systems' END® technology is an excellent tool to utilize in makeup and blowdown treatment. END® removes total dissolved solids (TDS) by transporting the ions through ion exchange membranes, without forcing the water to pass through such a barrier. This method of TDS removal allows the system to run at very low pressure and keeps scaling potential well below reverse osmosis. Treatment of the makeup flow limits the use of necessary chemical treatment by removing the high scaling material before it enters the cooling tower. Cleaner makeup water allows the system to increase the number of times the water is cycled within the system, making the entire process more efficient and sustainable. In blowdown treatment, END® can treat the water at very high recovery, back to the standards of the initial makeup water. This allows for an incredible reduction in waste water sent to the sewer, again lowering operational costs significantly. An added benefit of the END® system is that it does not capture the scale inhibitors, corrosion inhibitors, and biocide chemicals used within the system, cycling them back into the makeup to be reused.

Liquid water is the most important element required to sustain life. Deploying creative strategies to work with existing technologies is of immediate importance. With recovery rates up to 98% and energy usage 50% below competitive technologies, END® is well suited to turn cooling towers into more efficient users of the world's most precious resource.