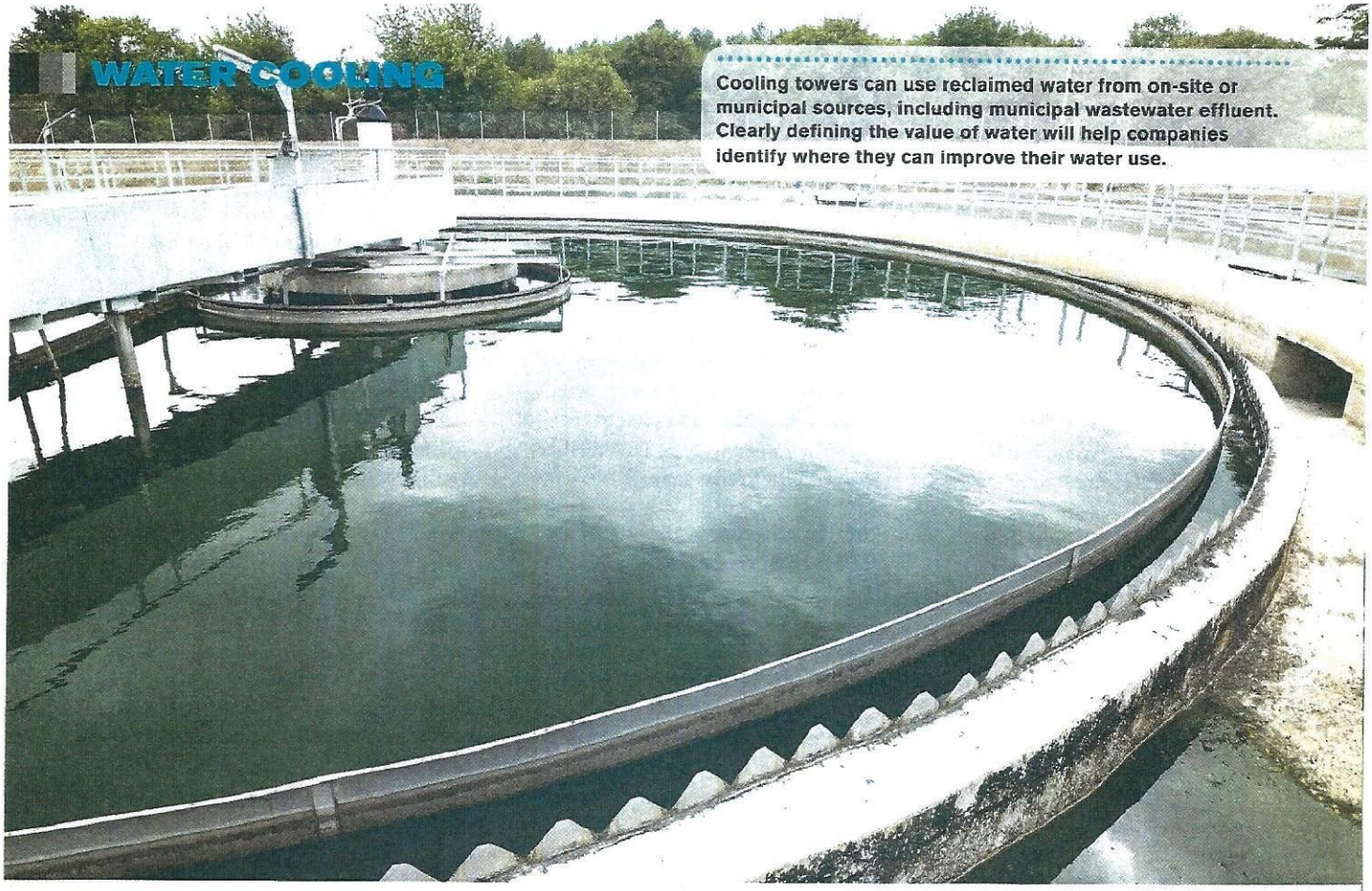


Cooling towers can use reclaimed water from on-site or municipal sources, including municipal wastewater effluent. Clearly defining the value of water will help companies identify where they can improve their water use.

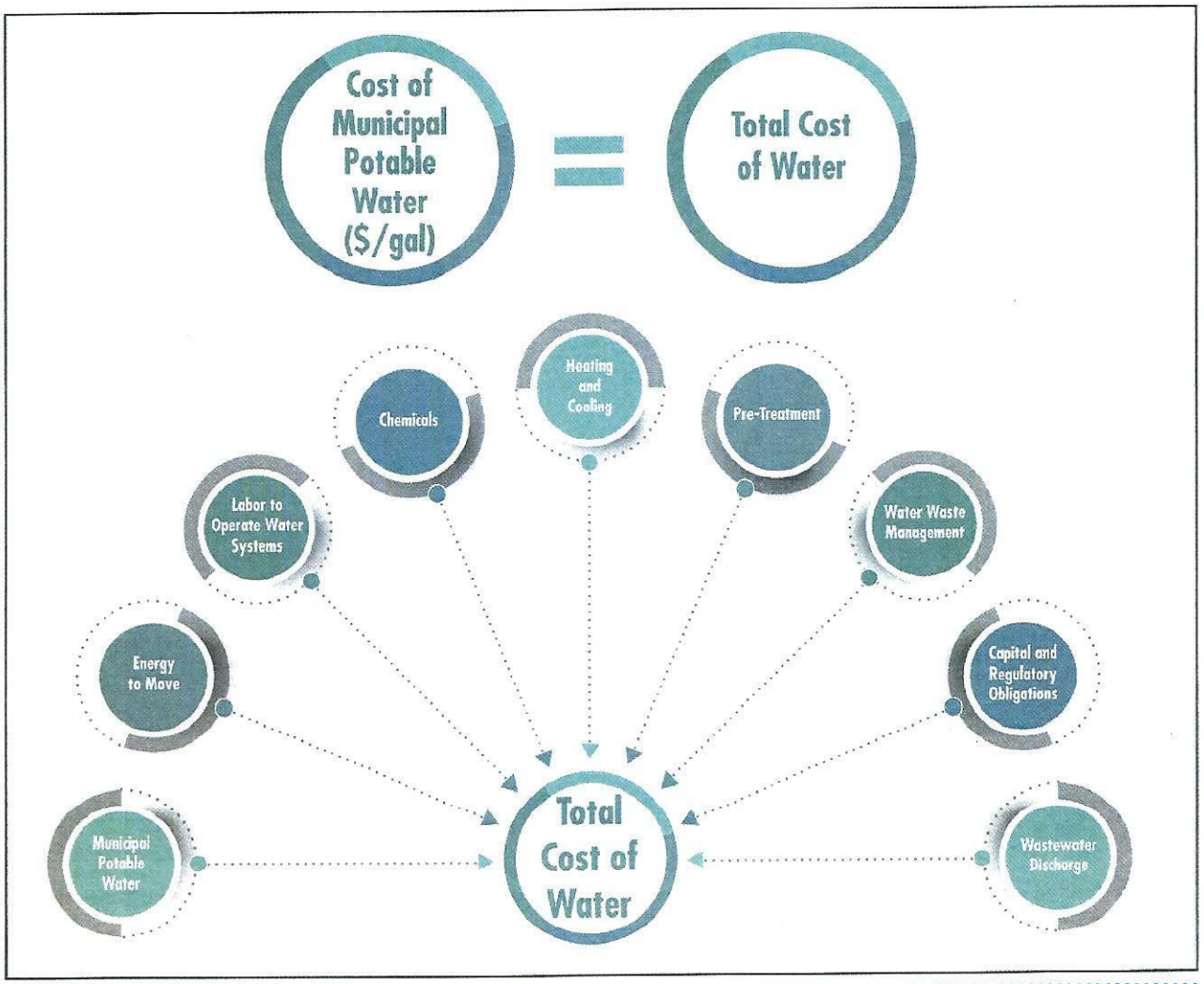
# Cooling Towers Provide *Water Reuse Opportunity*

**High water demand with relatively low quality water requirements — and low implementation costs — make industrial cooling towers good candidates for water reuse.**

By Kelsey Beveridge, Water Reuse Foundation

Due to highly publicized drought events and changing public perception, sustainable water management is a growing priority in recent years to companies in a variety of sectors. As with any change to their current operations, companies view water-conservation projects through a financial lens. When evaluating water usage at an industrial facility, however, the full cost of water is not always taken into account even though costs from water are incurred through all parts of the process chain. Companies routinely evaluate risks that may impact their finances, but such reports do not traditionally include risks associated with water supply or impaired water quality.

Among the many components of any industrial facility that require water, cooling towers offer a significant opportunity for water reuse. Cooling towers are frequently the most common industrial reuse option because of the high water demand, relatively low quality of water required and low cost to implement. Cooling towers can use reclaimed water from on-site or municipal sources, including wastewater from industrial processes and even municipal wastewater effluent. Clearly defining the value




**A plant's costs from water are incurred through all parts of the process chain. This illustration shows the total cost of water.**

of water will help companies identify where they can improve their water use and ultimately create a return. Based on the foundation's experience with water reuse for industrial processes, this article will explore research projects demonstrating how facilities employ water reuse in cooling processes.

Several perceived barriers prohibit changes. One significant barrier to implementation is the perception that there will not be a sufficient financial return on investment. Because water is perceived as inexpensive, companies sometimes think the payback for measures to implement water conservation or reuse practices is too low. A second barrier is concern about the regulatory challenges of implementing water reuse at a facility. Finally, concerns about how changes to operations could affect product quality if they are implemented incorrectly also serve as a barrier to implementation.

Traditional water-management practices typically focuses on the direct cost of water to the company. When considering the indirect water costs associated with a project, the financial benefits can be significant. A research report from the Water Reuse Federation, *A Framework for the Successful Implementation of On-Site Industrial Water Reuse*, identified the water kaizen blitz (WKB) method as a valuable asset for teams to determine the best course of action. Water kaizen blitz focuses primarily on water-conservation and reuse projects such as cooling towers for the manufacturing process.

The water kaizen blitz process was developed through lean manufacturing principles and is more detailed than a traditional water audit. The WKB process is completed by an interdisciplinary team from the facility and identifies potential opportunities for conservation and reuse, along

**When evaluating water usage at an industrial facility, the full cost of water is not always taken into account. Costs from water are incurred through all parts of the process chain.**

with full costs and benefits. This more complete cost of water considers:

- The labor to operate water systems.
- Heating and cooling.
- Pretreatment.
- Wastewater management.
- Wastewater discharge.
- Capital and regulatory obligations.

Drivers for reuse vary across industrial sectors, but generally they follow the running theme of meeting discharge requirements and demand to reduce water usage due to scarcity or drought. Within a single facility, water conservation typically is implemented ahead of water reuse to conserve water without unneeded treatment. For cooling towers, the range of available sources of water at an industrial facility can lead to on-site reuse opportunities. For example, stormwater collection can be an alternative source of clean water for the facility. It can lower the costs of infrastructure and operations, and it preserves the value of the water that is collected. Another option is using treated industrial wastewater as makeup water to reduce the site's potable water demand. Such a change ultimately reduces the demand on the regional water supply.

An example of successful implementation of industrial water reuse is a PPG Industries facility in Wichita Falls, Texas. This facility took steps to better manage the water supply during a time of drought.

PPG operates a glass-manufacturing facility that uses approximately 107 million gallons of water per year. While there were no industrial water-use restrictions placed during the drought in 2013, the Wichita Falls facility management researched ways to reduce water demand while maintaining operations. The team found that half of the plant's water demand came from its seven cooling towers. On-site wells and trucking water from other facilities was not a viable option. It was determined that a direct pipeline to the local wastewater treatment facility to purchase non-potable, reclaimed water was the best option for an alternative water supply.

After discussions with the city, PPG built an on-site 1 million gallon reservoir to store the wastewater from

the treatment plant. Following more than a year of construction, the first cooling towers at PPG started using reclaimed water. By August 2015, the plant had used 27.5 million gallons of reclaimed water and, consequently, had saved an equivalent amount of potable water for use by the city.

This is just one example. Water resources will vary by local climate, water source, water management system and local environmental regulations. Currently, conventional treatment of cooling tower water occurs through chemical processes, and operational issues need to be minimized through proper water quality criteria. Another research report from the Water Reuse Federation, *Drivers, Successes, Challenges and Opportunities of On-Site Industrial Water Reuse,* prescribes a series of steps for evaluation and utilization of degraded water sources for cooling tower makeup:

- Identify and characterize source water.
- Evaluate contaminants of concern.
- Identify cooling tower design and operating impacts.
- Determine the need for treatment.
- Evaluate treatment requirements.
- Evaluate disposal issues.

Subsequent to this evaluation process, the Water Reuse Federation report, *Scorecard for Evaluating Opportunities in Industrial Reuse,* can be used to help a company bridge gaps in water-risk and cost information and calculate a more accurate return on investment for capital projects. The research team has evaluated existing tools that help companies determine how and when they should consider water reuse. This can help companies meet the sustainability goals and utilize a holistic approach to understand the operational benefits. The tools will help evaluate the impact of activities on a local water resource and risks related to water use and management and local sites.

Promotion and expansion of on-site water reuse within industrial facilities will result in benefits from additional research efforts to address existing knowledge gaps and implementation challenges. Advancements in finance, technology and communication will best drive on-site water efforts when they occur simultaneously. Such advancements will positively reinforce each the efforts in evaluating the overall process for on-site industrial reuse. **PC**

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Additional Information

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