SHOWCASE PROJECT: HARBECE: WATER RETENTION POND

SOLUTION OVERVIEW
HARBEC’s Water Retention Pond is a key project supporting the company’s goal to be water neutral, which the company defines as eliminating the use of municipally supplied water for all purposes except drinking and hand washing. This goal will be achieved through a series of water efficiency measures, as well as utilization of the pond, which captures and stores rainwater for use in plant operations. While the pond is being adapted to help HARBEC pursue its water savings goal, its original construction was driven by a unique economic driver – an insurance requirement to implement a sprinkler system for fire suppression purposes. The municipal water authority was reluctant to build a bigger water line to supply the HARBEC facility, so the company began searching for alternatives. HARBEC considered installing a 250,000 gallon water tank, before realizing it could dig a retention pond and pipe the water in for the sprinklers, with significant environmental and water saving benefits.

The pond collects rainwater diverted from the HARBEC facility’s roof and parking lot and has the capacity to provide 1,200,000 gallons annually. Although the pond was developed primarily to supply water to the facility’s sprinkler system, other uses have emerged over time. HARBEC discovered that the plant’s evaporative cooling towers were large water consumers with two separate cooling needs: process cooling (a steady demand) and facility HVAC (a seasonal demand). The pond now helps meet the demand for both process cooling water and facility HVAC, complementing the remaining cooling tower used by the plant. The pond and sprinkler system cost about $250,000 to construct and install. The project ultimately paid for itself in about 5 years since it led to about $50,000 per year in avoided insurance costs, and about a $3,000 reduction in annual water bills.

SECTOR TYPE
Industrial

LOCATION
Ontario, New York

PROJECT SIZE
50,000 Square Feet

FINANCIAL OVERVIEW
$250,000

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SOLUTIONS
The retention pond has enabled HARBEC to conserve over 830,000 gallons of water without increasing energy consumption. For example, with the assistance of a grant, heat exchangers were placed at the bottom of the pond such that it can also function as a geothermal heat sink. By piping warm process water through the pond to reduce the cooling load of the cooling tower, HARBEC has been able to significantly reduce use of purchased makeup water each year. These savings include using the pond during the winter and cold months for cooling HARBEC’s process water loop. HARBEC’s process water, which needs to be maintained at 65F, is tempered by the cooling capacity the pond offers. Pond water is used in conjunction with a plate and frame heat exchanger to keep the process loop at setpoint. This is called “free cooling” and requires no evaporative cooling towers to maintain temperature which saves the company 250,000 gallons of purchased makeup water per year. While the pumps required to circulate the water through the heat exchangers consume electricity, it is far less energy than the cooling towers were consuming in the past.

HARBEC takes substantial action to counter undesired environmental effects on the pond. The pond is considered a resource. During the winter the pond surface can freeze as much as 8 inches thick, but water can be taken from the bottom that runs 15 feet at the deepest point. Even when freezing occurs, pond water capacity still exceeds facility needs. HARBEC also adds oxygen (via pumps powered by wind pumpers) to the water, a process known as aeration which helps offset freezing. Pond water treatment is a minor expense. There are currently no major water treatment processes, aside from adding mild acids into the water loops periodically to keep the pH slightly below 7.0. This prevents microorganisms from contaminating the pond water. Bacteria will not grow in water if it is the slightest bit acidic. Acidity is monitored remotely by the water system contractor, as well as on-site by HARBEC.

OTHER BENEFITS
The water retention pond project is helping HARBEC work towards its goal of water neutrality and water treatment with minimal use of toxic chemicals. The dissimilar metal slurry water treatment system used in the past for the company’s cooling towers did not rely on chemicals, but built up an abnormal amount of heavy metals like copper and zinc over time. From an environmental perspective, the pond is a marked improvement over both that system and the proposed water storage tank the company also considered.

Most importantly, HARBEC is using less energy and water because of the retention pond than it would have used had the company gone with a conventional system, such as the water storage tank. Also, the original evaporative cooling system consumed 50Hp to operate pumps and fans in the system. The new free cooling system consumes 6 Hp. which is more than an 80% reduction in energy consumption. Planned additional reporting systems will help develop strategies to make the pond even more efficient and address other negative environmental issues, such as evaporation, algae growth, and sediment build-up. Eventually, all elements of the project will be reported in real time on HARBEC’s website, where users will also be able to access historic data.
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<th>Annual Energy Use</th>
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