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Avon Lake pilots first electrochemical water treatment process in North America

KIM PALMER

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Avon Lake Regional Water will be the first utility in North American to use onsite tech that produces the chemical required to treat drinking water.

Avon Lake Regional Water will be the first Northeast Ohio utility to employ a promising new technology developed in Asia that produces the chemicals required by the Environmental Protection Agency (EPA) to treat drinking water.

The pilot project, facilitated by the Cleveland Water Alliance (CWA) and created by South Korean technology company Techwin, will install a system that uses salt and an electrochemical process to make high-concentrate sodium hypochlorite, an EPA-required water treatment compound.

“It is a process that starts with salt and goes through an electrical chemical process through a series of modules that use a specific type of electrical pulse or current and it creates what is needed for water treatment,” said Bryan Stubbs, CWA president and executive director.

The partnership comes after years of discussions and a few international trips, Stubbs said. In the end Techwin and the South Korean government, which is funding the $6 million economic development project, picked Lake Erie to be the entrance point into the U.S. market.

“They could have gone anywhere in the U.S. but they saw the work we have done here around building out the smart sensors and test beds on the lake and came here,” Stubbs said. “We were asked to help find a pilot partner here to launch the technology.”

Avon Lake will use sodium hypochlorite — a liquid compound comprised of a chlorine ion bonded to an oxygen atom used to control algal and other contaminants in potable water — to replace the chlorine gas it has been using for water treatment.

The timing for the pilot comes as many water utilities are looking for solutions to sourcing sodium hypochlorite because prices for treatment chemicals spiked during the pandemic. And subsequent supply chain problems in some U.S. locations meant water treatment plants were unable to receive shipments of the necessary chemicals, which the EPA requires to treat drinking water.

“There are only a few manufacturers in the country," Stubbs said. "They create (the chlorine gas) in big batches of what is used in water treatment. It's then put on trains for shipment which is a slow and highly regulated process. This electrochemical process is a lot more benign from a regulatory perspective.”

Even before the supply chain issues, utilities in places like Avon Lake went from paying about $470 a ton for the chlorine gas used in its water treatment to $2,300 a ton. And in Avon Lake, said Rob Munro, chief utility executive at the Avon Lake water facility, it's been a common occurrence to have 11-ton cylinders shipped from manufacturers out of state.

Producing sodium hypochlorite on site cuts costs for ratepayers and reduces the risks associated with transporting the chlorine gas, which is considered a hazardous material.

The on-site additive process will address the supply chain issues while keeping costs constrained.

“We're trying to minimize our risk because if we can't get sodium hypochlorite, we don't have clean water. We see the scarcity as a trend and we want to be out in front of it,” Munro added.

Avon Lake, a midsize utility governed by a five-member board of elected residents rather than the city, is also prepping to increase the water draw on its system and has been looking for progressive and unique technology adoption to make that happen.

At the time that Munro began discussions with CWA and Techwin, no water utility in the state had an on-site chemical generation system. "Techwin wants to expand this technology into the United States and we said we'd be willing to partner," he added.

The Avon Lake utility sends 87% of the water produced in the facility to bulk customers outside of Avon Lake and, Munro said, he is always looking for ways to diversify its revenue stream. The eventual goal is to produce enough sodium hypochlorite to sell to other utilities in the region.

Actual cost savings from producing the treatment in-house will be determined during the pilot. Another benefit to using the electrochemical process is that the salt needed as the raw ingredient will come from a mine in Rittman, Ohio.

"We are much closer to the salt mine than the facility we were sourcing our chlorine gas from so we are going to get a much more attractive price," Munro said.

Now that contracts have been signed, the Techwin machinery on its way. Installation is expected to begin in the fall with Techwin staff be on site to help install. The system, Stubbs said, will be up and running by early next year.

From there, CWA will offer tours and look for other partners to use the technology.

The Techwin technology has been used in several Asian countries, including South Korea and Vietnam, and now the company is looking to CWA to find and develop a manufacturing partnership here in Ohio, Stubbs said.

"It is the embodiment of the ripple effects of the water economy," Stubbs said. "We will be testing this technology here, piloting it here and then, once the pilot is successful and if we manufacture it here, it can ship through the Port of Cleveland."