Chlorine has long been a reliable tool in the water and wastewater treatment industry. It is one of the most widely-utilized chemicals in the space, and as such, there is no shortage of solutions for obtaining and applying it.

With so many options to parse, Water Online sat down with the experts at De Nora Water Technologies. We covered the treatment uses for chlorine in its different forms, the advantages of generating the disinfectant on-site, and considerations that make safety the priority.

**Why do treatment operations need to generate sodium hypochlorite?**

Most water and wastewater treatment requires disinfection of the potable water prior to injection into the distribution system or the wastewater effluent prior to discharge to the environment to control pathogens, viruses, and harmful bacteria. Chlorination remains one of the most widely utilized disinfection methods for both water and wastewater treatment processes at both municipal and industrial facilities.

Additionally, chlorine is one of only a few chemicals that provide a residual that lasts from the water treatment plant through the water distribution system and to the user's tap.

Chlorine can be utilized in the form of pure gas, as a solid in the form of calcium hypochlorite, or as a liquid in the form of sodium hypochlorite. Making sodium hypochlorite at the facility using an on-site sodium hypochlorite generation (OSHG) system is a cheap, easy and effective way to provide chlorine for disinfection.

**What are some other advantages of producing sodium hypochlorite on-site for treatment?**

The major advantages of generating sodium hypochlorite on-site include safety, lowered costs, the elimination of off-gassing, and the reduction of the formation of chlorine byproducts.

OSHG systems are safer than chlorine gas (100 percent...
concentrated) or bulk hypochlorite (10 to 15 percent concentrated) systems for several reasons. OSHG systems produce a 0.8 percent sodium hypochlorite solution, which is considered a non-hazardous chemical. 0.8 percent sodium hypochlorite does not present a threat to public safety, is not registered as a pesticide, does not require OSHA Process Safety Management or U.S. EPA Risk Management Planning, does not require special personal protective equipment for handling, and does not require special contaminant provisions in case of leaks.

The cost of generating a pound of chlorine onsite using an OSHG system is typically significantly less than the cost of purchasing a pound of chlorine using bulk sodium hypochlorite.

10 to 15 percent sodium hypochlorite solution decays rapidly, causing off-gassing in piping systems that leads to problems associated with feed pump dosing accuracy.

High concentration sodium hypochlorite decomposes rapidly due to long storage time, high storage temperature, high concentration of impurities, and exposure to UV light. This decomposition causes the formation of chlorine byproducts such as chlorate. On the other hand, 0.8 percent sodium hypochlorite produced from an OSHG system decomposes at a much slower rate compared to bulk sodium hypochlorite and is typically used for dosing as soon as it is produced, therefore reducing significantly the formation of chlorine byproducts.

What type of facilities are ideal candidates for OSHG systems?
An OSHG system can be installed at any facility where water disinfection, taste/odor control, biological growth control, or chemical control is required and where power and water are available.

Will OSHG result in high energy costs?
No, OSHG does not result in high energy costs. It typically takes approximately three pounds of salt and 2 KWh of electricity to produce a pound of chlorine equivalent as sodium hypochlorite. Depending on the cost of salt and electricity, it generally costs only about two thirds the cost of bulk sodium hypochlorite to manufacture on-site and offers a host of other benefits.

OSHG itself originally started in the swimming pool industry as a safer alternative to chlorine gas and a cheaper alternative to bulk sodium hypochlorite. It quickly grew in the municipal water and wastewater disinfection industry for the same reasons. As more and more OSHG systems were installed, a need for simpler, safer, reliable, efficient, and less-expensive equipment was recognized. The DN model utilizes the same basic system as previous models, but is simpler, safer to maintain, and delivers unique operating advantages.

What are some of the primary safety concerns that need to be addressed before generating sodium hypochlorite on-site?
OSHG is by far the safest method of disinfecting with chlorine since the raw materials are salt, water, and electricity.

During the electrolysis of brine, hydrogen is produced as a byproduct which is then safely contained, rapidly diluted, and vented into the atmosphere. It is important to have built-in safeguards including a hydrogen detector to shut the entire system down if the concentration of hydrogen exceeds certain parameters. It is important to select a vendor with a proven track record that supplies a system designed with safety in mind.

What criteria were considered in the design of the DN model?
Safety, simplicity, and accuracy were the primary drivers for the design of the DN model and in the process, there was a reduction in cost.

What do treatment operators need to know about maintaining this system?
Maintenance of OSHG systems is fairly simple. It is important to monitor the system regularly and to follow the manufacturer’s maintenance guidelines, which include acid cleaning the electrolytic cell(s), depending on specific site conditions.