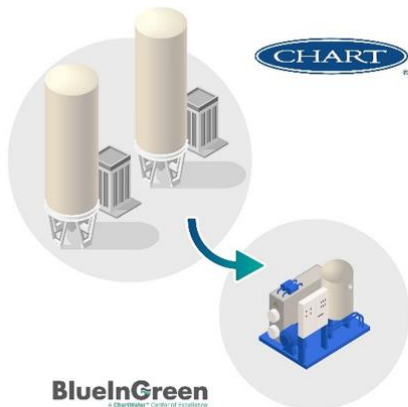


ADVANCING CLEANER WATER WITH CO₂ FOR PH CONTROL



How Chart and BlueInGreen Solutions Work Together. Chart offers the cryogenic gas storage and vaporization equipment that provides the feed-gas to BlueInGreen's gas-dissolution technology. BlueInGreen systems attain a supersaturated solution and deliver it to the basin, pipe, lagoon, river, lake, or reservoir – delivering lower treatment costs for oxygenation (aeration), pH adjustment, oxidation, and odor control. BlueInGreen uses downstream sensors in the bulk flow to achieve treatment objectives. The combination provides the complete package from ChartWater with



Figure 1. Common uses of CO₂ for pH Adjustment in Water Treatment.
(1) Lime Softening – the process of adding lime (calcium hydroxide) to water to raise the pH and precipitate mineral (Ca, Mg) out of solution, after which, the pH is normalized by adding dissolved carbon dioxide, often called “recarbonation.” (2) Remineralization – the process of optimizing the mineral balance of water by simultaneously adding lime, caustic, or limestone with dissolved carbon dioxide to protect downstream infrastructure from otherwise aggressive water (such as RO permeate). The process increases alkalinity and is also commonly referred to as alkalinity adjustment, stabilization, or corrosion control. (3) Strong Acid Replacement – used in industrial wastewater pretreatment

A municipal drinking water facility is in the process of upgrades and has selected ChartWater's BlueInGreen CO₂ gas-dissolution systems to soften its water prior to distributing it to the community – adding lime to increase pH and precipitate excessive minerals before normalizing the pH with dissolved CO₂. The mineral-laden wastewater generated from the water softening process flows to a Lagoon Overflow Treatment Plant for treatment prior to being discharged to the environment in accordance with strict permit requirements – including the pH of the discharge water.

Using CO₂ for pH control has become the preferred solution in water treatment for many applications (figure 1). The use of dissolved CO₂ in place of strong acid provides more precise control while improving worker safety – reducing risk and streamlining safety protocols by eliminating the inventory, handling, and use of strong acids.

Based on the proven performance of the BlueInGreen CO₂ gas-dissolution systems used in the water softening process, the municipality approached ChartWater™ to design the pH control system at the Lagoon Overflow Treatment Plant when it was time to upgrade the plant's legacy equipment. Specific project criteria included the need for a minimal footprint to incorporate the pH control system into the existing building. Other criteria called for a two-tank storage and dissolution system – with both systems used simultaneously during periods of high-demand, while operating in duty/standby mode during typical operating conditions. The ChartWater™ engineering team met the challenge by using liquid CO₂ storage tanks standard to Chart's Beverage Carbonation line – solutions typically used in restaurants, municipal pools, and other small CO₂ applications.

Specifically, the ChartWater™ team fulfilled the municipality's design and operational requirements by combining two Carbo-Max® Bulk CO₂ Storage Systems, one VaporMan 125® Manifold Vaporizer System, a piping module skid, a duplex BlueInGreen StreamLine® CO₂ gas-dissolution system, and onsite commissioning. The engineered solution includes necessary transmitters for both CO₂ flow and pressure, as well as pressure release valves to ensure safe operation. Adding to the value proposition, the new system will operate using the existing SCADA controls at the plant. The StreamLine® CO₂ system from BlueInGreen, a ChartWater™ Center of Excellence, is a pressurized, sidestream solution leveraging Henry's Law to cost-effectively provide stable pH control through carbon dioxide dissolution. This, BlueInGreen's smallest system, is capable of deliveries of up to 35 lbs./hr. of CO₂.

As the water industry continues to replace sulphuric and other strong acids with carbon dioxide for pH control in an increasing number of applications, a couple of motivations are noteworthy: (1) more precise treatment (precision control of optimal pH), and (2) a desire to improve worker safety. Acids are often considered to be an unnecessary risk requiring significant safety protocols. A related benefit is improved worker productivity – eliminating the inventory, handling, and use of strong acids reduces downtime, changeover time, and the risks associated with manual acid-feed systems. As noted by another ChartWater™ customer: "A year in, we're very pleased with the new set-up and the entire process. Sensors on the gas storage tank notify our gas supplier when we need more carbon dioxide and they come and fill up the tank. The BlueInGreen system does the rest. Now, our operators spend more time managing the rest of the operations. A lot more precise treatment means less variability in pH; so, we're at steady state a lot more and the downstream treatment processes are running better."

For more information, visit <https://www.chartindustries.com/Businesses-Brands/BlueInGreen>