



# Blowdown Recovery System

## Technology Overview

Chilled water plants use cooling towers to transfer waste heat to the atmosphere through evaporation. As water evaporates, mineral content suspended in the remaining water becomes increasingly concentrated. When the remaining water can no longer hold the minerals in suspension, scaling and corrosion result. Consequently, system water must be flushed periodically to minimize mineral build-up, a process known as “blowdown.” The blowdown recovery system optimizes chilled water system performance by capturing and purifying a percentage of the blowdown. This water is returned to the condenser water system as very low conductivity, zero hardness makeup. The technology incorporates sidestream filtration, carbon filtration, reverse osmosis (RO) demineralization, and a control system. Condenser water (blowdown) is ported from the discharge side of the sidestream filtration through a carbon filter to remove chlorine and then to an RO pump where the water is pushed through permeable membranes to extract minerals. Antiscalant is injected into the RO inlet water stream to prevent scaling on the membrane surfaces, extending the life of the membranes, and reducing maintenance.

The blowdown recovery system can be run as a standalone unit or combined with the continuous monitoring and partial water softening system from the same manufacturer, which GPG evaluated in Findings #045.

## Why is GSA Interested?

Chilled water plants account for approximately 23% of a commercial building’s total water demand, and in some cases, where control is poor, substantially more. This system’s blowdown optimization promises up to 46% blowdown and sewer savings as well as improved monitoring and control of cooling tower water. Components of this technology exist within other technologies but their effective combination would be a significant improvement over current best practices.

## How Will Success Be Measured?

The testbed design will verify two key claims: 46% blowdown recovered/15% makeup water savings; and payback under 5 years (Savings to Investment Ratio > 1). Researchers will also evaluate the level of effort required for installation and commissioning and the impact on operations and maintenance (O&M). The manufacturer estimates two days to install and commission the technology for one cooling tower and minimal impact on O&M. The assessment will evaluate the technology both as a stand-alone treatment system and in conjunction with the partial-water-softening system.

## Deployment Potential

This technology is applicable to cooling towers in central plants, which are responsible for cooling the majority (~80%) of GSA space. If it were installed in 41% of GSA’s owned portfolio, 717 systems, it could save \$12 million annually.

*GSA Proving Ground (GPG), in association with the National Renewable Energy Laboratory, is evaluating the real-world performance of a Blowdown Recovery System in a cooling tower at the Lloyd D. George Courthouse in Las Vegas, NV. The technology will be provided by Aqualogix and coordinated with other ongoing evaluations of this technology.*