Itron

Envision Charlotte Water Report

Water Benchmarking and Conservation

What: 22 buildings in Smart Water Now, focusing on conservation in the central business district, reads water meters centrally, records consumption, display building level dashboards, and provides conservation program

When: 2015 (period of time start to finish)

Technology applied: Networked and measurement technology to read water sensors and provide data analysis with increased granularity.

Benchmark findings: Water consumption patterns by building on usage based on building types, temperatures and occupancy that can be used to drive conservation

WHITE PAPER

CHARLOTTE'S WATER – THE LIFEBLOOD OF THE COMMUNITY

Water is the lifeblood of society, but it is also a scarce resource that requires careful management. Diligent use and management of water is vital in creating vibrant, resourceful cities. As cities grow and implement systems capable of making decisions in real-time, known as smart technology, water projects are a key component. A burgeoning smart city, Charlotte, North Carolina is currently facing challenges in water usage as it builds a city of the future. In fact, the Charlotte Observer reported a 14 percent increase in the population from 2010 to 2017, putting a strain on city resources and development.

Clean and plentiful water is important for any city, and Charlotte is no exception. Charlotte relies primarily on lakes and rivers for raw water. Specifically, the Catawba-Wateree River Basin feeds into the numerous rivers and lakes, which provides water to Charlotte and surrounding counties. In 2006, nearly 420 billion gallons were withdrawn from this basin by the City of Charlotte to support the community's water needs.

Further, water has a dependent relationship with energy, known as the energy-water nexus, which Itron has invested in through the launch of an interactive science, technology, engineering and mathematics (STEM) curriculum called *Resourcefulness: An Introduction to the Energy-Water Nexus*. Developed by University of Texas professor Michael E. Webber, the curriculum encourages resourcefulness in addressing water and energy challenges of the 21st century.

Water delivery in Charlotte successfully serves citizens today, however with a growing population and climate change, this system is not sustainable in the long term. According to a 2014 study conducted by the Catawba-Wateree Water Management Group (CWWMG), Charlotte could reach unsustainable water usage in less than 50 years.

Without a significant, coordinated effort to manage water availability and consumption in the area, it is likely that soon there will not be enough water to support the growing city; not enough water to support new jobs, produce electricity and drive new industry.

SMART WATER NOW GOALS AND OBJECTIVES

Addressing water sustainability, Charlotte has recently created water goals and objectives to ensure sustainable water management as a part of their larger Envision Charlotte initiative to transform Charlotte into a smarter city. Envision Charlotte, a public private plus cooperative, is committed to working with local stakeholders to create sustainable water systems in the City of Charlotte. Through innovations that strengthen economic competitiveness, environmental sustainability and positive community impacts, Envision Charlotte aims to make Charlotte a city of the future.

Through water management, it is estimated that Charlotte could extend water sustainability by **40 YEARS**

Naturally, a city of the future has a plan for water delivery that will continue to support the population for years to come. To ensure resourceful use of water, Envision Charlotte identified reduction of public water usage and implementation of water management strategies as key goals. With these efforts it is estimated that Charlotte could extend water sustainability in the basin by 40 years.

For Charlotte, these goals are long-term and require specific objectives to build a smart water system. For example, reducing water usage requires thoughtful implementation of technology and software. Foundational to instituting any reduction in water demand is a robust usage awareness program, which reduces water costs to the community. To support these programs, utilities need access to real-time data. Charlotte requires smart technology to gather and analyze data points, which in turn encourages more sustainable water usage.

SMART WATER NOW PROGRAM

Building on the success of Envision Charlotte's energy program, which resulted in a 19 percent reduction in energy consumption, Envision Charlotte worked with local stakeholders to address the complex issue of sustainable water resources. To address water concerns, Charlotte Water joined the project to address water usage and delivery, aiming to ultimately reach the goal of a significant reduction in water usage.

As a starting point, Itron – a technology and service company – deployed a demonstration-scale fixed data collection network, which efficiently collected high frequency water consumption data from 22 commercial buildings in downtown Charlotte. This system remotely reads water usage, eliminating tedious mobile reading.

After collecting hourly consumption data via the fixed network, Itron analysts normalized the data to ensure that all data was comparable regardless of the building's size, type or weather conditions. This was necessary because raw data does not create helpful information, and the buildings varied from office buildings to a county jail. By normalizing the data, the building managers could more reliably identify outlier data points that were likely to indicate potential water saving opportunities.

Using this normalized data, Itron developed a suite of data dashboards for the participating building managers to monitor and compare their water consumption in ways never possible before. These dashboards provide greater visibility for building operators to take informed action to better manage their water consumption and associated building assets.

Since these dashboards were complex, Envision Charlotte, Charlotte Water and Itron hosted workshops over lunch to explain the dashboards to building operators. Driving the value of this information, building operators gained in-depth knowledge of the data to better understand water usage in their buildings.

OUTCOMES

Due to this project, building managers gained access to granular, hourly data enabling real-time visibility for every building that participated. By producing high level comparative benchmarks, building managers were able to look for patterns in their water delivery. By analyzing these patterns, water utilities can identify and incentivize efficiency measures by utilizing near real-time water use data to uptown building managers and occupants.

The benchmarking and monitoring dashboards created through this project gave Charlotte Water the ability to better analyze water usage in the participating buildings. Collecting hourly data from the pilot network, the dashboards incorporated local weather data, occupancy and building type to provide actionable information to building owners. Applying these insights, Charlotte Water can use these patterns to identify water-saving opportunities and give greater visibility to water customers.

WHAT'S NEXT

Enhancing Charlotte's image as a progressive city will attract new businesses and strengthen its economic base, and Envision Charlotte is taking strides to make the goal a reality. A smart water solution is vital for Charlotte's smart city goals, and the dashboards are only a step in a greater water solution for the city.

With the dashboards, buildings have greater visibility, but anomalies in the building data do not always mean that the building has a water saving opportunity. In order to leverage the data to work for the utility, there must be a diagnostic team to determine what aspects of water delivery can be improved. It also requires smart technology to execute some of these solutions.

For future projects, the benchmarks should include an inventory of water fixtures, controls and equipment to create a more detailed understanding of water usage. The dashboards could also include custom data visualizations, giving users the ability to interact with the data by sorting data by time, daily profile and variance history. Furthermore, experts could work with building managers to analyze the dashboards to identify, fund and implement water-saving interventions.

This project laid the foundation for future sustainability programs that will reduce water usage and empower customers to reduce usage. With the highly detailed, normalized data in the dashboards, building managers have greater visibility that was not possible before this project. As Charlotte continues to develop its smart water programming, the pilot network and dashboards established will support future projects.

A review of best practices, case studies and water use information associated with commercial buildings can be found on the Environmental Protection Agency's WaterSense information portal at https://www.epa.gov/watersense/commercial-buildings.

Itron

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