

DISCUSSION DRAFT

Exploring NACWA's Role in Big Data and Smart Utility Systems

As an outgrowth of its work on the Water Resources Utility of the Future, NACWA has been increasingly engaged in the emergence of the 'smart utility'. At the core of this dialogue is the issue of 'big data' and how collecting and managing vital information about utility systems and operations can lead to cost-saving efficiencies, better technology and more informed decision-making. At the same time, as a highly regulated, often risk-adverse industry, more data can also be anxiety-producing, raising concerns about what a regulator – or the public and citizen groups – may do with all that information. Regardless of this push and pull, or indeed because of it, NACWA recognizes that it is time for the Association to engage in the growing dialogue on these issues.

NACWA's 2015 Summer Conference served to initiate the current dialogue among the membership, with keynote speaker Gordon Feller from Cisco highlighting that "[t]he ability to improve city infrastructure management [through better utilization of data analytics] is increasingly defining social, environmental, and economic success." Ninety percent of the world's data was created in the last few years and more new data were created in 2012 than in the prior 5,000 years combined. Harnessing this 'big data' is the key to unleashing the smart utility and, more importantly, putting clean water agencies more in control of how they manage their assets and make needed infrastructure investment.

The increasing collection and use of this type of information can help to build on the foundation of flexibility created by the U.S. Environmental Protection Agency's (EPA) Integrated Planning Framework and related policies. EPA has shown a willingness to allow clean water agencies more control over their clean water investments and the additional control and opportunities for optimization provided by 'big data' could help to create even more flexibilities. Much of this data collection has been going on for some time, but only very recently have utilities begun to maximize the power of this information by integrating it enterprise-wide and presenting it in a manner that gives utility managers an unprecedented look at how things are running, what needs to be adjusted, and where additional investments are needed.

What is 'big data'?

Simply put, 'big data' "combines massive computing power with the knowhow to collect, curate, integrate and analyze large swaths of complex information to make better-informed decisions."¹ The goal of 'big data' applications is to deliver predictive and prescriptive (what action should be taken) outcomes, in real-time. In a combined sewer system context, for example, 'big data' systems

¹ Water Canada, *Will Big Data Save Our Water Resources?*, Posted September 18, 2015.

are allowing utility managers to track flows system-wide to better predict where overflows may occur and allow them to take action to prevent or minimize the overflow. On the drinking water side, advanced metering infrastructure (AMI) has been around for some time now, but its full potential is increasingly being realized in communities across the country. It is allowing utilities to monitor water use in real-time and giving ratepayers access to their own usage statistics.

Big data can extend beyond distribution and collection systems to the treatment plant and be used for energy demand forecasting; assisting with monitoring of chemical usage to allow for more efficient purchasing; enhancing environmental monitoring and analytics to allow for more precise control of treatment systems; and real-time asset management, allowing utility managers and operators to bring different assets into and out of service as needed and better predict asset failure and take proactive corrective measures.

Much of the data collection to date has been in silos, in discrete portions of the water enterprise – water metering, pipe integrity, collection system and overflow monitoring, etc. More often than not, these discrete systems provide tremendous value to the utility, but do not talk to one another very well or at all. Different or proprietary software systems may not allow easy integration. The growth of cloud computing and the Internet of Things (IoT) is now allowing for unprecedented developments in data integration and analysis, and ultimately a more open, vendor-neutral approach.

Benefits from NACWA Engagement

Above all else, NACWA engagement on the smart utility and big data fronts would provide the Association and its members a better understanding of the role this type of information collection and management can play in improving compliance with current and future Clean Water Act requirements. This would, for example, create opportunities for more advanced, but more flexible ways to develop and implement permit limits for wastewater pollutants. The smart utility concept can strengthen our advocacy arguments that clean water agencies should and must be seen as equal partners in improving water quality, not simply as a regulated entity. Engagement in this area would also complement and build upon NACWA's existing Utility and Industry of the Future efforts and better enable utility managers to take advantage of the latest developments in data integration and analysis.

The technology is continuously evolving and, therefore, so is the need to assess and discuss its role to ensure that utility managers are making informed investment decisions. Enhancing the ability of NACWA Member Agencies to evaluate and adopt these increasingly sophisticated systems is an important focus. There is also interest in ensuring opportunities for NACWA Affiliates and technology and solution providers not previously engaged with NACWA to interact with and learn from utility managers.

Nexus between Big Data and NACWA's Mission

There are a number of areas where the smart utility/big data concepts naturally intersect with and complement NACWA's mission and core advocacy functions. Among the areas where NACWA could provide value to its members on this issue are:

- Work to address regulatory barriers to more widespread adoption of advanced data systems. In the current regulatory environment, whether perceived or real, there is a fear that additional information will lead to greater scrutiny from regulators. For example, if a utility can monitor its entire sewer system and predict and estimate overflows, will a regulator require more of the utility with this information than it would from another utility? There are concerns that utilities may be reluctant to spend significant resources on a system that may simply lead to more scrutiny from regulators, rather than the flexibility that should be derived from the improved data. Again, this is directly linked to the integrated planning, affordability and Utility of the Future efforts discussed above.
- Explore and promote with environmental regulators how real-time monitoring and analysis can improve compliance with current Clean Water Act requirements (e.g., predicting and controlling sewer overflows). Central to this is demonstrating to regulators that utilities using ‘big data’ approaches are taking a more proactive approach to ensuring compliance with Clean Water Act obligations, thus building a greater level of trust that utilities really are ‘co-regulators’ and partners with government when it comes to water quality protection. This in turn can then lead to utilities having greater flexibility in how they design, fund, and implement compliance programs.
- Assist in addressing existing utility manager concerns with technology system deployment, which include cost recovery concerns/long payback times (with some providers taking multiple years to bring systems online), past failures of information technology systems that may influence a utility’s perspective on new systems, and institutional barriers, including utility staff who are comfortable with existing systems.
- Explore the need for consistent best practices for procurement of these services through collaboration among public and private interests.
- Ensure that utilities with existing data systems can better use the information they currently have across the water enterprise to inform their decision making. Address concerns with proprietary software and vendor-specific solutions that limit enterprise-wide integration.
- Explore how ‘big data’ efforts at the utility level can integrate with larger scale ‘smart city’ initiatives. Fragmented efforts are often inefficient, have limited effectiveness and are not economical. Uncertainty over the role of water/wastewater providers in these smart city efforts is also slowing adoption and in many cases the water side of the enterprise is left out of the conversation.²
- With ‘big data’ comes large quantities of data that must be managed, stored, protected and consistently updated. The power that this information can wield can also present management and cybersecurity concerns that will need to be addressed.

² Breaking Energy, *Uncertainty By Water Utilities Surrounding Smart City Concept May Hide Golden Opportunity*, August 27, 2015.

- Ensure utilities can fully explain the efficiency and reliability gains achieved through ‘big data’ to their ratepayers.³

At the same time that big data issues are interwoven with many elements of NACWA’s mission, the issue touches a much broader array of issues and challenges facing the modern world. While there is a clear and unique aspect of big data that is applicable to the water sector, ensuring that NACWA’s engagement remains focused on those aspects most relevant to the water sector and the Association’s advocacy mission will be critical.

Next Steps

These issues will feature prominently during a Smart Utility Roundtable Discussion during NACWA’s 2016 Winter Conference in San Diego. The discussion will be part of the General Session programing and allow technology solution providers to interact directly with utility managers, share experiences from clients that have deployed these types of systems and discuss the pros, cons, and barriers to broader adoption. Case study presentations from utilities will also be featured.

Following the discussion in San Diego, NACWA will continue to explore how best to integrate these issues on an ongoing basis into its advocacy agenda.

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