operation optimization

By Scott Haskins

Managing utility budgets & maximizing efficiencies to yield additional revenue

Operating and maintaining water infrastructure is costly, especially considering that much of the U.S.' aging water infrastructure needs repair or replacement. Couple this with stricter environmental regulations and customer demands, and it is clear why utilities and public works agencies are looking for ways to streamline operations and do more with less while meeting safety, service, operational and financial goals. Utility optimization offers a way to operate water and wastewater systems more effectively, better manage limited budgets and identify efficiencies to generate additional revenue.

A Comprehensive Approach

Utility optimization involves finding the most favorable solution to generate cost savings and greater economic benefits for water and wastewater systems, while maintaining desired levels of service and risk management. While advancements in technology have given utilities access to tools and models for analyzing all potential solutions, there are more effective alternatives to a "one-size-fits-all" approach.

Utilities can realize true optimization by fully integrating management, engineering, finance, and operations and maintenance (O&M) decisions to streamline business processes, manage capital spending and funding needs, make better decisions, train staff, and enhance facilities to ultimately drive down costs.

There are six components to consider when streamlining utility management and operations:

1. Cost efficiency
2. Risk management
3. Maintenance effectiveness
4. Service levels
5. Sustainability
6. Knowledge transfer

Several utilities have adopted this approach and are seeing significant benefits through greater optimization.

Columbus

Columbus, Ohio, for example, calculates $57 million in savings through improved operations.

Since starting its optimization initiative in 2008, the Department of Public Utilities (DPU) in Columbus has avoided $57 million in capital and operations expenditures as a result of a $7-million investment, freeing up resources for other needs in a budget-constrained environment. The utility adopted a culture of continuous improvement and conducted a department-wide asset management needs and operational assessment to identify opportunities for optimizing its asset decision-making process.

In 2010 and 2011, Columbus DPU evaluated operations at both of its wastewater treatment plants, and all three of its water treatment plants for potential energy and chemical savings. Using asset management tools and process models, each plant was analyzed and potential opportunities were identified, taking into consideration the feasibility and cost of necessary improvements when compared with the financial and operations gains.

Columbus DPU is an industry leader and attributes its asset management and maintenance programs as key foundation pieces in helping it achieve its sustainable and effective management and operation optimization. While Columbus DPU has already achieved significant savings by implementing maintenance, risk management and performance management best practices, as well as conducting business case evaluations, the utility's ongoing strategic plan and commitment to optimization will further streamline its management decisions and keep operating costs down in the future.

Cincinnati

The city of Cincinnati, the Greater Cincinnati Water Works (GCWW) and the Metropolitan Sewer District (MSD) are leading the industry in terms of adopting transformative utility optimization practices. Designed to reduce operating costs while maintaining high-quality utility services, the city adopted a risk-based asset management approach to manage increasing regulatory pressures and capital expenses in an environment when budgets are strained.

The MSD provides wastewater services to 800,000 people with operating costs of $180 million annually. It operates and maintains 3,000 miles of combined and sanitary sewers, high- and low-pressure force mains, seven treatment plants, approximately 130 pump and lift stations, several package plants, real-time control facilities, high-rate treatment plants, levees, dams and floodgates to protect the Mill Creek Valley. The GCWW provides more than 130 million gal per day of water to several counties in Ohio and Kentucky. The utility supplies approximately 235,000 residential and commercial clients with drinking water, which is tested more than 600 times from the source through the distribution system to ensure the highest quality.

Taking a long-term, community-wide approach to major investments, Cincinnati is effectively considering green infrastructure alternatives; economic development; and environmental and social costs, benefits, and risks. It also is engaging its workforce in new technology and maintenance efforts. Working with consultant experts, the city has developed strategic plans to align the utility missions with customer service level expectations, asset reliability, regulatory compliance, organizational efficiency, employee development, financial viability and community sustainability.

Looking across both GCWW and MSD, Cincinnati identified numerous ways to improve the effectiveness of its water and wastewater operations, including opportunities to save money by re-examining policy and administrative procedures. One example includes changing GWCC's policy to replace 30 miles of pipe every year at a cost of $40 million. The savings from replacing pipes based on risk rather than a set annual rate allowed the utility to make other more critical investments. Additionally, GWCC and MSD are combining administrative services to save $68 million to $105 million over 10 years. Identifying quick wins and working with a bottom-up and top-down approach, Cincinnati is transforming the way it operates to keep costs low for ratepayers.

San Diego

The city of San Diego Public Utilities Department (SDPUD) operates and maintains one of the largest and most complex water infrastructure systems in the U.S. Given its location in a semi-arid region, the city imports approximately 90% of its water to meet the needs of 1.3 million people. Recognizing the value of streamlining operations, SDPUD recently signed a contract with CH2M Hill to optimize the operation of its water and wastewater systems, each of which include three treatment plants.

An Operational Optimization Survey will review and evaluate San Diego's water and wastewater operations and determine if improvements can be made in the areas of energy utilization, water production and distribution, chemical usage, sludge processing and disposal, data utilization, and optimizing the deployment of city staff. The study's findings will provide insight into implementable solutions to optimize SDPUD's operations and enhance the reliability of its systems, without adding unacceptable risks such as wastewater spills, reduction in potable water quality or increases in water main breaks.

Currently, energy use comprises approximately 10% of the San Diego water treatment plants' O&M costs, and it has risen dramatically at two plants due to the recent installation of ozone facilities. On the wastewater side, SDPUD is seeking to optimize sludge handling by dewatering a higher percentage of solids while keeping disposal costs at a minimum. Using innovative technology, judicious capital investment and effective O&M, the San Diego Operations Optimization Program will continue SDPUD's efforts to increase the efficiency of its water and wastewater operations.

The projects in Columbus, Cincinnati and San Diego are indicative of trends in the water industry to better manage infrastructure and help utilities make informed decisions when streamlining operations and investing in new and existing assets. As financial demands continue to increase, along with new regulatory obligations, utilities are challenged as never before to achieve higher levels of performance managing their people, processes, technology, maintenance programs, capital planning and service delivery. By eliminating unnecessary expenditures and making wiser investments in both new capacity and O&M, water utilities can bring greater value to ratepayers. WWD

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