

Maximize Asset Management's Triple-Bottom-Line Benefits

Heather Himmelberger and Andy Yang



Layout imagery by Photon photo/Shutterstock.com

Why is infrastructure asset management so important for water and wastewater utilities? Simply put, the practice yields important benefits—financial, social, and environmental. But if a utility is going to continue to invest its limited time, money, and resources in implementing an asset management program, it's helpful to identify—quantitatively and qualitatively—the benefits received through the existing program or through asset management-related activities. Communicating these benefits to decision makers and customers can help ensure they see advancing asset management as a worthwhile long-term practice and the utility as a good steward of funds.

Back to Basics

Asset management includes five core components: the current state of assets, level of service, criticality, life-cycle

costing, and long-term funding. To establish these components in an overall plan, asset managers must answer the following questions:

- What assets does the utility own?
- What do these assets need to accomplish?
- Which assets are critical for success?
- How will the utility design, construct, operate, maintain, repair, rehabilitate, and replace its assets over the course of their lives?
- How will these activities be funded now and over the long term?

Triple-Bottom-Line Benefits

When assessing the benefits of asset management activities and programs, it's helpful to have a deeper understanding of the triple-bottom-line benefits organizations may realize.

- Finance benefits include three potential types: cost savings, cost avoidance, and revenue enhancement. Cost savings refers to doing a task or activity in a less expensive way. Cost avoidance means changing the situation so a task doesn't need to be done at all. Revenue enhancement entails a change that creates additional revenue.
- Environmental benefits include regulatory improvement (e.g., increasing regulatory compliance that results in reduced violations), better resource efficiency (e.g., decreasing use of water resources, reducing carbon footprint, and increasing energy efficiency), and waste reduction (e.g., reducing process waste, changing the type of waste produced to a less hazardous waste, and changing the nature of the waste discharge).
- Social benefits improve the lives of customers, employees, and elected leaders. For example, customers can benefit from increased customer satisfaction, fewer disruptions and blocked roads, and more consistent service. Employees can benefit in many ways,

such as having a more planned, less reactive work day; more opportunities for career advancement; fewer injuries and less work time lost; and increased job satisfaction. Finally, elected leaders can benefit from having more supportive employees and customers so that necessary rate increases receive support, or at least a less antagonistic response. They might have more supportive customers in general.

Utilities Using Asset Management

The three following case studies detail how these triple-bottom-line benefits can be quantified and assessed within an asset management program's specific activities. Many activities result in more than one type of benefit.

Board of Public Utilities, Kansas

The Board of Public Utilities (BPU) in Kansas City, Kan., has implemented many asset management practices—particularly related to maintenance—that have resulted in cost savings and other nonmonetary benefits. One of its important assets is a scrubber that is used to remove chlorine gas if a leak occurs. The scrubber had to be cleaned out annually, which was a difficult, messy job for the employees and expensive for the utility.

In 2012, BPU challenged itself to not just fix the problems, but improve the underlying situation. This mode of thinking in the area of operations and maintenance (O&M) suggests utilities should look beyond simple fixes and dig deeper for more meaningful results. Following this proactive philosophy led BPU to redesign the chlorine scrubber with an inert dry media that replaced the originally designed hazardous liquid media. The retrofit cost approximately US\$100,000, with a reduced O&M cost of approximately \$1,000/year—far less than the old system, which cost approximately \$20,000/year. This investment resulted in a payback period of a little over five years. In addition to the monetary benefits, the retrofit eliminated the need for difficult, hazardous maintenance, thus improving employee job satisfaction and safety (social benefits).

Communicating asset management program benefits to decision makers and customers can help ensure they see advancing asset management as a worthwhile long-term practice and the utility as a good steward of funds.

In addition to creating an overall safer working environment, fewer pipe breaks allows employees more time to work on other tasks, such as exercising valves or replacing meters.

Unlike the original design, the new media remains inert, so its eventual disposal is better for the environment with no residual liability.

Albuquerque Bernalillo County Water Utility Authority, New Mexico

Similar to BPU, the Albuquerque Bernalillo County Water Utility Authority, which serves the greater Albuquerque, N.M., area, has reduced the number of main line breaks in its water distribution system by applying asset management principles to its pipe replacement strategy. With the help of the Southwest Environmental Finance Center at the University of New Mexico, the utility studied break patterns for a 15-year period and determined steel lines (mostly 4 and 6 in.) were causing half of the breaks but only made up ~5% of the system. Although the utility was focused on replacing steel pipe, it hadn't focused on removing the most critical steel pipe first. This philosophical change—using criticality to determine which pipes needed to be replaced first—reduced pipe breaks by more than 40% between 2011 and 2018 and avoided more than \$9 million that the utility would have otherwise spent to send crews to perform repairs that would have occurred before pipe criticality was emphasized.

Additionally, fewer pipe breaks means less water loss, which is an environmental benefit—one that's particularly important in New Mexico's desert environment. Break reduction also creates social benefits by reducing service disruptions and the headaches of repair activities, such as open trench cuts on busy streets. In addition to creating an overall safer working environment, fewer pipe breaks allows employees more time to work on other tasks, such as exercising valves or replacing meters.

The utility's increased meter replacement activity resulted from fewer repairs, which freed up time and resources for operational personnel to replace stopped or inoperable meters and provide these customers with more accurate water bills. Between fiscal years 2012 and 2018, the utility reduced the number of inoperable meters from more than 4,500 to a few hundred, leading to increased revenue and more equitable billing for all customers.

San Jose Water, California

San Jose Water (SJW), which is located in Silicon Valley and serves customers in the San Jose, Calif., metropolitan area, has experienced a wide range of benefits by implementing a comprehensive asset management program that addresses organizational alignment, strategy and planning, data and systems, workflow, technology, and sustainable culture. This enterprisewide program, after having established clear organizational levels of service, has aligned multiple departments toward common goals and created cross-departmental synergies that wouldn't have developed otherwise.

An overarching risk framework was developed to provide data-driven, risk-based asset management plans for all major asset types. These plans lay the groundwork for capital and O&M investment decisions that must ultimately balance service level goals, costs, and risk, and they have allowed for 100-year asset-based risk forecasts.

SJW's program also includes ongoing preventive maintenance (PM) optimization efforts, which consist of a series of discussions between field staff and supervisors from various departments as well as risk and cost data analysis. In just the first three of these efforts, decisions were made that improved operator safety and saved \$200,000/year in operations costs, which can be reallocated to more critical tasks. One of these decisions included revamping a legacy suction-tank-cleaning PM program in which a condition-triggered cleaning strategy was implemented in lieu of its previous high-frequency, calendar-based cleaning program. The new strategy optimized the cleaning frequency and greatly enhanced tank inspection efficiency and effectiveness through the use of remotely operated vehicle technology and streamlined data collection mobile applications. The PM optimization efforts also improved cross-departmental communication and encouraged field staff to remain actively engaged in continuous improvement.

In addition, the asset management program has increased trust with regulators. Coupling risk-based pipeline asset management planning with the implementation of leak detection technology, the California State Water Resources Control Board's Division of Drinking Water (DDW) has come to understand SJW is applying robust measures to minimize the risk of chlorinated discharge into the environment. This has proved beneficial in ongoing communications between SJW and DDW and has helped with permitting efforts for new projects. SJW continues to experience the compounding benefits from its asset management program and, going forward, expects to realize future benefits at greater scales.

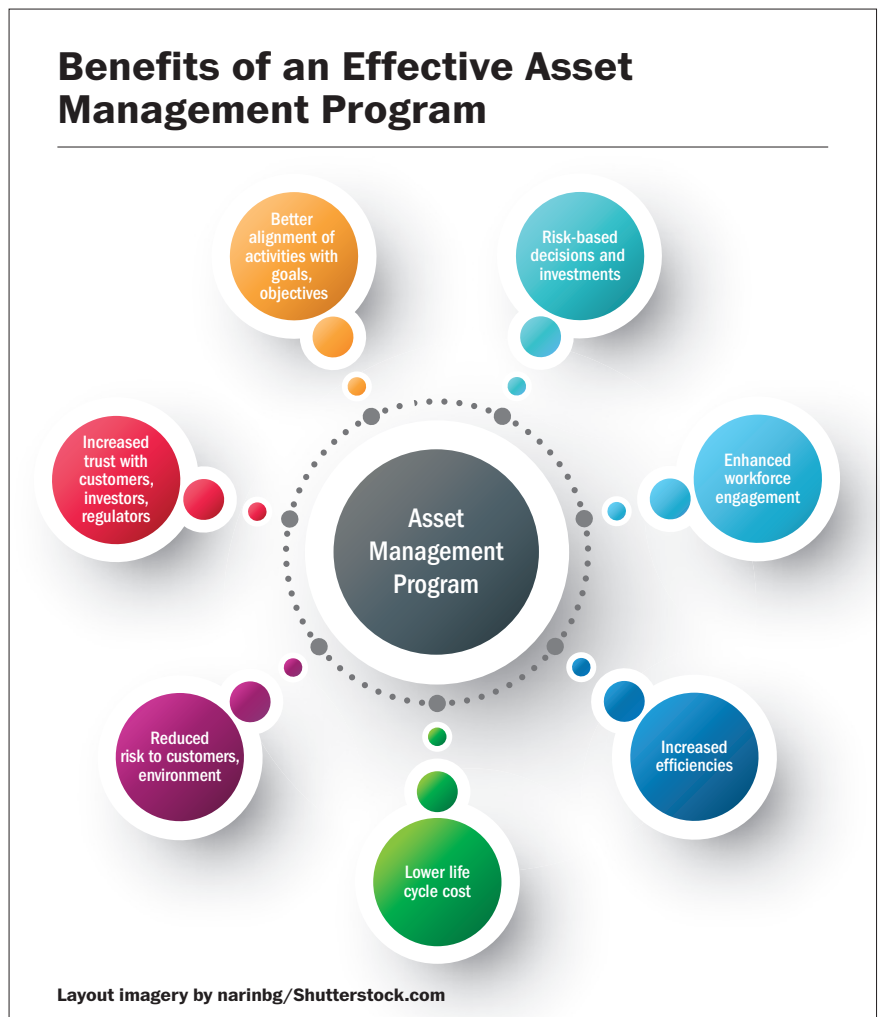


Figure 1

Asset Management Benefits

Organizations need a program focused on sustainable asset management to experience benefits similar to those in the preceding examples. The benefits of comprehensive asset management (Figure 1) can include better alignment of work activities with organizational goals and objectives; risk-based decision-making for short- and long-term capital and O&M investment; increased efficiencies through cross-departmental coordination for streamlining processes; reduced asset life-cycle cost; ongoing identification of cost-saving and risk-reducing opportunities; systematic safety and reliability improvements for customers and the environment; increased trust and transparency with customers, investors, and regulators; improved worker safety and morale; and an enhanced problem-solving culture focused on continuous improvement.

Once an asset management plan is in place, its benefits need to be measured and communicated to key stakeholders. Too often these benefits go unnoticed and uncelebrated. Indeed, this effort takes commitment and buy-in from senior leadership, but it's worth the effort. If your utility

doesn't have a comprehensive asset management program, start small, be strategic, aim for early success, and be sure to share the benefits widely. A few quick wins and a clear vision may lead your utility to a stronger asset management program, one that perpetually benefits its triple bottom line while improving services to your community. ♣

Heather Himmelberger is director of the Southwest Environment Finance Center at the University of New Mexico (www.southwestefc.unm.edu), Albuquerque, N.M.; heatherh@unm.edu.

Andy Yang is manager of asset management with San Jose Water (www.sjwater.com), San Jose, Calif.

Douglas G. Brinkman (column coordinator) is a water engineering consultant based in Lynchburg, Va. He can be contacted at brinkmandg@gmail.com.

<https://doi.org/10.1002/awwa.1434>