EFFECTIVE UTILITY MANAGEMENT

A Primer for Water Sector Utilities

2024

EPA

ASSOCIATION OF METROPOLITAN WATER AGENCIES

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American Water Works Association

NACWA

Water Environment Federation
the water quality people®

THE Water Research FOUNDATION

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Message from EUM Steering Group

Dear Water Sector Utility Leader:

Every day you provide the leadership to deliver vital services that protect public health and support the vitality of your communities, natural environment, and economy. Your organizations are truly anchor institutions in your communities. Today's water sector utilities[1] face a broad range of complex challenges: rising costs; aging infrastructure; expanding regulatory requirements; a workforce in transition; extreme weather events; rapidly evolving technology; cybersecurity threats; enhanced customer expectations; and additional focus on equitable access to clean and safe water. Water sector utilities need a common-sense, replicable, and proactive set of approaches to meet these current and future challenges.

Developed in 2008, Effective Utility Management (EUM) is a water utility management approach that was developed by water sector leaders for the water sector. This management approach is based around Ten Attributes of an Effectively Managed Utility and Five Keys to Management Success. EUM is now the most widely recognized water utility management program in the country, and this Primer is the foundation of EUM. The Primer will help your utility comprehensively assess current operations and identify a path to improving in key areas that are the highest priorities. The Primer was first updated in 2017, based on key changes in the water sector identified by the EUM Steering Group. In 2023, a new Steering Group comprised of previous Steering Group Members joined by new utility leaders was convened to modernize the Primer in response to historic changes to the water sector due to shifts in the water workforce, changing environmental conditions, and a recognition of the importance of a utility's organizational culture.

EUM, as embodied in this modernized Primer, can help your utility to respond to and plan for current and future challenges, supporting your mission of being a successful 21st century service provider. It is more relevant than ever before to help meet the challenges that we face. The Primer is a starting point for effective and sustainable operations, allowing utilities. to address challenges in a step-wise process, at a pace that you control based on the capacity of your utility.

Key Messages to the Water Sector

EUM and this Primer are the keys to unlock the potential of your utility to protect public health and the environment in the 21st century:

- EUM helps you take a 360-degree look at your utility and then set priorities that work for you and your community.
- It helps you protect your current infrastructure investments and ensure that your workforce is motivated and able to address the challenges that they face every day.
- It moves you from reacting only to urgent needs to proactively planning for the future.
- It helps you engage your staff in the process of assessing and charting your own course for the future.
- It is simple, actionable, affordable, and scalable to meet the needs of all utilities where they are.
- Finally, it is achievable for utilities of all sizes and configurations, and across all staff levels. EUM will help your utility collaborate internally and work with the community to manage cost of service in support of reliable and sustainable services.

In closing, thank you for all you do every day. Please consider using the EUM Primer and chart a sustainable course for the future. We encourage you to join the growing group of utility leaders implementing EUM!

Sincerely,
The EUM Steering Group

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[1] Throughout this Primer and EUM materials, the phrase "water sector utilities" includes drinking water utilities, wastewater utilities, stormwater utilities, combined utilities, and reuse utilities.

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Section 1. Effective Utility Management

Effective Utility Management: A Primer for Water Sector Utilities ("*Primer*") is the foundation of Effective Utility Management (EUM). It is designed to help water sector utility managers make informed decisions and practical, systematic changes to achieve excellence in utility performance in the face of everyday challenges and long-term needs for the utility and the community it serves. It was produced by utility leaders who are committed to helping all utilities improve their management. The *Primer* distills the expertise and experience of these water sector leaders into a framework intended to help utilities identify and address their most pressing needs through an incremental, continual improvement management approach.

EUM and the *Primer* are designed to be accessible and beneficial to all water sector utilities. All utilities have the capacity to incorporate EUM at the level and pace that works for them. Each utility has unique management opportunities and challenges, and EUM provides a commonsense way of assessing, managing, and measuring a utility's performance to address these opportunities and challenges. The steps described in the document and associated resources are relevant to any water utility, regardless of size, budget, or other capacity.[2]

EUM has three primary components and three implementation tools which, when taken together, form the basis for a complete cycle of effective and sustainable utility management:

EUM Components

- **The Ten Attributes of Effectively Managed Water Sector Utilities (Attributes).** These Attributes provide a clear set of reference points and are intended to help utilities maintain a balanced focus on all important operational areas rather than reactively moving from one problem to the next or focusing on the "problem of the day." See **Section 2** for a full discussion of the Ten Attributes.
- **Five Keys to Management Success (Keys).** These proven approaches help maximize resources and improve performance. By embedding the Five Keys to Management Success into organizational culture, utilities create a robust foundation for strong, ongoing performance in the Ten Attribute areas. See **Section 3** for full a discussion of the Five Keys.
- **Organizational Culture.** Organizational Culture is the embodiment of your organizational values, beliefs, and ethical behaviors that shape how utility employees interact within the organization and with their communities – it forms the basis of the identity of the organization and a sense of shared identity among its members. A healthy Organizational Culture supports on-going self-assessment, with resources like EUM enabling continuous improvement while positively influencing the Organizational Culture, management, and operations of the utility. See **Section 4** for a full discussion of Organizational Culture.

EUM Implementation Tools

- **Where to Begin – A Self-Assessment Tool**. The rigorous and systematic self-assessment tool described in the *Primer* helps utility managers and staff evaluate their operations and identify where to begin improvement

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[2] While EUM is specifically designed to meet all utilities where they are and the framework adapts to any utility regardless of size, there are also specific resources available for small and rural utilities. *Rural and Small Systems Guidebook to Sustainable Utility Management*. The *Guidebook* is a resource jointly developed by EPA and the United States Department of Agriculture (USDA), which adapts the Ten Attributes for use by small and rural systems. https://www.epa.gov/sustainable-water-infrastructure/rural-and-small-systems-guidebook-sustainable-water-and-wastewater.

efforts. By assessing how a utility performs relative to the Attributes, utility managers can gain a more balanced and comprehensive picture of their organization. See **Section 5** of this *Primer* and **Appendix B**.

- **Getting to Work – Implementation of Effective Utility Management.** The Implementation section is a central connecting point between multiple elements of EUM. It focuses on an overall continual improvement process (the "EUM Implementation Process") and describes how a utility's self-assessment results can lead to a cycle of planning, implementation of effective practices, measuring performance, and making adjustments over time. This implementation process can be undertaken as an EUM improvement plan, or in coordination with a strategic business planning cycle. See **Section 6** of this *Primer*.
- <u>**Moving Towards Sustainability: Sustainable and Effective Practices for Creating Your Water Utility Roadmap**</u> **(EUM Roadmap)**: This is a companion document to the *Primer* to assist utility leaders in implementing proven and effective practices organized according to three separate business levels using the EUM Attributes and Keys. If utilities choose to use this tool, it provides a cohesive structure to help them systematically address various challenges proactively and with confidence to create an individualized "roadmap."

Section 2. Ten Attributes of an Effectively Managed Utility

The Ten Attributes of an effectively managed utility provide useful and concise goals for utility managers seeking to improve organization-wide performance. The Attributes describe desired outcomes that are applicable to all water sector utilities. They comprise a comprehensive framework related to operations, infrastructure, customer satisfaction, community sustainability, natural resource stewardship, and financial performance.

Water sector utilities can use the Attributes to select priorities for improvement, based on each organization's strategic objectives and the needs of the community it serves. The Attributes are not presented in a prioritized order, but rather can be viewed as a set of opportunities for improving utility management and operations in all aspects of the utility. **Section 5** provides steps for a utility to assess and prioritize the Attributes for itself, **Section 6** has steps for identifying performance indicators and creating an improvement plan based on the assessment, and **Appendix C** has example performance measures for each Attribute.

Photo courtesy Phoenix Water

The Ten Attributes are: Community Sustainability, Customer Experience and Satisfaction, Enterprise Resiliency, Financial Viability, Infrastructure Strategy and Performance, Operational Optimization, Regulatory and Reliability Performance, Stakeholder Understanding and Support, Water Resources Sustainability, and Workforce Development.
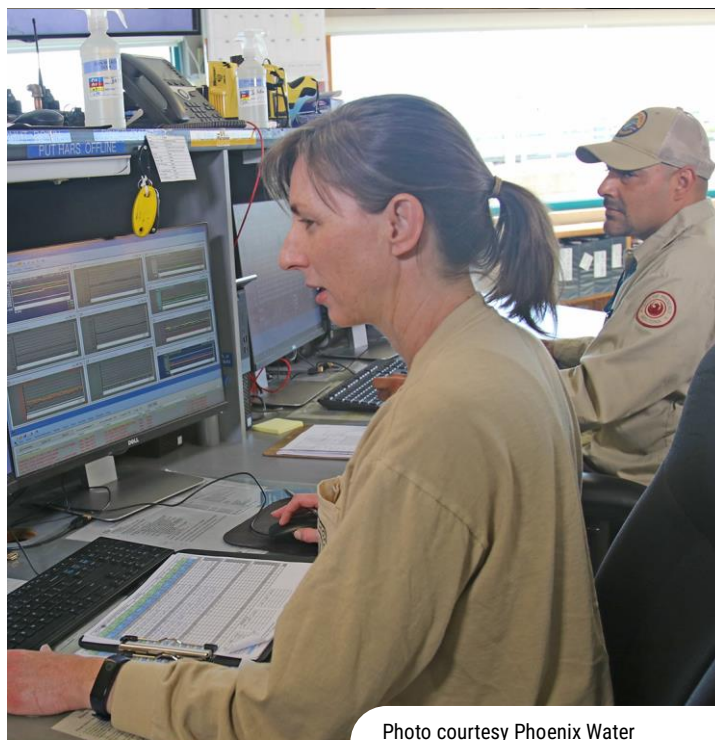
Community Sustainability

Takes an active leadership role in promoting and organizing community sustainability improvements through collaboration with local partners (e.g., transportation departments, other local water sector utilities, electrical utilities, planning departments, economic development organizations, watershed and source water protection groups). Manages operations, infrastructure, and investments to support the economic, environmental, and social health of its community. Integrates water resource management with community planning of infrastructure and social and economic development to support community-wide resilience, support for disadvantaged households, community sustainability, and livability. Identifies and implements programs such as community benefits and workforce development initiatives to strategically increase investments in the community to enable widespread economic inclusion.

Customer Experience and Satisfaction

Provides reliable and responsive services in line with explicit, customer-derived service levels. Utilizes a mix of evolving communication technologies to understand and respond to customer needs and expectations, encourages all utility personnel to be aware of and actively responsive to customer needs, feedback, and emergencies. Provides tailored customer service and outreach to residential, commercial, and industrial customers to enhance trust in the utility. Understands and exercises as appropriate the opportunities presented by new product lines and related customer groups (e.g., high strength waste producers, electric utilities).

Enterprise Resiliency

Manages risk to ensure enterprise continuity in collaboration with internal and external partners. Assesses potential impacts such as legal, regulatory, financial, social, environmental, safety, physical and cybersecurity, knowledge, talent loss, and natural disaster-related. Proactively identifies, evaluates, and establishes acceptable tolerance levels for risk, including interdependencies with other services and utilities, by understanding relevant trends and forecasts to anticipate potential hazards. Responds to, adapts, and recovers from service disruption by understanding relevant trends and forecasts to anticipate emergency events and hazards, and by creating and executing response plans in coordination with regional partners.
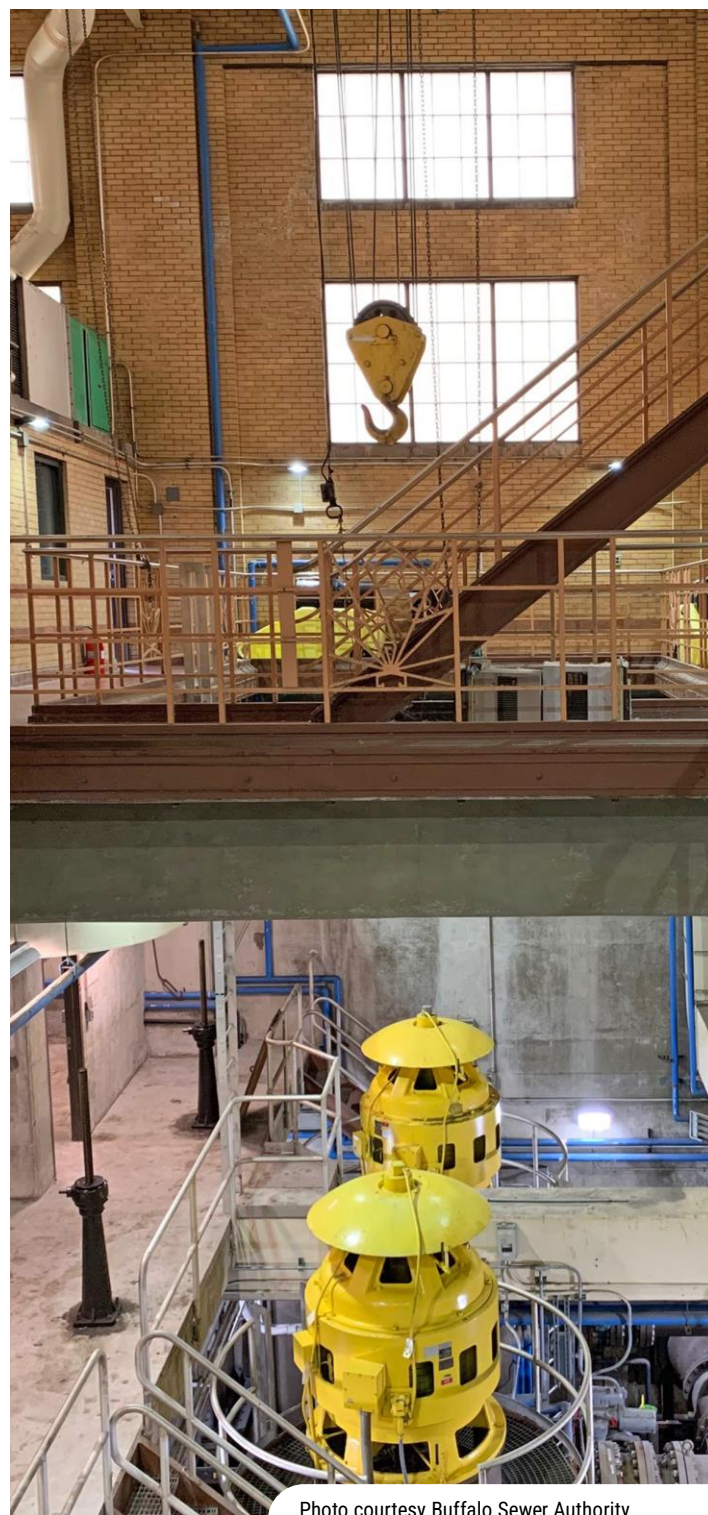

Photo courtesy Buffalo Sewer Authority

Financial Viability

Establishes predictable rates consistent with community expectations that consider full life-cycle cost of utility operations and value of water resources. Effectively balances long-term debt, capital, operations and maintenance expenditures with revenues and asset values. Adopts and implements financial practices that adequately recover costs, provide reserves, invest for future needs, maintains optimal bond ratings, and address cost of service and the needs of disadvantaged households. Implements a range of strategies for collecting customer payments while connecting customers with resources and assistance programs. Utilizes opportunities to diversify revenues and raise capital through new and innovative business and financing models.

Infrastructure Strategy and Performance

Understands the condition of and costs associated with critical infrastructure assets. Plans infrastructure investments to address environmental justice impacts and service equity, consistent with community needs, anticipated growth, and relevant community priorities, building in a robust set of adaptation and resilience strategies (e.g., for changing weather patterns, customer base). Maintains and enhances the condition of all assets over the long-term at the lowest possible life-cycle cost and acceptable risk consistent with customer, community, and regulator-supported service levels. Assures asset repair, rehabilitation, and replacement efforts are coordinated within the community to minimize disruptions and other negative consequences. Looks for innovative and cost-effective technologies to establish and maintain infrastructure resilience consistent with agreed upon service levels and available resources. Develops and implements an asset management plan aligned to a strategic business plan that is communicated, available, and visible to all stakeholders.

Operational Optimization

Continuously incorporates innovative solutions through ensuring ongoing, timely, cost-effective, reliable, and sustainable performance improvements in all facets of its operations in service to public health and environmental protection. Effectively utilizes technological approaches and tools to optimize data management and analysis. (See **Section 3** Keys to Management Success on Measurement and Continual Improvement). Maintains awareness of information and operational technology developments to anticipate and support timely adoption of improvements and ensure information technology and information system business alignment. Maintains attentiveness to supply chain vulnerabilities to ensure efficient and timely acquisition of critical parts and supplies.

Regulatory and Reliability Performance

Meets or exceeds regulatory requirements, provides reliable services/products within the utility's community. Service reliability ensures consistent and equitable outcomes for livable communities (municipal operations, institutional operations, industrial users, commercial users, residential users). Maintains consistency with customer, community, public health, safety, ecological, and economic priorities (applies to drinking water, wastewater, stormwater, and recovered resources).

Stakeholder Understanding and Support

Enables understanding and support from stakeholders (anyone who can affect or be affected by the utility including direct customers, oversight bodies, community and watershed interests, regulatory bodies, and consumers) for service levels, rate structures, operating budgets, capital improvement programs, and risk management decisions. Actively

promotes an appreciation of the true value of water and water services, and water's role in the social, economic, and environmental health of the community. Through community dialogue, considers the full spectrum of impacts at all stages of decision making to a diverse set of stakeholders to ensure the same level of service and quality to all communities served. Understands what it takes to operate as a "good neighbor," and positions the utility as a critical asset (anchor institution[3]) to the community.

Water Resource Sustainability

Ensures integrated and sustainable water resource management that considers all water of value. Understands the utility's role in the complete water cycle including fit for purpose water reuse options, ensuring attainment of designated uses and maintenance of surface water quality, and integrating utility objectives and activities with other watershed managers and partners. Analyzes the potential for water resource variability (e.g., changing weather patterns, including extreme events such as drought and flooding), and utilizes as appropriate a full range of watershed investment and engagement strategies to plan appropriately to meet community needs. Undertakes long-term integrated water resource planning, striving to equitably meet customer, community, and ecological water-related needs.

Workforce Development

Recruits, develops, retains, and inspires a workforce that is inclusive, competent, motivated, adaptive, and reflective of the community they serve. Builds community relationships that foster a diverse pipeline of potential employees. Maintains a participatory, collaborative organization dedicated to continual learning, technical proficiency, safety, and

Photo courtesy Gwinnett County Water Resources

innovation where employees recognize themselves as valuable team members that belong and actively contribute to achieving utility goals. Ensures institutional knowledge is retained, transferred, and improved upon over time through knowledge management policies. Emphasizes and invests in opportunities for professional and leadership development, taking into account the differing needs and expectations of a diverse, multi-generational workforce. Establishes a supportive, collaborative, and aligned senior leadership team.

Section 3. Keys to Management Success

The Keys to Management Success represent management approaches and systems that enable water sector utilities to manage more effectively. Operating within a continual improvement-based Organizational Culture, the Keys to Management Success create a supportive context for a utility as it works towards the outcomes outlined in the Attributes, and they can help integrate the utility's improvement efforts across the Attributes. Each Key is a rich topic that can be studied further and will evolve as it is implemented within each utility. The Five Keys to Management Success are: Continual Improvement Management, Knowledge Management, Leadership, Measurement, and Strategic Business Planning and Management. The main concepts for each Key are described below.

Continual Improvement Management

Continual Improvement Management is a large field of study. At a minimum, it is usually implemented through a complete, start-to-finish management system, also referred to as a "Plan-Do-Check-Act" framework. Continual improvement is the central component of healthy Organizational Culture. Implementation of the EUM Self-Assessment, adopting performance measures and working towards improvement on the Attributes, either through Strategic Business Planning or an EUM Attribute Improvement Plan, are all activities of Continual Improvement Management. Continual improvement timeframes can align with your strategic business planning timeframe for optimal implementation.

Continual Improvement Management includes:

- Conducting an honest and comprehensive self-assessment, informed through staff engagement, to identify management strengths, areas for improvement, priority needs, etc. (See **Section 5** for Self-Assessment).
- Establishing a regular periodic timeframe to hold sessions among interested parties (stakeholders) to identify improvement opportunities.
- Reporting your results and following up on improvement projects underway.
- Establishing and implementing performance measures and specific internal targets associated with those measures (See **Section 6** for full description of Measurement and **Appendix C** for example performance measures).
- Defining and implementing related operational requirements, practices, and procedures.
- Defining supporting roles and responsibilities to derive clear accountability for conducting assessments and implementing performance improvements.
- Implementing measurement activities such as regular evaluation through operational and procedural audits.
- Responding to evaluations using an explicit change management process.

Continual Improvement Management is further supported by gap analysis, establishment of standard operating procedures (SOPs), internal trend analysis and external benchmarking where appropriate, best practice review and adoption, and other continual improvement tools. It can be used as a framework to help utilities understand

improvement opportunities and establish explicit service levels, guide investment and operational decisions, form the basis for ongoing measurement, and provide the ability to communicate clearly with customers and key stakeholders.

A component of Continual Improvement Management is organizational change management. Organizational change management is a structured approach to implementing change within an organization ensuring that lasting benefits are achieved. It involves strategic planning, effective communication, training, leadership involvement, and continuous monitoring to achieve desired business outcomes. Without intentional organizational change management, change can be chaotic and disruptive, resulting in significant investment without optimized benefit. Monitoring the change process can identify issues early and allow them to be addressed before significant adverse impacts develop. The goal is to minimize disruption, increase organizational adoption, and maximize the benefits of the change.

Knowledge Management

Knowledge management is another cornerstone of EUM and is critical to ensuring reliable utility operations and fostering continuous improvement. It spans SOPs, workforce management, business systems, and operating systems data integration to support dependable operations and continual improvement across all Ten Attributes. In particular, the Workforce Development Attribute is strongly tied to this Key due to the succession planning, recruiting, training and onboarding plans that advance Knowledge Management goals. A utility is able to respond effectively to the inevitable knowledge loss brought on by employee turnover or unexpected absence by ensuring that processes are well documented, SOPs are regularly updated, and knowledge is shared among all employee categories (formal and

Photo courtesy Austin Water

informal knowledge). An effective knowledge management system is flexible to the use of new and evolving technologies and should be updated on an ongoing basis.

Knowledge Management Strategy:

- Starts with a knowledge management inventory, considering formal and informal knowledge to facilitate knowledge transfer (e.g., policies and procedures, institutional knowledge, business processes, onboarding information, and SOPs).
- Includes SOPs that provide step-by-step detail on how to perform defined functions.
- Validates existing knowledge to determine that high-quality knowledge is recorded and transferred.
- Requires a standardized system to be implemented throughout the organization.
- Treats knowledge as an asset to be managed, prioritizing efforts based on a risk profile that identifies processes that would result in the largest losses to operations if that knowledge were not maintained.
- Uses automated "smart" systems and data integration/management capabilities. These are an increasingly important aspect of efficient and effective continual improvement management. These systems and capabilities are available across all areas of utility management, and they can substantially improve the ability of utilities to track performance in real time, identify variability, and manage performance more effectively and precisely.

Leadership

Leadership is critical to overall success and must be present at every level of the organization. It is vital to EUM, particularly in the context of leading and inspiring purposeful change within an organization and in its surrounding community. Effective leadership embodies a commitment to cultivating a desired Organizational Culture, helping the establishment and adoption of methods to achieve the utility's vision, and ensuring all employees both understand and connect with their role in achieving this vision through the organization's day-to-day operations.

Leaders have an important responsibility to engage proactively with stakeholders and community decision makers; advocate for the utility as a valued, competent, and trustworthy environmental and public health steward and community asset; and collaborate with external

Photo courtesy Louisville MSD

partners (including new and nontraditional partners, like the agricultural sector). Leaders should drive an awareness and commitment to workplace safety, employee training and development, organizational diversity, ethical conduct, and positive morale. Leadership must further reflect a commitment to organizational excellence, leading by example to establish and reinforce an Organizational Culture that embraces positive change. Leadership that fosters a culture of

continual improvement will create a professional environment that can provide new opportunities for emerging leaders, address both near and long-term challenges, and plan for transition to new leadership.

Leadership includes:

- Supporting and modeling an Organizational Culture that inspires others to participate in developing, achieving, articulating, and embodying a shared set of values, a sense of purpose, and shared vision of the desired goals of the utility.
- Developing a culture that clearly connects the organizational values to performance objectives while supporting job functionality, employee coaching, and solidifying performance-based compensation parameters.
- Professionals who are highly interpersonally competent, as well as self-aware, and are prepared to use various approaches and communication techniques to engage and inspire others.
- Individuals who can be effective champions for improvement, and those who can work as a team to provide resilient day-to-day management continuity and direction.
- Making difficult decisions in the best interest of the organization after reviewing all aspects of the issue.

Measurement

Measurement is the basis for management improvement efforts associated with the Attributes and is the backbone of successful continual improvement management and strategic business planning. A measurement system serves many vital purposes, including focusing attention on key issues, clarifying expectations, facilitating decision making, supporting learning and improving, establishing and maintaining accountability, and, most importantly, communicating effectively internally and externally. A measurement system can also allow benchmarking relative to utility peers. Always keep in mind the management adage, "If you can't measure it, you can't improve it."

Successful Measurement:

- Utilizes performance measures that apply at strategic, tactical, and operational levels and advance decision making and focus the organization on its goals.
- Measures how well a utility delivers its primary services and internal support functions to internal and external customers.
- Views measurement as a continuum, starting with basic internal tracking and moving to more sophisticated baselining and trend analysis, as necessary, with the development of key performance indicators, and inclusion of externally oriented measures which address community sustainability interests.
- Is informed by staff input, clearly defined in terms of need for measurement, and is driven by and focused on answering questions critical to effective internal management and external stakeholder needs, including information needed to allow governing bodies to comfortably support large capital investments.
- Supports a continual improvement framework assuring results are evaluated, communicated, and addressed in a timely manner.

There is an expanded description of Measurement in *Primer* **Section 6** "Getting to Work: Implementation" that describes types of measurements and how to incorporate performance measures into your continuous improvement plans. Example performance measures for each of the Ten Attributes are provided in **Appendix C.**

Strategic Business Planning and Management

Strategic business planning directs and helps to achieve balance and cohesion across the Ten EUM Attributes. A strategic business plan, or simply a strategic plan, provides a framework for decision making by:

- Assessing current conditions and conducting an assessment of strengths and challenges;
- Characterizing a continuum of possible and likely future conditions;
- Assessing underlying causes and effects of future conditions; and
- Establishing the utility's vision, objectives, strategies, and underlying organizational values.

A successful strategic business plan is dynamic and adaptable, allowing the utility to capitalize on new and emerging opportunities and cultivates a sense of purpose throughout the organization. It is made more robust by engaging with staff and external stakeholders (including governing bodies), and by utilizing planning methods that

Photo courtesy Louisville MSD

can accommodate and address a variety of future operating scenarios (e.g., managing for uncertainty through "stress testing" a plan's ability to hold up during extreme events, such as extended drought).

A strong plan reflects specific implementation steps that will move a utility from its current level of performance to achieving its vision. Preparation of a strategic business plan involves taking a longer-term view of utility goals and operations and establishing a clear vision and mission.

A strategic plan, through engagement with external stakeholders, will:

- Reflect key community values, needs, and interests.
- Drive and guide utility objectives, measurement efforts, investments, and operations.
- Help explain the utility's conditions, goals, and plans to staff and stakeholders, stimulate change, and increase engagement and support for improvement efforts.

Strategic Management

Strategic Management is the ongoing accountability for making the strategic plan relevant and an active part of the organization's work. Active monitoring of performance under the plan engages employees in the process and provides accountability. Communicating the status of measurement indicators will keep staff updated and engaged with the strategic plan, helping all employees understand how their roles align to the utility's goals and objectives and see value in achieving goals and fulfilling the organization's mission and purpose. Additionally, Strategic Management will ensure that strategic planning drives and guides budgeting, utility objectives, measurement efforts, investments, and operations.

The EUM Framework can be incorporated by all utilities whether they are engaged in Strategic Planning or not. For more information on Strategic Planning, See **Section 6** of the *Primer* "Getting to Work: Implementation." For more information on implementing EUM with the Self-Assessment, see **Section 5** of the *Primer*. The Self-Assessment is a key element in assessing current conditions and identifying areas for improvement. The practices that will be incorporated to improve performance on an EUM Attribute, and the suggested performance measures for tracking progress can be incorporated into an existing strategic plan. If your utility is not currently engaged in strategic planning, an EUM Attribute Improvement Plan can serve the same purpose and can help the utility to start strategically working through a continuous cycle of assessment and improvement.

The Ten Attributes and Five Keys Work Together

The Attributes and Keys are the basis of the EUM Framework, a combination of desired outcomes and management strategies that are applicable to all water sector utilities. The Keys are cross-cutting and create a supportive context for the utility as it works towards each of the outcomes outlined in the Ten Attributes. The processes of self-evaluation and cycles of implementation of this Framework described in the rest of this *Primer* will lend a utility to develop a continual improvement based Organizational Culture. The below graphic shows how the Keys and Attributes work together to create EUM Framework.

The Ten Attributes to an Effectively Managed Utility and Five Keys to Management Success

Section 4. Organizational Culture

Organizational Culture in utility management is the embodiment of your organizational values, beliefs, and ethical behaviors that shape interactions within the organization and with the community. An effectively managed utility fosters a culture in which everyone is committed to continuous improvement of skills and services. It is about fostering an environment that encourages innovation, integrity, collaboration, flexibility in the workforce and workplace, sustainability, and customer-centric approaches in line with the utility's vision. Leadership must understand, reflect, and cultivate not only the explicitly stated values and norms preferred by the organization, but also the unspoken basic underlying assumptions of their culture. These include the unconscious, taken-for-granted beliefs, morale levels, and values that form the essence of their Organizational Culture. Employees are respected and supported by leadership, while also supporting leadership, leading to robust engagement at all levels.

One of the benefits of a healthy Organizational Culture can be enhancing the organization's ability to attract, retain, and develop a talented and diverse workforce. Effective culture assures staff and customers are valued throughout the organization and feel a strong a sense of belonging, with diversity and equity intentionally informing staffing, operational, and investment decisions. A people-centered culture focused on continuous improvement creates and maintains the connection between the utility's organizational values, performance objectives, employee coaching, and solidifying performance-based compensation parameters.

Photo courtesy Austin Water

A sustainable Organizational Culture enhances the work experience and is built on a foundation of trust and employee buy-in. Creating the right workplace culture supports and fosters the proper setting, programs, and tools for a sustainable workforce. Here are some strategies to consider for sustaining a thriving Organizational Culture:
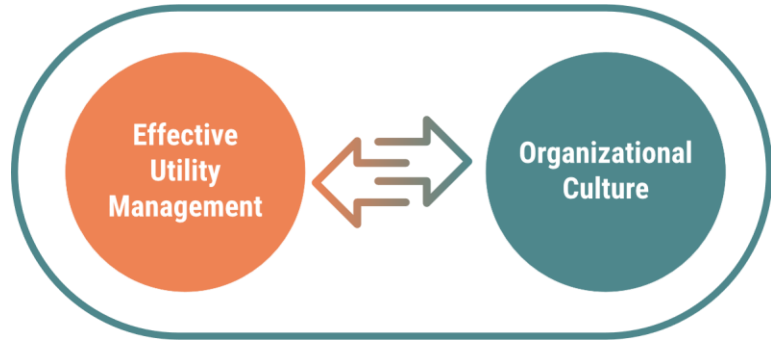
- **Consistent leadership behavior**. Leaders should consistently demonstrate the values and behaviors that reflect the organization's culture.
- **Transparent, trust-based communication.** Open and honest communication builds trust and strengthens relationships within the organization.
- **Regular feedback**. Encourage feedback at all levels – across peers, from subordinates to superiors, and vice versa. This promotes a culture of continuous learning and improvement.
- **Long-term strategic vision.** Align everyone in the organization with a shared vision, goals and objectives.
- **Employee involvement.** Actively seeking opportunities for employee engagement in decision-making increases commitment to the organization.
- **Appreciation, recognition and reward**. Regularly acknowledging achievement and efforts boosts morale and motivation.
- **Professional development**. Workforce and leadership development programs assure recruitment, retention, and continuously improving competency in support of vision.
- **Fostering a safe and inclusive environment**. Cultivating an environment where everyone feels safe and included promotes diversity and enhances collaboration.

There are a whole range of cultures that can generate successful outcomes. The goal is instilling a cycle of continuous assessment and improvement that works for your utility, based in the Ten Attributes and Five Keys. With this base knowledge in hand, working through the EUM Implementation Tools will influence and adapt your Organizational Culture towards a people-focused culture of continuous improvement.

A healthy culture facilitates the implementation of EUM and assists in identifying and overcoming obstacles to EUM success. Adapting your utility's culture should not itself be a hurdle to implementing EUM, because through the process of implementing EUM at your utility, the framework itself can instill an Organizational Culture of continuous improvement management.

Section 5. Where to Begin: A Self-Assessment Tool

There are many ways to successfully apply the EUM Framework for improving utility performance and each utility is unique. Some utilities may choose to start small and make improvements step by step, perhaps by working on a few key initiatives that will yield early successes. Other utilities may choose to take on several improvement initiatives simultaneously. Some may prefer to further enhance their strengths, while others will prefer to focus on improvement areas. Each utility should determine for itself the most important issue to address, based on its own strategic objectives, priorities, and the needs of the community it serves.

A thorough assessment of current performance based on the Attributes is a useful first step in identifying options for improvement. It also establishes a quantifiable baseline from which to measure progress. As conditions change, future reassessments will reveal new opportunities and new priorities.

The following Self-Assessment tool can help utility managers use the EUM Attributes to evaluate their utility's current performance against internal goals or specific needs and determine where to focus improvement efforts. While it can be completed initially by an individual manager, it is more effective when used as a vehicle for conversation and consensus building among the utility's management team and key staff. As appropriate, other stakeholders might be invited to participate in the assessment, including oversight bodies, community and watershed interests, and regulatory authorities.

A blank copy of the Self-Assessment worksheet is available in **Appendix B** that can be copied and shared among staff. It is recommended that multiple employees from your utility take the utility Self-Assessment when you start your EUM implementation process. Having a variety of voices representing all levels and divisions within your utility will provide a more holistic assessment of the status of your utility.

Photo courtesy Lehigh County Authority

The EUM Self-Assessment has four steps:

1) **Assess** current level of achievement for each Attribute.

2) **Rank** the importance of each Attribute for your utility.

3) **Chart** the results.

4) **Choose** one or more high-priority Attributes to focus on.

Following completion of the Self-Assessment, a guide for taking action on the results is included in the next section, "Getting to Work: Implementation of Effective Utility Management." Here is an explanation of each step.
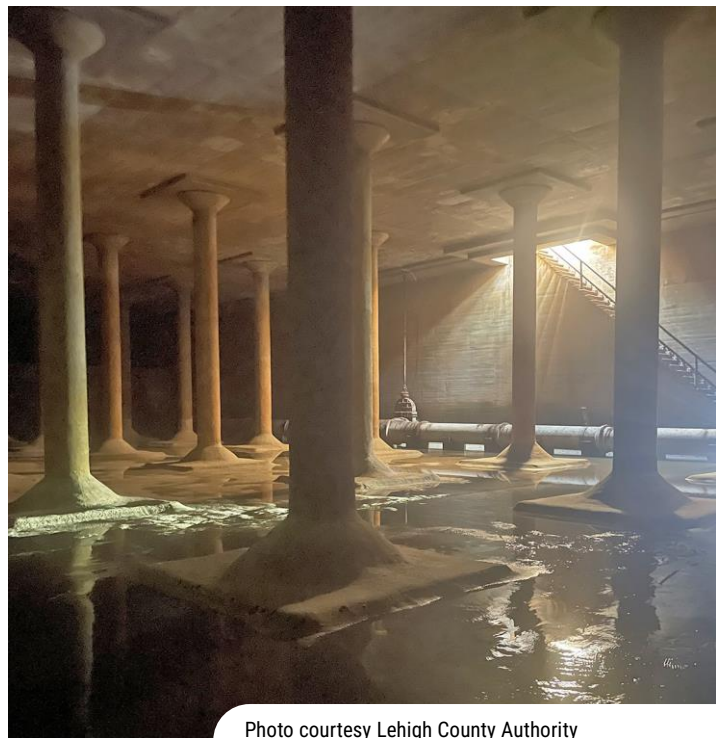
Step 1: Assess Current Level of Achievement

Using the blank worksheet in **Appendix B**, assess current conditions by rating your utility's systems and approaches and <u>current level of achievement</u> for each Attribute, using a 1 (high achievement) to 5 (low achievement) scale. Consider the degree to which your current management systems effectively support each of the Attributes and their component parts. Consider all components of each Attribute and gauge your rating accordingly. Use these descriptions to guide your rating. You will note that each Attribute has several components represented by the bullet points listed for each.

Your rating can either reflect the lowest level of achievement of all of the bullet points for that Attribute (for example, if you believe that your achievement in one of the bullet points for that Attribute was "5," but another bullet point you rated as "2," your rating for achievement under that Attribute would be "5"), or an average across all of the bullet points for that Attribute. Whichever approach you choose to use when rating, make sure to be consistent in this approach across all Attributes.

Rating	Description
1.	Effective, systematic approach and implementation; consistently achieve goals.
2.	Workable systems in place; mostly achieve goals.
3.	Partial systems in place with moderate achievement but could improve.
4.	Occasionally address this when specific need arises.
5.	No system for addressing this.

Step 2: Rank Importance of Attributes

Rank the importance of each Attribute to your utility, based on your utility's vision, goals, and specific needs. The ranking should reflect the interests and considerations of all stakeholders (managers, staff, customers, regulators, elected officials, community and watershed interests, and others).

Of the Ten Attributes, consider long-term importance to your utility, and rank the most important Attribute 1, the second most important 2, and so on. The least important Attribute would be ranked 10. Your ranking of each Attribute's importance may be influenced by current or expected challenges in that particular area, recent accomplishments in addressing these issues, or other factors. Importance ranking is likely to change over time as internal and external conditions change.

As you fill in numbers on the worksheet in **Appendix B**, please note that your analysis for Step 1 (rating achievement) should be separate and independent from your analysis for Step 2 (ranking importance).

Step 3: Chart Results

Graph each Attribute based on your rating and ranking. For example, if you rated Regulatory and Reliability Performance (RR) 4 for achievement and ranked it 3 for importance, you would place it on the graph as illustrated below. Similarly, if you rated Customer Experience & Satisfaction (CS) 3 for achievement and ranked it 5 for importance, you would place it on the graph as illustrated below. A blank graph is provided in **Appendix B**.

Step 4: Determine High-Priority EUM Attributes

The goal of EUM is to establish high-achieving systems and approaches for each Attribute. Ultimately, utilities should strive to improve performance for all Attributes until each can be charted in the lower half of the table (high achieving). Utility managers may wish to focus on one or a few Attributes at a time, aiming to eventually ensure that all Attributes have been addressed and improved upon over time.

Examining the results of the charting exercise in Step 3 can help identify Attributes for focused attention. Attributes that graph into the dark orange shaded quadrant are both very important (ranked 1-4), and have low achievement (rated 4-5), and would typically be selected as the highest priority Attribute areas for moving forward with improvement actions. Attributes that graph into the light orange shaded area indicate medium importance, and a moderate level of current achievement; these would typically be selected as additional strong candidates for improvement efforts.

Attributes that fall in the lower left-hand quadrant are both important and high-achieving areas for the utility. Some utilities may choose to focus on these areas to continue further improving upon important and high-achieving areas, due to their long-term importance (e.g., Water Resource Sustainability). Specifically examining these areas may also help a utility identify success factors which would be helpful in addressing areas needing improvement. Others may choose to focus on Attributes that would lead to early successes to build confidence in effecting change, Attributes that maximize benefit relative to the utility's key goals, or Attributes that minimize risks. The choice to embark on improvements in one or more areas is up to the judgment of utility managers, and may also involve consideration of resources (staff and financial), leadership support, and other competing activities.

Section 6. Getting to Work: Implementation of Effective Utility Management

This section focuses on the specific steps that utilities are encouraged to go through to implement EUM. This section includes a description of each element of the steps of the EUM Implementation Process and explains how utilities can take the results of their Self-Assessment, identify and implement effective practices, measure progress in priority Attribute areas, and do this through an EUM Attribute Improvement Plan.

The EUM Self-Assessment serves as a comprehensive starting point for utilities, and the steps of the EUM Implementation Process reflect how a utility's Self-Assessment results can build into a continual improvement management process. Utilities can implement EUM in a variety of ways. It can be integrated into processes already in place as a part of the utility's operations and management and/or incorporated into a long-term planning process. Depending on a utility's maturity with strategic business planning, the results of the Self-Assessment could be incorporated into strategic business planning, or a specific Attribute-based improvement plan can be created until strategic business planning is initiated or further developed. A short guide for creating an EUM Improvement Plan based on the Self-Assessment results follows at the end of this section.

Beginning with the Self-Assessment exercise in **Section 5**, the EUM implementation process is a self-reinforcing progression of assessment, planning, implementation, measurement, and adjusting over time. One of the main goals of the EUM Implementation Process is to influence and adapt your utility's Organizational Culture towards a people-focused culture of continuous improvement. Each step of the implementation process is described below.

THE ROLE OF THE FIVE KEYS TO MANAGEMENT SUCCESS IN IMPLEMENTATION

Applying the Keys to Management Success is very important for moving each Attribute over time to the "high-achievement" quadrants. Continual Improvement is a Key that operates throughout and supports the entire EUM Implementation Process. The water sector is a rapidly evolving world, and utilities must stay abreast of new technologies, changes in the workforce, transforming customer needs, and much more. To adapt to these shifts, an effective utility must continually assess its performance and priorities, update its strategic plan, and make adjustments where necessary.

Two other Keys are reflected directly in the EUM implementation process: Strategic Business Planning and Management and Measurement. These Keys are explained in greater detail later in this section. The two remaining Keys are also important to supporting all aspects of EUM implementation: Leadership and Knowledge Management.

- Leadership can exist at any level of a utility's organizational structure and is vital to active participation in an EUM culture.
- Knowledge Management supports the critical information and operating needs of each step of the cycle of EUM.

All five of the Keys to Management Success are integral to EUM, and they work in tandem with the Ten Attributes to support successful utilities.

Steps of the EUM Implementation Process

    A.   EUM Self-Assessment
    B.   Creating an EUM Attribute Improvement Plan
    C.   Implementation of Effective Practices
   D.   Measurement
    E.   Reflect and Adjust

Step A: EUM Self-Assessment: See **Section 5**

Step B: Creating an EUM Attribute Improvement Plan

Following completion of the Self-Assessment, utilities will now have a holistic picture of their current performance and priorities for the future relative to the Ten Attributes. EUM Attribute Improvement Plans support the implementation of effective practices in your chosen Attribute area(s). Below are areas to consider in the development of your Attribute Improvement Plans:

- **Identify Effective Practices**
  - o   Each Attribute area for improvement will be supported by effective practices implemented by the utility. See the "**EUM Roadmap**" for ideas on effective practices.
- **Set Near- and Long-term Goals**
  - o   Set goals as part of the Improvement Plan to help define what is being worked toward. Near- and long-term goals for the utility should be linked to their strategic, asset management, and financial plans. Goals should also be "SMART."
    - ▪   **S – Specific:** *What exactly will be achieved?*
    - ▪   **M – Measurable:** *Can you measure whether you are achieving the objective?*
    - ▪   **A – Assignable:** *Can you specify who will be responsible for each segment of the objective?*
    - ▪   **R – Realistic:** *Do you have the capacity, funding, and other resources available?*
    - ▪   **T – Time-Based:** *What is the timeframe for achieving the objective?*
- **Identify Resources Available and Resources Needed**
  - o   For each practice/activity to be implemented as part of the Improvement Plan, identify resources (financial, informational, staff, or other) that exist on-hand, and those that are needed, to support implementation.
- **Identify Challenges**
  - o   For the overall Improvement Plan and for specific practices/activities to be implemented, identify key challenges that will need to be addressed.
- **Assign Roles and Responsibilities**
  - o   For each improvement action, identify roles and responsibilities for bringing the implementation to completion. This could be an opportunity to identify future utility leaders who can champion the Improvement Plan.
- **Define a Timeline**
  - o   Establish start date, milestones, and a completion target for each activity/improvement action.
- **Establish Measures**
  - o   Establish at least one (or more) measure of performance for actions to be implemented under the Improvement Plan.

EUM Materials to Support the Development of your Attribute Improvement Plans
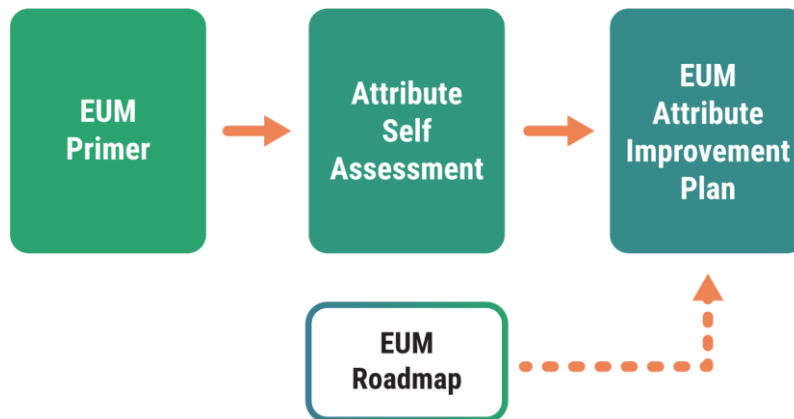
Strategic Business Planning and Management

The results of the Self-Assessment can also be used to inform the utility's existing strategic business planning process if the utility is already using that planning approach. Strategic business planning provides a framework for decision making and planning for the future. A strategic business plan could include, or be complemented by, an asset management plan and a financial plan for the utility. For utilities that don't have an existing strategic business planning process, the EUM Attribute Improvement Plans can act as the basis for the development of a strategic business plan. Additional resources on strategic business planning can be found in **Section 7.**

Step C: Implementation of Effective Practices

After the utility has determined its priority Attribute areas for improvement and has established an Attribute Improvement Plan, it is time to identify and implement effective practices linked to the Attributes in support of these objectives. Effective practices can also be identified in many ways: through learning activities (e.g., conferences, training events, webinars), through interactions and benchmarking activities with other utilities, and through resources created specifically to guide utilities in this area. A resource to help utilities link the Attributes to specific practices is the ***Moving Toward Sustainability: Sustainable and Effective Practices for Creating Your Water Sector Roadmap*, ("EUM Roadmap")** this document is a companion to the *Primer* and was developed by EPA with extensive input from water sector leaders. Additional resources can be found in **Section 7**.

Step D: Measurement

To gauge performance and progress on the utility's strategic plan and practice implementation, the next step in the cycle is to establish performance measures relative to key activities. The adage of "you can't improve what you don't measure" applies here. Measurement is a key focus of this *Primer*, with approaches and example measures that utilities can implement addressed in greater depth later in this section and in **Appendix C,** and additional resources like the AWWA Benchmarking Survey (see **Section 7**).

Approaching Measurement

There are two general approaches to performance measurement: internal and external benchmarking. This *Primer* focuses on internal performance measurement. Internal performance measurement focuses on evaluating current internal utility performance status and trends. A robust measurement system will be built around a combination of leading, lagging, and coincidental performance indicators.

- **Leading indicators** provide an indication of the future state of a performance parameter of keen interest to the utility, for example, an increase in near misses relative to safety violations can foretell of an increased risk of workplace injuries. Leading indicators provide a utility with the diagnostic ability to proactively manage for its desired performance outcomes. *Leading indicators drive preventative actions.*
- **Lagging indicators** typically reflect a performance parameter of keen interest to a utility (such as compliance rate or water quality conditions) while at the same time providing performance information that can only be reacted to, making it sometimes challenging to proactively adjust operations before performance moves into an unacceptable range. These indicators, however, are critical to an overall measurement system as they typically focus on key performance outcomes that the utility, by necessity, must document (e.g., compliance with permit limits). *Lagging indicators drive immediate, corrective actions that could have been prevented by using leading and coincidental indicators.*
- **Coincidental indicators** are a form of leading indicator that draws on the behavior of two or more parameters to signal the future state of a key performance parameter (such as the effect of phosphorus discharge concentration on future nitrogen discharge concentration). These indicators are important to both proactive management of key performance outcomes, but also to conducting root cause analysis when key performance outcomes vary outside of desirable ranges. *Coincidental indicators drive proactive process control actions.*

Photo courtesy Louisville MSD

Benchmarking is the overt comparison of similar measures or processes across organizations to identify best practices, set improvement targets, and measure progress within or sometimes across sectors. A utility may decide to engage in benchmarking for its own internal purposes or in a coordinated fashion with others.

While performance measures should be tailored to the specific needs of your utility, the following guidelines can help you identify useful measures and apply them effectively.

- Select measures that support the organization's strategic objectives, mission, and vision, as well as the Ten Attributes.
- Select the right number, level, and type of measures for your organization. Consider how measures can be integrated as a cohesive group (e.g., start with a small set of measures across broad categories and increase number and specificity over time as needed), and consider measures that can be used by different audiences within the organization.
- Measuring performance will not necessarily require additional staff but will require resources. Allocate adequate resources to get the effort off to a good start, and fine tune over time to balance the level of measurement effort with the benefit to the organization.
- Develop clear, consistent definitions for each measure. Identify who is responsible for collecting the data, and how the data will be tracked and reported.
- Engage the organization at all levels in developing, tracking, and reporting measures, but also assign someone in the organization the role of championing and coordinating the effort.
- Set targets rationally, based on criteria such as customer expectations, improvement over previous years, industry performance, or other appropriate comparisons. Tie targets to improving performance in the Attributes.
- Select and use measures in a positive way to improve decision making, clarify expectations, and focus attention, not just to monitor, report, and control.
- When selecting measures, consider how they relate to one another. Look for cause-and-effect relationships; for example, how improvements in product quality could result in increased customer satisfaction.

Develop an effective process to evaluate and respond to results. Identify how, when, and to whom you will communicate results.

Incorporate the "Plan-Do-Check-Act" cycle approach into evaluating both the specific measures and the system as a whole. Regularly review the performance measurement system for opportunities to improve.

Attribute-Related Measures

Appendix C provides examples of targeted, Attribute-related measures. Each example measure includes an explanation and example calculations. Taken as a whole, the measures provide a utility with a cohesive, approachable, and generally applicable starting place for gauging progress relative to the Ten Attributes.

The measures presented are both quantitative and qualitative. Most are quantitative, focus on outcomes typically of interest to utility managers (e.g., compliance rate), and include generally applicable example calculations. The qualitative measures encourage active assessment of the practices in place to support effective management in each Attribute area. These are mostly "activity measures" and typically have a "yes/no" format. Like the Attributes themselves, certain measures focus on core utility operations. Several measures reflect emerging utility issues, challenges, or opportunities that have received increasing attention from a growing number of utility managers. Other measures may reflect broader interests that are worthy of consideration from a broader community perspective.

You can choose and tailor the measures to your own needs and unique, local circumstances. They are intended for your own internal use, even as certain measures (e.g., those noted as "Benchmarking Performance Indicator") can support external benchmarking purposes. In these cases, the measures have been selected because they are relevant to the Attributes, have been tested and are in use by utilities, are supported by reference information useful for implementation, and generally can act as a good starting point for Attribute-related progress assessment.

Step E. Reflect and Adjust

Finally, at regular intervals, the utility should reflect on its progress toward the goals set forth in its strategic plan and its Attribute Improvement Plans, and determine if adjustments in course are needed, accounting for any changes in the utility's operating context. Regular reflection on your EUM implementation and strategic planning will influence your Organizational Culture towards a people-focused culture of continuous improvement.

Section 7: Resources and Organizations

EUM is designed as a broad framework to complement and enhance other prominent utility management initiatives and utility resources currently in use. In addition to this EUM *Primer*, a wide range of resources exist across the water sector to support each step of the EUM implementation process. The resources listed below are examples of materials that can support each step of the EUM implementation.

Resources

Moving Toward Sustainability: Sustainable and Effective Practices for Creating Your Water Utility Roadmap (U.S. EPA). A companion to the EUM *Primer*, the "Roadmap" contains effective practices organized according to three separate business levels of implementing EUM.

Rural and Small Systems Guidebook to Sustainable Utility Management (U.S. EPA & USDA). Small and rural utilities seeking to implement EUM are served by a variety of resources specifically designed for them, including the Rural and Small Systems Guidebook to Sustainable Utility Management. The Guidebook is a resource jointly developed by EPA and the United States Department of Agriculture (USDA), which adapts the Ten Attributes for use by small and rural systems.

The Water Resources Utility of the Future: A Blueprint for Action (National Association of Clean Water Agencies, Water Environment & Reuse Foundation, and Water Environment Federation). The Utility of the Future Today Recognition Program seeks to reach deeply into the water sector to form and motivate a community of like-minded water utilities engaged in advancing resource efficiency and recovery, developing proactive relationships with stakeholders, and establishing resilient, sustainable, and livable communities.

The EUM Resource Toolbox (U.S. EPA). A set of tools that are organized according to the Ten Attributes of Effectively Managed Water Sector Utilities and Five Keys to Management Success, providing a set of resources relevant to each Attribute and Key as well as information on where to find these resources.

EUM Case Examples (U.S. EPA). EPA developed a compendium of Case Examples to inform utilities about how their peer water service providers have integrated EUM into their day-to-day operations and future planning initiatives.

Benchmarking Performance Indicators for Water and Wastewater (American Water Works Association). Provides objective performance measures for utility leaders to track their organizational performance. Benchmarking utility performance indicators are an essential element of continuous improvement, allowing utilities to track their own performance, compare their results to peers, and identify areas that could be strengthened or improved.

Performance Benchmarking for Effectively Managed Water Utilities (Water Research Foundation). Identifies best practices and metrics used by water utilities to support each of the Ten Attributes of Effectively Managed Water Utilities. It contains a framework and methodology for utilities to evaluate the Attributes and an Excel-based tool that they can use to conduct a self-assessment for internal performance benchmarking.

Planning for Sustainability: A Handbook for Water and Wastewater Utilities (U.S. EPA). Handbook describing steps utilities can undertake to enhance their planning processes to ensure that water infrastructure investments are cost-effective over their life-cycle, resource efficient, and support other relevant community goals.

Making the Right Choices for Your Utility: Using Community Priorities and Sustainability Criteria for Water Infrastructure Decision-Making (U.S. EPA). Building from EPA's Planning for Sustainability Handbook, this guide provides an alternatives evaluation framework to value triple-bottom line criteria (environmental, economic and social) in the actual comparison of infrastructure alternatives.

Resource Guide to Effective Utility Management and Lean: Improving Performance and Addressing Key Management Priorities at Water-Sector Utilities (U.S. EPA). Provides information and case studies to help utilities use Lean techniques and tools to achieve the outcomes associated with the EUM attributes.

The Partnership for Clean Water (American Water Works Association). A global optimization and recognition program for wastewater utilities and was established as a parallel program to the Partnership for Safe Water. The Partnership offers self-assessment and optimization programs so that operators, managers, and administrators have the tools to improve performance above and beyond even proposed regulatory levels.

The Partnership for Safe Water (American Water Works Association). An unprecedented alliance of six prestigious drinking water organizations with the mission to improve the quality of water delivered to customers by optimizing water system operations. The Partnership offers self-assessment and optimization programs so that operators, managers and administrators have the tools to improve performance above and beyond even proposed regulatory levels.

ANSI-Accredited Standards of Minimum Requirements (American Water Works Association). Resources related to all areas of water treatment and supply, from source to storage, from treatment to distribution reflecting the state of the industry as new technologies emerge, new standards are developed.

EPA's Cybersecurity Assessments and Technical Assistance (U.S. EPA). EPA's Cybersecurity Evaluation Program conducts virtual cybersecurity assessments for drinking water and wastewater utilities where utilities work with a cybersecurity professional virtually to complete an assessment using the Water Cybersecurity Assessment Tool (WCAT). Utilities can use the WCAT to self-assess their cybersecurity practices, which utilizes EPA's Cybersecurity Checklist that contains basic cybersecurity controls needed to build a strong cybersecurity program. EPA offers direct technical assistance through the Cybersecurity Technical Assistance Program for the Water Sector where utilities can submit cybersecurity questions and receive remote assistance from a cybersecurity subject-matter expert.

Business Continuity Planning for Water Utilities: Guidance Document (American Water Works Association, The Water Research Foundation, and U.S. EPA). Guidance Document for Business Continuity Planning (BCP) designed to

be used with the corresponding BCP template to assist users in the development of a BCP for a water sector utility. Business Continuity Planning's end goal is maintating solid operations – financially, managerially, and functionally after any incdient. To further enhance an understanding of the BCP process, a series of video training modules was developed to accompany the BCP guidance document and template.

International Standards Organization (ISO) (International Organization for Standardization). The International Organization for Standardization is an independent, non-governmental international organization with a membership of 170 national standards bodies that has developed a variety of standards for water utility management, water quality and cybersecurity. Relevant ISO Standards include: ISO 24540, ISO 24518, ISO 24512, and more.

Organizations

This *Primer* was developed through a collaborative partnership with the following groups. More information about this partnership and additional resources can be found on their websites, or by contacting organizational staff.

- Association of Clean Water Administrators: www.acwa-us.org
- Association of State Drinking Water Administrators: www.asdwa.org
- American Water Works Association: www.awwa.org
- Association of Metropolitan Water Agencies: www.amwa.net
- National Association of Clean Water Agencies: www.nacwa.org
- U.S. Environmental Protection Agency: www.epa.gov/sustainable-water-infrastructure
- Water Environment Federation: www.wef.org
- Water Research Foundation: www.waterrf.org

Photo courtesy Lehigh County Authority

Appendix A. Definitions

Attribute: A basic building block of effective utility management for water sector utilities. Attributes describe characteristics or outcomes of a utility that indicate effective performance.

Benchmarking: The comparison of similar processes or measures across or within organizations and/or sectors to identify best practices, set improvement targets, and measure progress.

Continual Improvement: A systematic approach that supports ongoing efforts to improve products, services, or processes, through incremental steps over time or through "breakthrough" advances all at once.

Effective Utility Management: A comprehensive water sector utility performance assessment and management framework, endorsed by the U.S. Environmental Protection Agency and ten national water sector associations dedicated to improving products and services, increasing community support for water services, and ensuring a strong and viable utility into the future.

Gap analysis: Defining the present state of an enterprise's operations, the desired or "target" state, and the gap between them.

Knowledge Management: The multi-disciplinary process of creating, sharing, using, managing, and preserving the knowledge and information of an organization.

Life-cycle cost: The total of all internal and external costs associated with a product, process, activity, or asset throughout its entire life cycle – from raw materials acquisition to manufacture/construction/installation, operation and maintenance, recycling, and final disposal.

Performance measurement: Evaluation of current status and trends; can also include comparison of outcomes or outputs relative to goals, objectives, baselines, targets, standards, other organizations' performance or processes (typically called benchmarking), etc.

Operations and maintenance expenditure: Expenses used for day-to-day operation and maintenance of a facility.

Operating revenue: Revenue realized from the day-to-day operations of a utility.

Optimization: The process of ensuring operations are performing as efficiently and effectively as possible. Typically, the goal is to minimize current costs and maximize operational capabilities. The aim is to produce the greatest amount of output, at the highest possible quality, for the lowest amount of input resources, including time and labor. Process optimization usually includes eliminating unnecessary steps and automating as much as possible.

Performance measure: A particular value or characteristic designated to measure input, output, outcome, efficiency, or effectiveness.

Source water protection: Efforts to prevent water quality degradation in streams, rivers, lakes, or underground aquifers used as public drinking water supplies.

Standard operating procedure: A prescribed set of actions to be followed routinely; a set of instructions having the force of a directive, covering those features of operations that lend themselves to a definite or standardized procedure without loss of effectiveness.

Strategic plan: An organization's process of defining its goals and strategy for achieving those goals. This often entails identifying an organization's vision, goals, objectives, and targets over a multi-year period of time, as well as setting priorities and making decisions on allocating resources, including capital and people, to pursue the identified strategy.

Stewardship: The careful and responsible management of something entrusted to a designated person or entity's care; the responsibility to utilize its resources properly, including its people, property, and financial and natural assets.

Sustainability: The use of natural, community, and utility resources in a manner that satisfies current needs without compromising future needs or options.

Watershed health: The ability of ecosystems to provide the functions needed by plants, wildlife, and humans, including the quality and quantity of land and aquatic resources.

Photo courtesy Phoenix Water

Appendix B. Self-Assessment

Applying the description and instructions in **Section 5** of the *Primer*, use this Self-Assessment to being choose your high priority EUM Attributes and begin EUM Implementation.

> **Step 1: Assess Current Level of Achievement**
>
> **Step 2: Rank Importance of EUM Attributes**
>
> **Step 3: Chart Results**
>
> **Step 4: Determine High-Priority EUM Attributes**

Step 1: Assess Current Level of Achievement

Assess current conditions by rating your utility's systems and approaches and *current level of achievement* for each Attribute, using a 1 (high achievement) to 5 (low achievement) scale. Consider the degree to which your current management systems effectively support each of the Attributes and their component parts. Consider all components of each Attribute and gauge your rating accordingly. Use these descriptions to guide your rating. You will note that each Attribute has several components represented by the bullet points listed for each.

Your rating can either reflect the lowest level of achievement of all of the bullet points for that Attribute (for example, if you believe that your achievement in one of the bullet points for that Attribute was "5," but another bullet point you rated as "2," your rating for achievement under that Attribute would be "5"), or an average across all of the bullet points for that Attribute. For whatever approach you choose to use when rating, make sure to be consistent in this approach across all Attributes. Mark your answers in the Step 1 column of the table on the next page.

Rating	Description
1.	Effective, systematic approach and implementation; consistently achieve goals.
2.	Workable systems in place; mostly achieve goals.
3.	Partial systems in place with moderate achievement but could improve.
4.	Occasionally address this when specific need arises.
5.	No system for addressing this.

Step 2: Rank Importance of EUM Attributes

Rank the importance of each Attribute to your utility, based on your utility's vision, goals, and specific needs. The ranking should reflect the interests and considerations of all stakeholders (managers, staff, customers, regulators, elected officials, community and watershed interests, and others). Of the Ten Attributes, consider long-term importance to your utility, and rank the most important Attribute 1, the second most important 2, and so on. The least important Attribute would be ranked 10. Your ranking of each Attribute's importance may be influenced by current or expected challenges in that particular area, recent accomplishments in addressing these issues, or other factors. Importance ranking is likely to change over time as internal and external conditions change.

Mark your answers in the Step 2 column of the table on the next page. *As you fill in numbers, please note that your analysis for Step 1 (rating achievement) should be separate and independent from your analysis for Step 2 (ranking importance).*

Attribute	Attribute Components	Step 1: Rate Achievement (1-5)	Step 2: Rank Importance (1-10)
Community Sustainability (SU)	• Actively leads in promoting and organizing community sustainability improvements through collaboration with local partners. • Uses operations to enhance natural environment. • Efficiently uses water and energy resources, promotes economic vitality, and engenders overall community improvement. • Maintains and enhances ecological and community sustainability including pollution prevention, watershed and source water protection. • Identifies and implements programs such as community benefits and workforce development initiatives to increase investments in people and the community for improved economic inclusion.		
Customer Experience and Satisfaction (CS)	• Provides reliable and responsive services. • Receives timely customer feedback. • Encourages all utility personnel to be aware of and responsive to customer needs and emergencies. • Provides tailored customer service and outreach to a range of customer groups (e.g., residential, commercial, industrial, and newly emerging groups such as high-strength waste producers or power companies).		
Enterprise Resiliency (ER)	• Manages risk to ensure enterprise continuity in collaboration with internal and external partners. • Identifies, evaluates, and establishes tolerance levels and effectively manages risks (including legal, regulatory, financial, social, environmental, safety, physical and cybersecurity, knowledge, talent loss, and natural disaster-related). • Understands relevant trends and forecasts to anticipate, respond to, adapt, and recover from disruption.		

Attribute	Attribute Components	Step 1: Rate Achievement (1-5)	Step 2: Rank Importance (1-10)
Financial Viability (FV)	• Establishes predictable and equitable rates consistent with community expectations that consider full life-cycle cost of utility operations and value of water resources. • Effectively balances long-term debt, capital, operations and maintenance expenditures with revenues and asset values. • Adequately recovers costs, provide reserves, invest for future needs, maintain optimal bond ratings, and address cost of service and the needs of disadvantaged households. • Understands opportunities for diversifying revenue and raising capital through adoption of new and innovative business and financing models.		
Infrastructure Strategy and Performance (IS)	• Understands the condition of and costs associated with critical infrastructure assets. • Maintains and enhances assets over the long-term at the lowest possible life-cycle cost and acceptable risk. • Coordinates repair efforts within the community to minimize disruptions. • Plans infrastructure investments consistent with community needs, anticipated growth, system reliability goals, and with a robust set of adaptation strategies. • Integrates service equity and environmental justice in the capital project planning process. • Develops and implements a strategic asset management plan that aligns to strategic business plan that is communicated, available, and visible to all stakeholders.		

Attribute	Attribute Components	Step 1: Rate Achievement (1-5)	Step 2: Rank Importance (1-10)
Operational Optimization (OO)	• Conducts ongoing performance improvements informed by performance and benchmarking monitoring. • Effectively utilizes technological approaches and tools to optimize data and resource management. • Continuously incorporates innovative solutions through ensuring ongoing, timely, cost-effective, reliable, and sustainable performance improvements in all facets of utility operations.		
Regulatory and Reliability Performance (RR)	• Meets or exceeds regulatory and reliability requirements. • Ensures consistent and equitable outcomes for livable communities (municipal operations, institutional operations, industrial users, commercial users, residential end users). • Maintains consistency with customer, community, public health, safety, ecological, and economic priorities (applies to drinking water, wastewater, stormwater, and recovered resources).		
Stakeholder Understanding and Support (SS)	• Enables understanding and support from stakeholders (anyone who can affect or be affected by the utility including direct customers, oversight bodies, community and watershed interests, regulatory bodies, and consumers) for service levels, rate structures, operating budgets, capital improvement programs, and risk management decisions. • Actively considers the full spectrum of impacts at all stages of decision making to a diverse set of stakeholders to ensure the same level of service and quality to all communities served. • Actively promotes an appreciation of the true value of water and water services, and water's role in the social, economic, public, and environmental health of the community.		

Attribute	Attribute Components	Step 1: Rate Achievement (1-5)	Step 2: Rank Importance (1-10)
Water Resource Sustainability (WS)	• Understands the utility's role in the complete water cycle including fit for purpose water reuse options, ensuring attainment of designated uses and maintenance of surface water quality, and integrating utility objectives and activities with other watershed managers and partners. • Manages operations to provide for long-term aquifer and surface water sustainability and replenishment. • Understands and plans for future water resource variability (e.g., changing weather patterns, including extreme events, such as drought and flooding). • Undertakes long-term integrated water resource planning, striving to equitably meet customer, community, and ecological water-related needs.		
Workforce Development (WD)	• Recruits, develops, retains, and inspires a workforce that is inclusive, competent, motivated, adaptive, and reflective of the community they serve. • Maintains a participatory, collaborative organization dedicated to continual learning, technical proficiency, safety, and innovation where employees recognize themselves as valuable team members that belong and actively contribute to achieving utility goals. • Implements procedures for institutional knowledge retention, workplace safety, and continual learning (e.g., standard operating procedures). • Emphasizes and invests in opportunities for professional and leadership development, taking into account the differing needs and expectations of a diverse, multi-generational workforce. • Establishes a supportive, collaborative, and aligned senior leadership team.		

Step 3: Chart Results

Chart each Attribute based on your ratings and rankings.

		1	2	3	4	5	6	7	8	9	10

*(Rating chart: vertical axis labeled **Rating**, with "Lower Achievement" for rows 5, 4 and "Higher Achievement" for rows 2, 1. Rows numbered 5, 4, 3, 2, 1 top to bottom. Horizontal axis labeled **Ranking**, columns 1–10, with "More Important" on the left and "Less Important" on the right. Dark orange shaded cells cover rankings 1–4 at ratings 4–5; light orange shaded cells cover rankings 1–4 at rating 3 and ranking 5 at ratings 3–5.)*

Step 4: Determine High-Priority EUM Attributes

The goal of EUM is to establish high-achieving systems and approaches for each Attribute. Ultimately, utilities should strive to improve performance for all Attributes until each can be charted in the lower half of the table (high achieving). Utility managers may wish to focus on one or a few Attributes at a time, aiming to eventually ensure that all Attributes have been addressed and improved upon over time.

Examining the results of the charting exercise in Step 3 can help identify Attributes for focused attention. Attributes that graph into the dark orange shaded quadrant are both very important (ranked 1-4), and have low achievement (rated 4-5), and would typically be selected as the highest priority Attribute areas for moving forward with improvement actions. Attributes that graph into the light orange shaded area indicate medium importance, and a moderate level of current achievement; these would typically be selected as additional strong candidates for improvement efforts.

Appendix C. Attribute-Related Water Utility Measures

Performance measurement is critical to effectively managing a utility. This section of the *Primer* provides detailed information on a range of measures that utilities can consider, including descriptions and example calculations and questions.

For each of the Attributes, a variety of example calculations and questions are provided in this Appendix for use by water sector utilities. This is not meant to serve as an exhaustive list, but rather a starting point for utilities as they begin to think about how performance can be measured for each Attribute. In addition to the example measures described in this section, utilities can reference a variety of resources available to the sector which provide additional specific measures for a variety of practices. Resources available to utilities include:

Photo courtesy Gwinnett County Water Resources

- **Benchmarking Performance Indicators for Water and Wastewater Utilities** (American Water Works Association) AWWA Performance measures are noted as "*This is a Benchmarking Performance Indicator.*"
- **Effective Utility Management Benchmarking Tool (**Water Research Foundation).
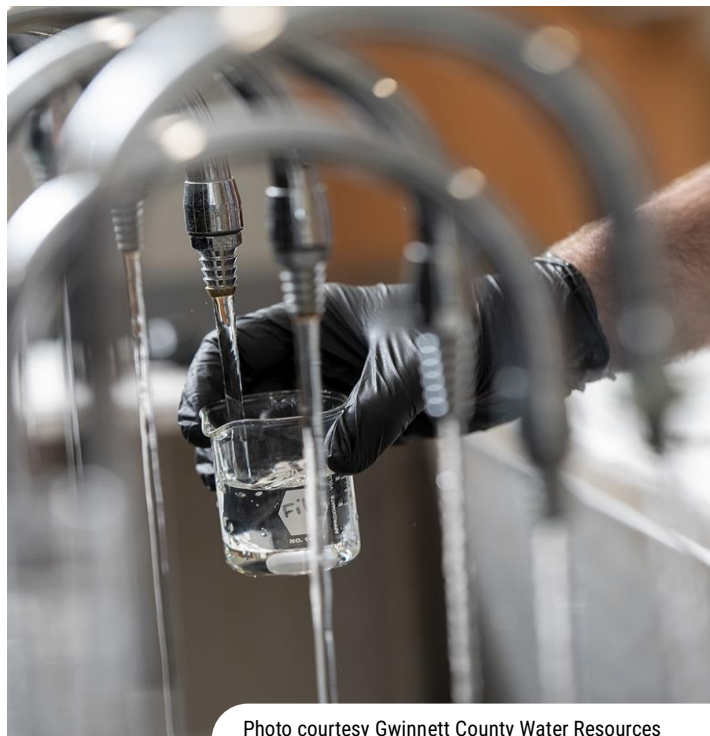
Attribute: Community Sustainability

1. Watershed-based infrastructure planning

Description: This measure addresses utility efforts to consider watershed-based approaches when making management decisions affecting infrastructure planning and investment options. Watershed protection strategies can sometimes, for example, protect source water quality limiting the need for additional or enhanced water treatment capacity.

Example performance measure:

- Does the utility employ alternative, watershed-based approaches to align infrastructure decisions with overall watershed goals and potentially reduce future infrastructure costs (yes/no)? Watershed-based approaches include, for example: centralized management of decentralized systems; stormwater management; source water protection programs; and conjunctive use of groundwater, source water, and recycled water to optimize resource use at a basin scale. (See also "green infrastructure" below.)

2. Green infrastructure

Description: This measure addresses green infrastructure, which includes both the built and natural/unbuilt environment. Utilities may promote source water protection and conservation green infrastructure approaches in support of water conservation (e.g., per capita demand reduction) and water quality protection objectives. Green infrastructure approaches can include: low-impact development techniques (e.g., minimization of impervious surfaces, green roofs); protection of green spaces and wildlife habitat; incentives for water-efficient domestic appliance use and landscaping; green building standards such as those promoted through the Leadership in Energy and Environmental Design (LEED) program; management of energy, chemical, and material use; etc.[4] Utilities often coordinate these efforts with community planning offices.

Example performance measures:

- Has the utility explored green infrastructure approaches and opportunities that are aligned with the utility's mandate, goals, and objectives and community interests (yes/no)?
- Does the utility have procedures that incorporate green infrastructure approaches and performance into new infrastructure investments (yes/no)?
- Assess the extent to which the utility's green infrastructure-based planning is defined as employing decision processes and criteria that promote source water protection and conservation for both the built and natural environment. *This is a Benchmarking Performance Indicator.*
    - Level 5 - Planning approach is well-defined and fully endorsed by staff, stakeholders, and decision-makers.
    - Level 4 - Planning approach is well-defined and endorsed by most staff, stakeholders, and decision-makers.
    - Level 3 - Planning approach has been moderately defined and endorsed by some staff, stakeholders, and decision-makers.
    - Level 2 - Planning approach has been somewhat defined and endorsed by few or no staff, stakeholders, and decision-makers.
    - Level 1 - No planning approach defined or endorsed.

3. Greenhouse gas emissions

Description: This measure will help drinking and wastewater utilities to understand and reduce their individual contributions to area greenhouse gas emissions. Trends indicate that water utility emissions of these gases will likely be of interest to stakeholders. Monitoring of these emissions is becoming more common among water sector utilities, and some utilities are beginning voluntary efforts to reduce their emissions (e.g., through production of reusable methane energy by wastewater utilities).

Example performance measures:

- Net (gross minus offsets) greenhouse gas emissions in tons of carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), and, as applicable, hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). Start by establishing an emissions baseline and then track emission trends in conjunction with minimizing/reducing emissions over time, where possible.[5] Emissions inventories often incorporate indirect emissions such as those generated during the production and transport of materials and chemicals.

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[4] For more information about green infrastructure, visit www.epa.gov/npdes/greeninfrastructure.
[5] EPA's industry-government "Climate Leaders" partnership involves completing a corporate-wide inventory of their greenhouse gas emissions. Information and related guidance is available at http://www.epa.gov/stateply/index.html.

- Percent of utility energy demand met by renewable energy resources.

4. Community economic development

Description: This measure assesses the extent to which utility operations play a role in local economic development (e.g., by attracting new employers to the area, enabling residential or commercial growth, or through job creation).

Example performance measures:

- Change in tax base (dollars or percent change) related to new water infrastructure.
- Number of jobs created by utility infrastructure investments. Jobs may be:
  - Internal to the utility;
  - Contracted by the utility; or
  - Through a new employer brought to the community as a result of utility infrastructure.
- Green infrastructure economic benefits:
  - Crime reduction (percent change); and
  - Increase in local property values (percent change).

Attribute: Customer Experience and Satisfaction

1. Customer concerns

Description: This measure assesses the complaint rates experienced by the utility, with individual quantification of customer service and core utility service complaints (note that "service complaints" would not include routine service requests by customers).[6] As a "passive measure," it will not likely be numerically representative (i.e., a statistically valid customer sample group) and is a "starting point" measure for understanding customer service problems.

Example performance measures:

- Number of complaints per 1,000 customers (or other appropriate value based on size of population served) per reporting period, recorded as either customer service or technical quality complaints.
  - Customer service complaint rate: 1,000 X (customer service associated complaints ÷ number of active customer accounts). *This is a Benchmarking Performance Indicator*.
  - Technical quality complaint rate: 1,000 X (technical quality associated complaints ÷ number of active customer accounts). *This is a Benchmarking Performance Indicator*.

For both calculations, utilities may wish to subcategorize complaints by type and aspect (e.g., customer service into billing, problem responsiveness, interruptions, etc., and technical quality into service deficiencies such as taste, odor, appearance, flow/pressure, etc.) and by type of customer (e.g., residential, industrial, commercial, etc.).

2. Customer service delivery

Description: This measure requires the utility, based on internal objectives and customer input, to set desirable customer service levels, then determine an appropriate (target) percentage of time to meet the performance levels. Once established, the utility can track how often it meets the service levels, helping the utility to determine how well customer needs are being satisfied (e.g., have 95 percent of service calls received a response within 60 minutes). A utility can average across individual measures to determine the overall percentage of service level commitments met.

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[6] From AWWA and AwwaRF, *Selection and Definition of Performance Indicators for Water and Wastewater Utilities*, p. 41. 2004. Note: This material is copyrighted and any reprinting must be by permission of the American Water Works Association.

Example performance measures:

- Call responsiveness (percent): 100 X (number of calls responded to within "X" minutes ÷ total number of calls during reporting period) (typically per month).
- Error-driven billing adjustment rate (percent): 100 X (number of error-driven billing adjustments during reporting period ÷ number of bills generated during reporting period). *This is a Benchmarking Performance Indicator*.
- Service start/stop responsiveness (percent): 100 X (number of stop/start service orders processed within "X" days ÷ total number of stop/start service orders during reporting period).
- First call resolution (percent): 100 X (number of calls for which problem was resolved/fixed/scheduled to be fixed at the time of the first call ÷ total number of calls during reporting period). *This is a Benchmarking Performance Indicator.*
- Customer delinquency rate: Percentage of overall accounts that are delinquent during the past 12 months. *This is a Benchmarking Performance Indicator.*
- Uncollected account-related debt (%). Uncollected revenue ÷ Total revenue billed. *This is a Benchmarking Performance Indicator.*

3. Customer satisfaction

Description: This is an overarching customer satisfaction measure based on requested customer feedback (surveys), not calls received or internal customer satisfaction service level commitments. A utility can measure customer satisfaction immediately after service provision or use a periodically performed, more comprehensive customer satisfaction survey. After-service surveys are simpler and easier for the utility to develop and implement without professional advice, but they tend to over represent the most satisfied (e.g., those who just received service) and the most dissatisfied (e.g., those who just called with complaints) customers. Comprehensive surveys can provide statistical validity enabling extrapolation to the population served. A utility can verify survey information through customer conversations, either as follow up to a survey, during public meetings or focus groups, or by some other method (e.g., individual telephone calls).

Example performance measures:

- Overall customer satisfaction: Percent of positive or negative customer satisfaction survey responses based on a statistically valid survey or on an immediately after-service survey. Satisfaction responses can be divided into categories such as: highly satisfied/satisfied/moderately satisfied/unsatisfactory; exceeding expectations/meeting expectations/not meeting expectations; numerical scales (e.g., 1-5); or other divisions. Customer satisfaction information is often also gathered and assessed by topic areas such as product quality, service reliability, billing accuracy, customer service, costs/rates/value, crew courtesy, notification around street construction/service interruptions, etc.

Attribute: Enterprise Resiliency

1. Recordable incidents of injury or illnesses

Description: This measure addresses incidence rates, which can be used to show the relative level of injuries and illnesses and help determine problem areas and progress in preventing work-related injuries and illnesses.

Effective Utility Management

Example performance measure:

The U.S. Bureau of Labor Statistics has developed instructions for employers to evaluate their firm's injury and illness record. The calculation below is based on these instructions, which can be accessed at: http://www.bls.gov/iif/osheval.htm. The 200,000 hours used in the formulas below represent the equivalent of 100 employees working 40 hours per week, 50 weeks per year, and provides the Bureau of Labor Statistics' standard base for the incidence rates.

- Total recordable incident rate: (Number of work-related injuries and illnesses X 200,000) ÷ employee hours worked. *This is a Benchmarking Performance Indicator.*
- Number of near misses: A "near miss" is an unsafe situation or condition where no personal injury was sustained and no property was damaged, but where, given a slight shift in time or position, injury and/or damage could have occurred. *This is a Benchmarking Performance Indicator.*

2. Insurance claims

Description: This measure examines the number, type, and severity of insurance claims to understand insurance coverage strength/vulnerability.

Example performance measures:

- Number of insurance claims: Number of general liability and auto insurance claims per 200,000 employee hours worked. *This is a Benchmarking Performance Indicator.*
- Severity of insurance claims: Total dollar amount of general liability and auto insurance claims per 200,000 employee hours worked. *This is a Benchmarking Performance Indicator.*

Photo courtesy Buffalo Sewer Authority

- Average severity ($/claim): Reported severity ÷ Reported number of claims. *This is a Benchmarking Performance Indicator.*

3. Risk assessment and response preparedness

Description: This measure asks whether utilities have assessed their all-hazards (natural and human-caused) vulnerabilities and risks and made corresponding plans for critical needs. Risk assessment in this context includes a vulnerability assessment regarding, for example, power outages, lack of access to chemicals, cybersecurity, extreme weather events, curtailed staff availability, etc.

Example performance measures:

- Emergency Response Plan (ERP) coverage and preparedness:
  - Does the utility have an ERP in place (yes/no)?
  - Number and frequency of ERP exercises per year: 100 X (number of critical employees who participate in ERP exercises ÷ total number of critical employees).
  - Frequency with which the ERP is reviewed and updated.
  - Does the utility discuss/coordinate ERP with other agencies/departments (e.g., city, state, police, fire, public health) (yes/no)?
- Vulnerability management: Is there a process in place for identifying and addressing system deficiencies (e.g., deficiency reporting with an immediate remedy process, established intervals between comprehensive vulnerability assessments) (yes/no)?
- Cybersecurity: Indicate utility's development and incorporation of an established cybersecurity plan with the following levels of complexity. *This is a Benchmarking Performance Indicator.*
  - Level 3: Utility has established and fully incorporated a detailed cybersecurity plan, which is routinely reviewed and implemented.
  - Level 2: Utility has developed a cybersecurity plan that has been approved and is generally used throughout the facility.
  - Level 1: Utility has identified and established a basic cybersecurity plan, which is minimally implemented.
  - No Plan: No plan is in place.

4. Ongoing operational resiliency

Description: This measure assesses a utility's operational reliability during ongoing/routine operations.

Example performance measure:

- Uptime for critical utility components on an ongoing basis (percent): 100 X (hours of critical component uptime ÷ hours that critical components have the physical potential to be operational). Note: a utility can apply this measure on an individual component basis or summed across all identified critical components. Also, a utility can make this measure more precise by adjusting for planned maintenance periods.

5. Operational resiliency under emergency conditions

Description: This measure assesses the operational preparedness and expected responsiveness in critical areas under emergency conditions.

Example performance measures (all apply to emergency conditions and, where relevant, factor in anticipated downtimes relative to required/high demand times):

- Power resiliency: Period of time (e.g., hours or days) for which backup power is available for critical operations (i.e., those required to meet 100 percent of minimum daily demand). (Note: "minimum daily demand" is the average daily demand for the lowest production month of the year.)
- Treatment chemical resiliency: Period of time (e.g., hours or days) minimum daily demand can be met with water treated to meet SDWA standards for acute contaminants (i.e., E.coli, fecal coliform, nitrate, nitrite, total nitrate and nitrite, chlorine dioxide, turbidity as referenced in the list of situations requiring a Tier 1 Public Notification under 40 CFR 141.202), without additional treatment chemical deliveries. (Note: "minimum daily demand" is the average daily demand for the lowest production month of the year.)
- Critical parts and equipment resiliency: Current longest lead time (e.g., hours or days) for repair or replacement of operationally critical parts or equipment (calculated by examining repair and replacement lead times for all identified critical parts and equipment and taking the longest single identified time).
- Critical staff resiliency: Average number of response-capable backup staff for critical operation and maintenance positions (calculated as the sum of all response-capable backup staff ÷ total number of critical operation and maintenance positions).
- Treatment operations resiliency (percent): Percent of minimum daily demand met with the primary production or treatment plant offline for 24, 48, and 72 hours. (Note: "minimum daily demand" is the average daily demand for the lowest production month of the year.)
- Source water resiliency: Period of time (e.g., hours or days) minimum daily demand can be met with the primary raw water source unavailable. (Note: "minimum daily demand" is the average daily demand for the lowest production month of the year.)

Attribute: Financial Viability

1. Budget management effectiveness

Description: This measure has short-term and long-term aspects. The short-term calculations are commonly used financial performance indicators, and the long-term calculation is a more comprehensive analytical approach to assessing budget health over the course of several decades.

Example performance measures:

Short-term (typically per year):

- Revenue to expenditure ratio: Total revenue ÷ total expenditures.
- O&M expenditures (percent): 100 X (O&M expenditures ÷ total operating budget).
- Capital expenditures (percent): 100 X (capital expenditures ÷ total capital budget).
- Debt ratio: Total liabilities ÷ total assets. Total liabilities are the entire obligations of the utility under law or equity. Total assets are the entire resources of the utility, both tangible and intangible. Utilities often have different debt-risk acceptability levels, thus the ratio itself should be considered within each utility's unique circumstances. *This is a Benchmarking Performance Indicator.*
- Current level of operating reserves as a percentage of goal.
- Days of Cash on Hand: Undesignated cash and cash equivalents ÷ (Operating expenses excluding depreciation ÷ 365 days). *This is a Benchmarking Performance Indicator.*

Long-term:

- Life-cycle cost accounting: Has the utility conducted a life-cycle cost accounting analysis[7] that explicitly incorporates accepted service level risks, asset condition, budget needs based on the values (net present values) of utility current and future assets, etc., and made financial and budget management decisions accordingly (yes/no)?

2. Financial procedure integrity

Description: This measure gauges the presence of internal utility processes to ensure a high level of financial management integrity.

Example performance measures:

- Number of control deficiencies and material weaknesses reported on annual audits.
- Does the utility have financial accounting policies and procedures (yes/no)?
- Are financial results and internal controls audited annually (yes/no)?
- Have the number of control deficiencies and material weaknesses been reduced from previous audits (yes/no)?
- Does the utility have a formal policy for the bill collection process (yes/no)?

3. Bond ratings

Description: This measure uses bond ratings as a general indicator of financial viability; however, they are not always within a utility's control and are less important if a utility is not participating in capital markets. Smaller utilities often struggle to obtain high ratings. Even though a higher bond rating is desirable and this provides a general indicator of financial health, the bond rating should not be considered alone. It should be considered in light of other factors such as the other measures suggested for this Attribute.

Example performance measure:

- Bond ratings.
- Change in bond ratings: Does the change reflect the utility's financial management in a way that can and should be acknowledged and, if need be, addressed?
- Debt-service coverage ratio: (Total operating revenue − Total O&M costs) ÷ Total debt service. *This is a Benchmarking Performance Indicator.*

4. Rate adequacy

Description: This measure helps the utility to consider its rates relative to factors such as external economic trends, short-term financial management, and long-term financial health. It recognizes that a "one size fits all" calculation would not be realistic due to each utility's unique situation and the number of variables that could reasonably be considered. The following three questions prompt assessment of key components of rate adequacy.

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[7] Section 707 of Executive Order 13123 defines life-cycle costs as, "…the sum of present values of investment costs, capital costs, installation costs, energy costs, operating costs, maintenance costs, and disposal costs over the life-time of the project, product, or measure." Life-cycle cost analysis (LCCA) is an economic method of project evaluation in which all costs arising from owning, operating, maintaining, and disposing of a [facility/asset] are considered important to the decision. LCCA is particularly suited to the evaluation of design alternatives that satisfy a required performance level, but that may have differing investment, operating, maintenance, or repair costs, and possibly different life spans. LCCA can be applied to any capital investment decision, and is particularly relevant when high initial costs are traded for reduced future cost obligations. See also: http://www.epa.gov/EMS/position/eo13148.htm, http://www.wbdg.org/resources/lcca.php.

Example performance measures:

- How do your rate changes compare currently and over time with the inflation rate and the Consumer Price Index (CPI) or Consumer Price Index for All Urban Consumers (CPI-U)? (Rate increases below CPI for very long may suggest rates are not keeping up with utility costs.) (Using a rolling rate average over time will adjust for short-term rate hikes due to capital or O&M spending needs.)
- Have you established rates that fully consider the full life-cycle cost of service and capital funding options? (See the life-cycle cost accounting discussion, above.)
- Does your utility maintain a rate stabilization reserve to sustain operations during cycles of revenue fluctuation, in addition to 60- (or 90-) day operating reserves?

5. Service affordability

Description: This measure addresses drinking water and wastewater service affordability, which centers on community members' ability to pay for water services. The true cost of water/wastewater services may be higher than some low-income households can afford, particularly when rates reflect the full life-cycle cost of water services. To the extent possible within its operating and regulatory contexts, the utility will want to consider and balance keeping water services affordable while ensuring the rates needed for long-term infrastructure and financial integrity.

Example performance measures:

- Bill affordability (households for which rates may represent an unaffordable level) (percent): 100 X (number of households served for which average water bill is > "X" percent (often 2-2.5%) of median household income[8] ÷ total number of households served).
- Household Burden Indicator (HBI): Basic water service costs (combined) as a percent of the 20th percentile household income (i.e., the Lowest Quintile of Income (LQI) for the Service Area). *This is a Benchmarking Performance Indicator.*
- Poverty Prevalence Indicator: Defined as the percentage of community households at or below 200% of Federal Poverty Level (FPL). *This is a Benchmarking Performance Indicator.*

Coupled with:

- Low-income billing assistance program coverage (percent): 100 X (number of customers enrolled in low-income billing assistance program ÷ number of customers who are eligible for enrollment in low-income billing assistance program). (The utility can try to increase participation in the program for eligible households that are not participating.)

Attribute: Infrastructure Strategy and Performance

1. Asset inventory

Description: This measure gauges a utility's efforts to assess assets and asset conditions, as the first steps towards building a comprehensive asset management program.

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[8] This calculation focuses on identifying low-income households based median household incomes (MHI); however, MHI is not strongly correlated with the incidence of poverty or other measures of economic need. Further, populations served by small utilities in rural settings tend to have lower MHI and higher poverty rates, but fewer options for diversifying water/wastewater service rates based on need compared to larger municipal systems.

Example performance measures:

- Inventory coverage (percent): 100 X (total number of critical assets inventoried within a reasonable period of time (e.g., 5-10 years) ÷ total number of critical assets). A utility will need to first define what it considers to be a critical asset. Typically, critical assets are those that you decide would have major consequences if they were to fail (major expense, system failure, safety concerns, etc.). A complete inventory will involve understanding the following for each asset:
    - Age and location;
    - Asset size and/or capacity;
    - Valuation data (e.g., original and replacement cost);
    - Installation date and expected service life;
    - Maintenance and performance history; and
    - Construction materials and recommended maintenance practices.[9]
- Condition assessment coverage (percent): 100 X (total number of critical assets with condition assessed and categorized into condition categories within a reasonable period of time (e.g., 5-10 years) ÷ total number of critical assets). Condition categories could include: unacceptable, improvement needed, adequate, good, and excellent to reflect expected service levels and acceptable risks.

2. Asset (system) renewal/replacement

Description: This measure assesses asset renewal/replacement rates over time. The measure should reflect utility targets, which will vary depending on each utility's determinations of acceptable risks for different asset classes. An asset class may consist of a cohort of pipe based on age/material, or a particular component of plants or lift stations. Generally, an asset class would have an expected service life, and this should be factored into calculations for an appropriate asset renewal/replacement rate. Decisions on asset replacement typically factor in internally agreed-upon risks and objectives, which may differ by asset class and other considerations. For instance, a utility may decide to run certain assets to failure based on benefit-cost analysis.

Example performance measures:

- Asset renewal/replacement rate (percent): 100 X (total number of assets replaced per year for each asset class ÷ total number of assets in each asset class). For example, a two percent per year replacement target (50-year renewal) for a particular asset class could be identified as the basis for performance monitoring.

    — or —

- Asset (system) renewal/replacement rate: 100 X (total actual expenditures or total amount of funds reserved for renewal and replacement for each asset group ÷ total present worth for renewal and replacement needs for each asset group). *This is a Benchmarking Performance Indicator*.

3. Water distribution/collection system integrity

Description: For drinking water utilities, this measure quantifies the number of pipeline leaks and breaks. Distribution system integrity has importance for health, customer service, operational, and asset management reasons. For wastewater utilities, this measure examines the frequency of collection system failures. When tracked over time, a utility can evaluate whether its failure rate is decreasing, stable, or increasing. When data are maintained to

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[9] From the U.S. General Accounting Office, *Water Infrastructure: Comprehensive Asset Management Has Potential to Help Utilities Better Identify Needs and Plan Future Investments*. GAO-04-461. March 2004. Available at: http://www.gao.gov/new.items/d04461.pdf.

characterize failures by pipe type and age, type of failure, and cost of repairs, decisions regarding routine maintenance and replacement/renewals can be better made.

Example performance measure (drinking water utilities):[10]

- Non-revenue water (NRW): Water supplied to the network that does not return revenue to the utility, including unbilled authorized consumption, apparent losses (theft, customer metering inaccuracies, systematic data handling errors), and real losses (leakage from the pipe network and distribution storage) as defined in the AWWA M36 Manual: *This is a Benchmarking Performance Indicator*.
    - Annual cost of apparent and real losses
    - Apparent and real losses per service connection per day
    - Apparent and real loss cost rate
    - Normalized water losses
- Infrastructure leakage index (ILI): Current Annual Real Loss ÷ Unavoidable Annual Real Loss (at current average system operating pressure. Measure would be expressed as a unitless ratio. *Automatic derivation of this measure provided in the AWWA Free Water Audit Software from annual water audit inputs.[11]*
- Water Audit Data Validity Score. Audit Validation Level: Level of validation (self-reported, 1, 2 or 3) conducted on the most recent water audit, as defined by Water Research Foundation Project 5057[12]

Example performance measure (wastewater utilities):

- Collection system failure rate (percent): 100 X (total number of collection system failures ÷ total miles of collection system piping per year). *This is a Benchmarking Performance Indicator*.

4. Infrastructure planning and maintenance

Description: This measure addresses planning for future infrastructure needs and ongoing maintenance for existing infrastructure, which is critical to overall infrastructure strategy and performance. Planned maintenance includes both preventive and predictive maintenance. Preventive maintenance is performed according to a predetermined schedule rather than in response to failure. Predictive maintenance is initiated when signals indicate that maintenance is due. All other maintenance is categorized as corrective or reactive.

Example performance measures:

This measure can be approached in different ways. Calculating costs may be preferable to encourage business decisions based on total cost; however, the reliability of costs is uncertain. Hours are likely to be less variable than costs, but not all utilities track hours. Thus, cost and hours ratios are desirable, where possible.

- Planned maintenance ratio by hours (percent) (can be calculated for water and wastewater separately): Total time for planned maintenance ÷ (Time for planned maintenance + time for corrective maintenance). *This is a Benchmarking Performance Indicator*.
- Planned maintenance ratio by cost (percent): 100 X (cost of planned maintenance ÷ (cost of planned + corrective maintenance)).

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[10] For most up to date AWWA M36 manual visit https://engage.awwa.org/PersonifyEbusiness/ AWWA M36 Manual (4th Ed. 2016) visit: https://engage.awwa.org/PersonifyEbusiness/Bookstore/Product-Details/productId/51439782 and to learn more http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx.

[11] https://www.awwa.org/Resources-Tools/Resource-Topics/Water-Loss-Control/Free-Water-Audit-Software

[12] For more information, visit: https://www.waterrf.org/research/projects/level-1-water-audit-validation-guidance-manual-second-edition

- Is there a formal process to prioritize infrastructure needs/future investments and allocate the necessary funding (yes/no)?
- Is there a formal process for identifying areas of uncertainty and building in needed flexibility during the infrastructure planning phase (yes/no)?
- Asset Management Program Maturity. Assess implementation status (Level 1-5) of each of the EPA's Five Core Components of Asset Management. *This is a Benchmarking Performance Indicator.*
    - Current State of Assets: Does the organization utilize and maintain an asset inventory (i.e., type, size, location, conditions, useful remaining life, replacement costs?
    - Level of Service: Has the organization defined an organizational level of service to clearly communicate organizational purpose?
    - Critical Assets: Has the organization defined asset criticality to determine how likely for a given asset to fail, and if so, what are the consequences?
    - Life Cycle Costing: Has the organization completed life-cycle costing on assets?
    - Long Term Funding: Has the organization identified long-term funding for critical assets?
        - Level 5 - This activity is fully implemented at the utility.
        - Level 4 - This activity is largely implemented, but there is room for improvement.
        - Level 3 - This activity is implemented, but there is room for substantial improvement.
        - Level 2 - This activity is implemented, but only occasionally or without uniformity.
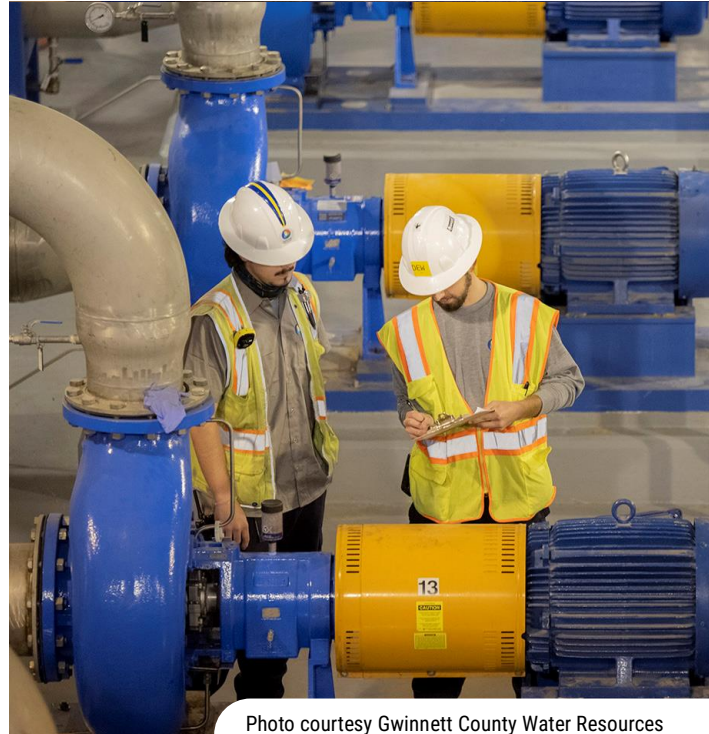   - Level 1 - This activity is not practiced at the utility.

Photo courtesy Gwinnett County Water Resources

Attribute: Operational Optimization

1. Resource optimization

Description: This measure examines resource use efficiency, including labor and material per unit of output or mile of collection/distribution system.

Example performance measures:

- Customer accounts per employee: Number of accounts ÷ number of FTEs. (FTE = 2,080 hours per year of employee time equivalent.) *This is a Benchmarking Performance Indicator.*
- MGD water delivered/processed per employee: Average MGD delivered/processed ÷ FTEs per year. *This is a Benchmarking Performance Indicator.*
- Chemical use per volume delivered/processed: Amount of chemicals used ÷ MG delivered/processed during reporting period. (Alternatively can use dollar amount spent on chemicals ÷ MG delivered/processed; in this case a rolling average for amount spent would account for periodic bulk purchases.)

- Energy use per volume delivered/processed: Energy consumption based on purchases of electricity, natural gas, and other fuels (minus stored amounts) converted to kBTU ÷ average daily demand x 365 days. *This is Benchmarking Performance Indicator.*
- O&M cost per volume delivered/processed: Total O&M cost ÷ MG delivered/processed during reporting period.

A utility can also apply the above resource use per volume delivered/processed calculations to resource use per mile (or 100 miles) of collection/distribution system, (i.e., chemical use per mile, energy use per mile, or O&M cost per mile).

2. Water management efficiency

Description: This measure assesses drinking water production and delivery efficiency by considering resources as they enter and exit the utility system.

Example performance measures:

- Production efficiency: Ratio of raw water volume taken into the treatment system to treated water produced.
- Meter function (percent): 100 X (total number of active billable meters minus stopped or malfunctioning meters ÷ total number of active billable meters). *This is a Benchmarking Performance Indicator.*

Attribute: Regulatory & Reliability Performance

1. Regulatory compliance

Description: This measure assesses water product quality compliance, particularly with regard to 40 CFR Part 141 (the National Primary Drinking Water Regulations), the National Pollutant Discharge Elimination System, and any other relevant federal (Clean Water Act, Safe Drinking Water Act, America's Water Infrastructure Act of 2018, etc.) or state statute/regulations and permit requirements. The scope can include the quality of all related products, including drinking water, fire suppression water, treated effluent, reused water, and biosolids (EPA 503 Regulations), as well as quality related to operating requirements such as pressure and number of sewer overflows.

Example performance measures:

- Drinking water compliance rate (percent): 100 X (number of days in full compliance for the year ÷ 365 days). *This is a Benchmarking Performance Indicator.*
- Wastewater treatment effectiveness rate (percent): (Total number of compliance events per utility's permit – number of events out of compliance) ÷ Total number of compliance events per utility's permit. *This is a Benchmarking Performance Indicator.*
- Number, type, and frequency of "near (compliance) misses": For example, reaching 80-95% of allowable levels of "X" during reporting period, typically per month. Tracking this type of measure could be used to improve performance in these "near miss" areas before violations occur.

2. Service delivery

Description: This measure assesses delivery of quality service based on utility-established objectives and service level targets.

Example performance measures:

- Drinking water flow and pressure (percent): 100 X [number of customers with less than (flow of "X" gallons per minute (gpm) and pressure of "Y" pounds per square inch (psi)—levels set by utility) ÷ total number of customers] (during reporting period, typically per month).
- Fire suppression water flow and pressure (percent): 100 X [hours of time when (flow of "X" gpm and pressure of "Y" psi—levels set by utility) is available for fire suppression at maximum day demand ÷ total number of hours when fire suppression water should be available at maximum day demand] (during reporting period, typically per month).
- Service interruptions (percent): 100 X (number of active account customers experiencing a service interruption of greater than 1 hour ÷ total number of customers during reporting period) (typically per month). Note: the utility may elect to measure planned and unplanned interruptions separately.
- Water quality goals met/not met: Number of days in reporting period (typically one month) where utility-defined beyond-compliance targets are met/not met.
- Sewer backups (amount and percent): Number of customers experiencing backups each year; 100 X (number of customers experiencing backups each year ÷ total number of customers).
- Sewer overflows: Number of sewer overflows per 100 miles of collection system piping, or number of sewer overflows per million gallons treated. *This is a Benchmarking Performance Indicator.*
- Water reuse (amount and percent):
  - Amount: Amount of water supplied that is from reused/recycled sources. *This is a Benchmarking Performance Indicator.*
  - Percent: 100 X (amount of water supplied that is from reused/recycled water ÷ total amount of water supplied). *This is a Benchmarking Performance Indicator.*
  - Then, as desired, these amounts can be broken into recipients/applications (e.g., irrigation, agriculture, industrial processes, etc.).
- Biosolids put to beneficial use (percent): 100 X (amount of biosolids produced that are put to a beneficial use ÷ total amount of biosolids produced) (in wet tons per year). *This is a Benchmarking Performance Indicator.*
- Percent of recovered resources that meet customer specifications or regulatory requirements: 100 X (amount of efficiently recovered material ÷ total amount of potentially recovered material).

Attribute: Stakeholder Understanding and Support

1. Stakeholder consultation

Description: This measure addresses utility actions to reach out to and consult with stakeholders about utility matters, including utility goals, objectives, and management decisions.

Example performance measures:

- Does the utility identify stakeholders, conduct outreach, and actively consult with stakeholders about utility matters (yes/no)? Elements of this plan can include:
  - Number of active contacts with stakeholders in key areas (e.g., from local government, business, education, non-governmental groups).
  - Does the utility actively seek input from stakeholders (yes/no)?
  - Frequency with which the utility actively consults with stakeholders. This measure should go beyond counting the number of calls or times information is sent out or posted on websites to items such as

number of stakeholder outreach and education activities, number of opportunities for stakeholders to provide input, participation of stakeholders on utility committees, etc.

- Does the utility actively consider and act upon stakeholder input (yes/no)?

2. Stakeholder satisfaction

Description: This measure addresses stakeholder perceptions of the utility. Stakeholder satisfaction can be measured through surveys sent to stakeholders, formal feedback surveys distributed to stakeholders at events, etc.

Example performance measures:

- Overall satisfaction (percent): 100 X (number of stakeholders who annually rate the overall job of the utility as positive ÷ total number of stakeholders surveyed).
- Responsiveness (percent): 100 X (number of stakeholders who annually rate utility responsiveness to stakeholder needs as positive ÷ total number of stakeholders surveyed).
- Message recollection for outreach programs targeted to specific stakeholder groups (percent): (a) 100 X (number of stakeholders who recall key messages ÷ total number of stakeholders surveyed); and (b) 100 X (number of stakeholders who recall the message source (TV, utility mailers, newsletters, etc.) ÷ total number of stakeholders surveyed).

3. Internal benefits from stakeholder input

Description: This measure addresses the value utility employees believe stakeholder engagement has provided to utility projects and activities. Measurement by the utility can focus on surveying utility employees running projects that have stakeholder involvement.

Example performance measures:

- 100 X (number of utility projects or activities where stakeholders participated and/or provided input for which utility employees believe there was value added as a result of stakeholder participation and input ÷ total number of projects where stakeholders participated and/or provided input).
- Overall value added (percent): 100 X (number of utility employees who rated their overall sense of value added from stakeholder participation and input as (high value added, some value added, little value added, no value added) ÷ total number of utility employees surveyed).

4. Comparative rate rank

Description: This measure depicts how utility rates compare to similar utilities (e.g., utilities of the same type (drinking water, wastewater) that are similar in terms of geographic region, size of population served, etc.). A utility can use the measure internally or to educate stakeholders. It should be noted that the lowest rate is not necessarily best (see Financial Viability). When comparing rates with other utilities, it is important to make sure to account for other variables that can affect rates to ensure that you are comparing "apples to apples." For example, when comparing a wastewater collection and treatment utility's rates to a utility providing treatment only, include the average rate of the separate wastewater collection utility in a combined rate.

Example performance measure:

- Typical monthly bill for the average household as a percentage of typical monthly bills for similar utilities.

5. Media/press coverage

Description: This measure captures media portrayal of the utility (newspaper, TV, radio, etc.) in terms of awareness, accuracy, and tone.

Example performance measures:

- Amount of coverage: Total number of media stories (social media, newspaper, TV, radio, etc.) concerning the utility per year.
- Media coverage tone (percent): 100 X (number of media stories concerning the utility that portray the utility in a positive way ÷ total number of media stories concerning the utility) per year.
- Media coverage accuracy (percent): 100 X (number of media stories that accurately describe the utility ÷ total number of media stories concerning the utility) per year.
- Number of outreach events conducted to build support for utility, value of water, and value of water services.

6. Partnering in your community

Description: This measure assesses how the utility actively engages with community organizations to advance important initiatives, engage partners in decision making, and to position the utility as an anchor institution in the community. Partnering in this manner can result in many different types of benefits for the utility and the community, including the increased understanding and support for utility needs and the value of water and water services to the community.

Example performance measures:

- Performance improvements resulting from a partnership (e.g., reduced volume of flooding or greenhouse gas emissions).
- Number and type of specific projects completed associated with partnerships (e.g., rain gardens installed, innovative technologies implemented, innovative practices adopted).
- Level of partner/community support for utility and the value of water (e.g., number of community members/partners participating in utility events or providing positive feedback for utility services).

Attribute: Water Resource Sustainability

1. Water supply adequacy

Description: This measure assesses short-term and long-term water supply adequacy and explores related long-term supply considerations.

Example performance measures:

- Short-term water supply adequacy: Period of time for which existing supply sources are adequate. This can be measured as a ratio of projected short-term (e.g., 12-month rolling average) monthly supply to projected short-term monthly demand. Often an index or scale is used, for example, short-term supply relative to severe drought (assigned a "1") to abundant supply conditions (assigned a "5").
- Long-term water supply adequacy: Projected future annual supply relative to projected future annual demand for at least the next 50 years (some utilities project out as far as 70-80 years). Statistical forecasting and simulation modeling and forecasting techniques are typically used for such long-term projections. Analysis variables in addition to historical record (e.g., historical and year-to-date reservoir elevation data), forecasted precipitation, and flows (including surface and groundwater, as applicable) can include:

- o Future normal, wet, dry, and very dry scenarios (including anticipated climate change-related scenarios);
  - o Anticipated population changes;
  - o Future service areas;
  - o Availability of new water supplies including both traditional, and alternative supplies, such as recycled water, groundwater banking, desalinization, or groundwater highest and best use; and
  - o Levels of uncertainty around the above.
- Water Reuse (water beneficially reused):
  - o Amount (percentage or gallons) of reclaimed water used in place of fresh water or drinking water for non-potable uses. *This is a Benchmarking Performance Indicator.*
  - o Amount (percentage or gallons) of reclaimed water used for potable purposes.
  - o Amount (gallons or acre feet) of reclaimed water added to drinking water reservoir(s).
  - o Area (acres) of land irrigated using only recycled water.

2. Supply and demand management

Description: This measure explores whether the utility has a strategy for proactive supply and demand management in the short and long terms. Strategy needs will depend on community circumstances and priorities, anticipated population growth, future water supply in relation to anticipated demand, demand management and other conservation options, and other local considerations.

Example performance measures:

- Does the utility have a demand management/demand reduction plan (yes/no)? Does this plan track per capita water consumption and, where analytical tools are available to do so, accurately attribute per capita consumption reductions to demand reduction strategies (such as public education and rebates for water-efficient appliances) (yes/no)?
- Do demand scenarios account for changes in rates (which can change for many reasons) and conservation-oriented, demand management pricing structures (yes/no)?
- Does the utility have policies in place that address, prior to committing to new service areas, the availability of adequate dry year supply (yes/no)? Alternatively, does the utility have a commitment to denying service commitments unless a reliable drought-year supply, with reasonable drought use restrictions, is available to meet the commitment (yes/no)?

3. Watershed sustainability

Description: This measure explores whether the utility has a strategy for proactive watershed management and/or partnerships to ensure an effective integration of utility and watershed investments and practices, to achieve overall optimized performance for the community and the utility.

Example performance measures:

- Amount of pollutants/contaminants managed through source control practices (avoiding the need for treatment plant upgrades, etc.).
- Has the utility developed a source water protection plan (yes/no)?
- Does the utility partner with regional stakeholders to protect and enhance its watershed (yes/no)?
- Percent of wet weather impacts (e.g., flooding, CSOs, SSOs, gallons of infiltrated water not reaching collection systems) managed through watershed (natural treatment) processes: 100 X (Number of wet weather impacts managed through watershed processes ÷ total number of wet weather impacts).

- Area (in acres) of enhancements to wetland areas for treatment/storage of wet weather flows.
- Amount of nutrient removal via watershed approaches:
  - Cost savings derived from nutrient control through watershed processes as an alternative to treatment plant nutrient removal; and
  - Percent of nutrient removal requirements met through watershed processes rather than treatment at the plant.
- Environmental benefits:
  - Amount of movement or reduction of saltwater front (in feet).
  - Amount of avoided freshwater diversion from sensitive ecosystems.

Attribute: Workforce Development

1. Employee retention and satisfaction

Description: This measure gauges a utility's progress toward developing and maintaining a competent and stable workforce, including utility leadership.

Example performance measures:

- Employee turnover rate (percent): 100 X (number of employee departures ÷ total number of authorized positions per year). Can be divided into categories such as:
  - Voluntary turnover (percent): 100 X (number of voluntary departures ÷ total number of authorized positions per year). (Perhaps the best indicator of retention problems.)
  - Retirement turnover (percent): 100 X (number of retirement departures ÷ authorized positions per year). (Measures vulnerability to loss/retention of institutional knowledge.)
  - Experience turnover (percent): 100 X (number of years of experience represented by all departures ÷ total years of experience with the organization) (at the beginning of the year). (These are harder data to collect but provide a good assessment of institutional knowledge loss potential and therefore the need to retain/capture institutional knowledge.)
- Employee job satisfaction (percent): 100 X (number of employees with "X" job satisfaction level ÷ total number of employees) (based on implementation and monitoring over time of a comprehensive employee survey). Can be divided into work type or job classification categories, etc., and cover overall satisfaction and topics deemed relevant to longer-term employee satisfaction and retention, such as:
  - Compensation and benefits
  - Management
  - Professional development and long-term advancement opportunities
  - Work and teamwork
  - Procedures
  - Fairness and respect
  - Communication
  - Positive work environment
  - Recognition for achievements
- Employee salary competitiveness relative to market rate: Average percentile rank of employee salaries compared to salaries in surrounding service areas, as determined by a market rate comparison.
- Recruitment, Retention and Succession Practices. *This is a Benchmarking Performance Indicator*.
  - Level 4 – workforce planning activities are largely implemented with continuous performance improvement mechanisms.

Effective Utility Management

- o Level 3 – workforce planning activities are implemented but there is room for substantial improvement.
- o Level 2 – workforce planning activities are implemented but only occasionally or without uniformity.
- o Level 1 – workforce planning activities not practiced at the utility.

2. Management of core competencies

Description: This measure assesses the utility's investment in and progress toward strengthening and maintaining employee core competencies.

Example performance measures:

- Presence of job descriptions and performance expectations: Percentage of classifications with current job descriptions and related performance expectations.
- Training hours per employee: Total of qualified formal training hours for all employees ÷ total FTEs (FTE = 2,080 hours per year of employee time equivalent) worked by employees during the reporting period. *This is a Benchmarking Performance Indicator.*
- Certification coverage (percent): 100 X (number of certifications achieved or maintained ÷ number of needed certifications per year) (across the utility).
- Employee evaluation results (assumes utility evaluates employee performance in a routine way and documents results): Results of employee evaluations (e.g., employee growth not clearly demonstrated, employee growth only demonstrated in certain areas or for certain labor categories, etc.).
- Presence of employee-focused objectives and targets: Percentage of employees with written employee-focused organizational objectives and targets. (Targets could be, for instance, related to quantity, quality, timeliness, or cost. A timeliness target could, for example, relate to the number of hours it takes on average to complete a routine task.)

Photo courtesy Lehigh County Authority

3. Workforce Engagement

Description: This measure assesses utility long-term workforce succession planning efforts to ensure critical skills and knowledge are retained and enhanced over time, particularly in light of anticipated retirement volume in coming years. Focus is on preparing entire groups or cohorts for needed workforce succession, including continued training and leadership development.

Example performance measures:

- Key position vacancies: Average time that critical-skill positions are vacant due to staff departures per vacancy per year.
- Key position internal/external recruitment (percent): 100 X (number of critical-skill positions that are filled internally (through promotion, transfer, etc. rather than outside recruitment) versus filled through outside recruitment ÷ total number of positions filled per year). (This will help the utility to understand if internal workforce development is covering long-term succession needs.)
- Long-term succession plan coverage (percent): 100 X (number of employees (or cohorts, work units, etc.) covered by a long-term workforce succession plan that accounts for projected retirements and other vacancies in each skill and management area ÷ total number of employees) (or cohorts, work units, etc.).
- Internal leadership development:
    - Percentage of staff and leadership positions with defined competencies.
    - Are internal or external leadership development/training/skills development opportunities provided to employees (yes/no)?

Additional Attribute-Specific Measurement Resources

The following resources provide additional measures that are specific to various Attributes. The list is not meant to be exhaustive, but rather, serves as a starting place for utilities seeking additional resources for measures.

- National Biosolids Partnership (Water Environment Federation)
- The Nutrient Roadmap (Water Environment Federation) paid resource
- Access Water (Water Environment Federation)
- The Value of Water (US Water Alliance)
- Work for Water (American Water Works Association and Water Environmental Federation)
- Water Advocates (Water Environment Federation)
- AWWA Water and Wastewater Rate Survey (American Water Works Association) subscriber only
- AWWA Compensation Survey (American Water Works Association) subscriber only
- NACWA Financial Survey (National Association of Clean Water Agencies)

Appendix D. A Brief History of EUM

May 2006	Seven Collaborating Organizations sign a Statement of Intent to establish a framework for working together to advance understanding of the principles and practices of effective utility management, and to encourage and promote wider application.
May 2007	Findings and Recommendations report delivered from a Utility Steering Committee to the seven Collaborating Organizations. The report recommends a variety of activities to be initiated, including the development of standalone primer that outlines a strategy for effective utility management.
June 2008	Effective Utility Management: A Primer for Water and Wastewater Utilities is released.
2009–2015	The Collaborating Organizations develop and sponsor a wide range of EUM-based workshops, webinars, case examples, and award programs to promote and support EUM implementation by the water sector.
April 2015	The Association of Clean Water Agencies and the Association of State Drinking Water Administrators join as new EUM Collaborating Organization partners. Collaborating Organizations convene a group of utility leaders to explore how the operating context of water utilities has changed since the *Primer* was released in 2008, and to consider refinements to the EUM framework.
February 2016	Taking the Next Step: Findings of the Effective Utility Management Review Steering Group report released. The report outlines key operating shifts in the water sector since 2008 and recommends a series of updates to the *Primer*.
July–Dec 2016	Collaborating Organizations convene a group of utility leaders to update the *Primer*.
October 2016	The Water Research Foundation and the Water Environment Reuse Foundation join as EUM Collaborating Organization partners.
January 2017	The Collaborating Organizations release the newly updated *Primer*.
June 2017	The first Effective Utility Management Multi-Utility Workshop, sponsored by the EPA Office of Wastewater Management, debuts in Holliston, MA as opportunity for utilities of all sizes to learn about the EUM framework. The Collaborating Organizations sponsor ongoing education and promotional efforts to support implementation of EUM by the water sector.

August 2020	The first Effective Utility Management Single-Utility Workshop is hosted virtually by Alexandria Renew Enterprises for a utility specific deep-dive into the application of the EUM framework.
June 2023	The 2023-24 EUM Steering Group is convened with previous and new Steering Group Members to modernize the EUM *Primer*.
July 2024 and Beyond	The Collaborating Organizations release the modernized *Primer*. Updated EUM workshops and webinars are sponsored by the Collaborating Organizations to continue education and promotion of the EUM framework within the water sector.

EFFECTIVE UTILITY MANAGEMENT TEN ATTRIBUTES AND FIVE KEYS TO MANAGEMENT SUCCESS

EFFECTIVE UTILITY MANAGEMENT

A Primer for Water Sector Utilities