Planning for Sustainability

EPA United States Environmental Protection Agency

A Handbook for Water and Wastewater Utilities

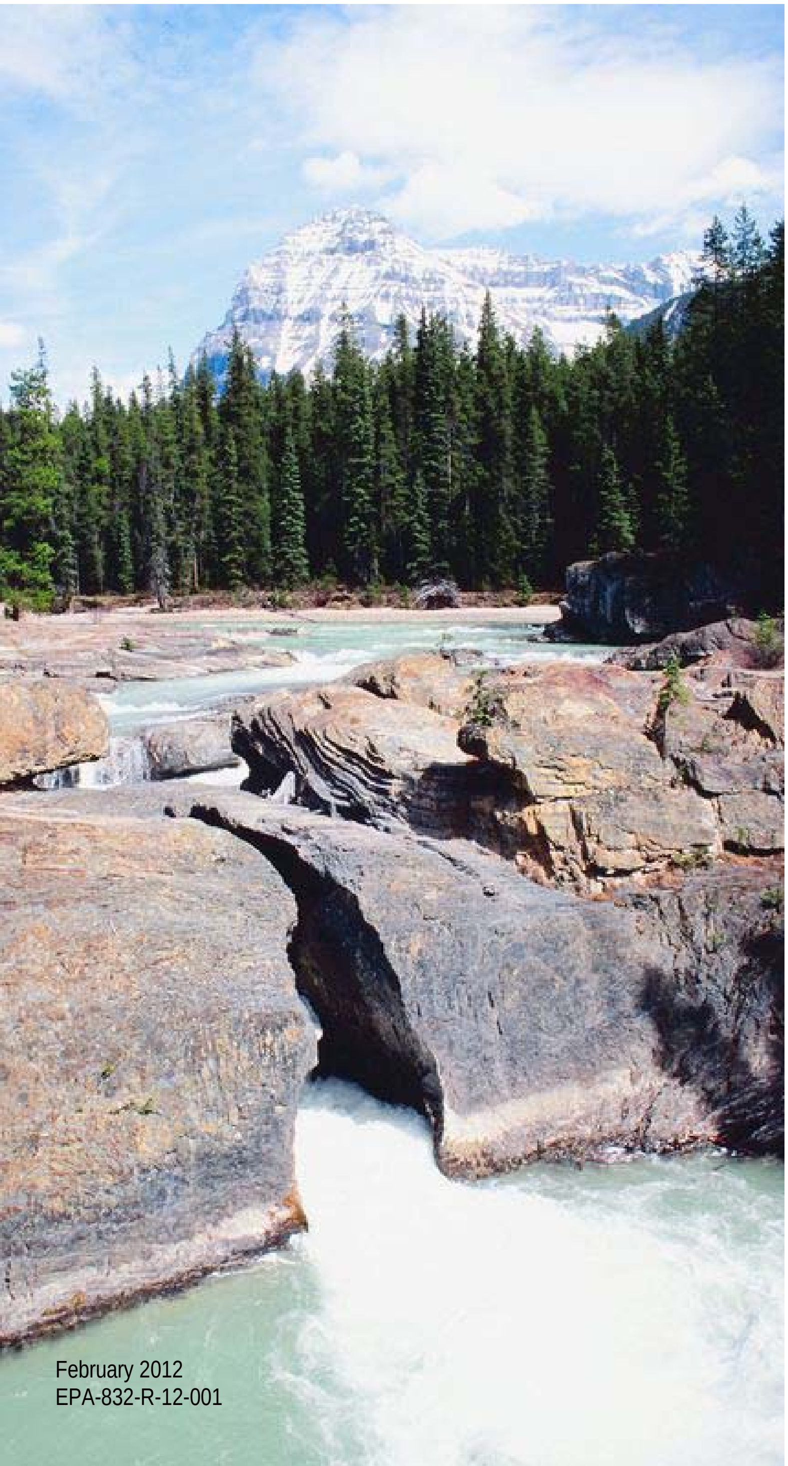

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Table of Contents

Foreword

Sustainable water infrastructure is vital to providing the American public with clean and safe water and helping to ensure the environmental, economic, and social health of the nation's communities. For the past several years, the U.S. Environmental Protection Agency (EPA) has worked with states, industry, and other stakeholders to help water and wastewater utilities sustainably plan and manage their water infrastructure and adopt innovative practices such as green infrastructure.

In September 2010, EPA released the *Clean Water and Safe Drinking Water Infrastructure Sustainability Policy* which described EPA's overall vision and priorities for ensuring the long-term sustainability of water infrastructure and communities throughout the nation. As the Policy was developed, stakeholders strongly emphasized the need to focus on the planning that takes place in the project development phase, before infrastructure solutions are designed and implemented.

In response, EPA is issuing *Planning for Sustainability: A Handbook for Water and Wastewater Utilities.* The Handbook describes a number of steps utilities can undertake to enhance their existing planning processes to ensure that water infrastructure investments are cost-effective over their life-cycle, resource efficient, and support other relevant community goals. Developed after extensive consultation and input from utilities, states, and other stakeholders, the Handbook is organized around a series of Core Elements, including:

- Setting utility sustainability goals and objectives that also support relevant community goals;
- Analyzing a range of alternatives, including green infrastructure and other innovative approaches, based on full life-cycle costs; and
- Implementing a financial strategy, including adequate rate structures, to ensure the alternatives selected are sufficiently funded, operated, maintained, and replaced over time.

EPA believes that utilities which incorporate sustainability considerations into planning consistent with the steps in this Handbook will realize many benefits because they will be able to better:

- Optimize environmental, economic, and social benefits by setting goals and selecting projects through a transparent and inclusive process with the community;
- Consistently assess a range of alternatives that address utility and community goals; and
- Enhance the long-term technical, financial, and managerial capacity of the utility.

Protecting our communities and our precious water resources by sustaining our Nation's water infrastructure is a critical and ongoing challenge. This Handbook is designed to help address this challenge.

Nancy K. Stoner
Acting Assistant Administrator for Water

Introduction and Context

Sustainable water infrastructure is critical to providing the American public with clean and safe water and to help ensure the social, environmental, and economic sustainability of the communities that water utilities serve. For the past several years, the U.S. Environmental Protection Agency (EPA), working with states and utilities, has been undertaking a number of programs to help ensure the long-term sustainability of water infrastructure. A key component of EPA's work has been to promote the adoption of practices by water and wastewater utilities that will help these utilities plan and effectively manage their infrastructure and operations to ensure sustainability and develop and maintain the necessary technical, financial, and managerial capacity to do this planning.

These efforts act in support of effective utility management based on the *Attributes of Effectively Managed Utilities,*[1] and include the Safe Drinking Water Act's Capacity Development Program, and training and technical assistance on advanced asset management and energy management.

In October 2010, EPA issued a *Clean Water and Drinking Water Infrastructure Sustainability Policy* in accordance with directions set forth in the President's FY 2010 budget request to Congress.[2] This Policy describes EPA's overall vision and priorities for ensuring the long-term sustainability of the nation's water infrastructure and the communities this infrastructure serves. The policy is applicable to infrastructure funded through the clean and safe drinking water State Revolving Loan Fund programs (SRFs), traditional forms of community financing, or other appropriate financing mechanisms.

During public consultation as the Policy was being developed, stakeholders emphasized that utility infrastructure investments throughout the water sector could best be influenced through the planning that takes place in the project development phase, before infrastructure solutions are selected and designed. This planning is relatively low cost and can reduce long-term infrastructure costs. Such planning helps ensure that funded projects are financially sustainable over the long term and that they support other relevant community sustainability goals.

Water utilities typically have a long-term planning horizon and long-term infrastructure operation and maintenance commitments. The costs and potential benefits of investment decisions will be realized over a long period of time. Accordingly, EPA's Sustainability Policy calls on drinking water and wastewater systems to undertake "robust and comprehensive" planning to ensure that water infrastructure investments are cost-effective over their lifecycle, resource efficient, and consistent with other relevant community goals. Throughout the Policy, EPA emphasizes the important relationship between utility and community sustainability. The core mission of water sector utilities is to provide clean and safe water in compliance with all applicable standards and requirements at an affordable price in order protect public health and enhance the economic, environmental, and social sustainability of the communities they serve. Similarly, a community's approach to economic development,

[1] See: http://water.epa.gov/infrastructure/sustain/upload/2009_05_26_waterinfrastructures_tools_si_watereum_primerforeffectiveutilities.pdf

[2] See: http://water.epa.gov/infrastructure/sustain/Clean-Water-and-Drinking-Water-Infrastructure-Sustainability-Policy.cfm

transportation, housing, and other relevant areas can also strongly influence the management, operations, and financial health of utility services—including the quality and quantity of available water, and drinking and wastewater capacity and treatment needs.

This handbook reflects a system-wide approach to planning that can drive a strategic shift from a project-by-project focus to one of utilities as systems. It can drive greater consideration of a utility's role within the community or watershed and open up opportunities to achieve water quantity and quality objectives. Many water infrastructure decisions share interdependencies with housing, transportation, and other infrastructure, requiring collaboration or pursuit of coordinated strategies to optimize these investments. A system-wide approach involves utilities looking "beyond the fence line" to include community institutions, and the implementation of projects outside the utility's direct span of control. There is also an opportunity to discuss collaborative partnerships with other municipal departments and with neighboring utilities to share information and services, or to plan on a regional basis.

A number of utilities are also facing challenging and sometimes competing infrastructure priorities driven by regulatory requirements. This handbook, supplemented by other more specific guidance, can help utilities consider a range of potential solutions that enable them to efficiently address their most pressing public health and welfare issues. Utilities that effectively incorporate sustainability considerations into planning can expect to achieve a number of benefits, including:

- **Minimizing costs** by optimizing investment choices, operating water and wastewater systems more efficiently, and pursuing cost-effective investment and management strategies, such as collaboration and partnering with neighboring systems to leverage resources and improve efficiency.
- **Maximizing results of investments** to ensure a continuing source of water, treatment, and discharge capacity, as well as financing capability.
- **Improving the ability to analyze a range of alternatives**, including (as appropriate) both traditional and non-traditional infrastructure alternatives, such as green infrastructure and/or decentralized **systems, and selecting the option or mix of options that best meet the needs of the utility and the community it serves.**
- **Engendering greater support for the utility** by recognizing community values and sustainability priorities.
- **Ensuring that financial and revenue strategies** are adequate to finance, operate, maintain, and replace essential infrastructure throughout its operational life, while appropriately considering the needs of disadvantaged households.

Reducing Costs through More Effective Water Utility Energy Management

Water utility planning that leads to adoption of energy efficient operational practices and technology can save utilities money. Nationally, water and wastewater energy costs are often 30-40% of a municipality's total energy bill. They are also often the largest controllable cost for these utilities.

The Hidden Valley Lake Community Service District in California, for example, found that it could save $70,000 per year in energy costs by pumping water during off-peak times when rates were lower.

This handbook focuses on helping utilities to incorporate sustainability considerations into their existing planning processes effectively. It will assist them in selecting projects that ensure protection of public health and water quality, support other relevant community goals, reflect full lifecycle costs, are based on a robust analysis of alternatives (including conservation or "green" approaches), and are implemented through an ongoing self-supporting financial strategy. If utilities are fully undertaking the actions described in this handbook, they will make decisions that are the most appropriate for the utility and the community and optimize economic, environmental, and social sustainability.

Some utilities and communities have been incorporating sustainability considerations into their planning processes but are looking for ways to improve and refine their current efforts. Others may choose to focus on how such considerations can help to cost-effectively meet existing regulatory or service requirements. Regardless of motivation, the steps described in this handbook can help to optimize infrastructure and operational investments.

Some utilities may want to start with small steps toward incorporating sustainability into their planning and operations and then pursue larger commitments to sustainability over time. To get started, utility managers should create time to discuss and seek input on their sustainability planning with their boards, commissions, and other leadership bodies. Appendix A includes resources for working with boards and commissions.

Sustainability Planning and Regulatory Compliance

Compliance with regulatory requirements is a key focus of water and wastewater utilities. By incorporating sustainability considerations into planning, utilities can meet regulatory requirements in ways that also contribute to utility and community sustainability. Examples (described further in this handbook) include:

- Lenexa, Kansas, which met new Municipal Separate Storm Sewer permit requirements by aligning stormwater management strategy with community master planning priorities through a program that promotes economic vitality, addresses environmental concerns, and meets community needs (see page 12).
- Louisville and Jefferson County (Kentucky) Municipal Sewer District which evaluated and selected green infrastructure strategies based on community input to meet consent decree requirements for its sanitary and combined sewer system (see page 44).

Utilities will want to improve their planning process continually over time by evaluating and refining their goals, objectives, and strategies. Recognizing that effectively incorporating sustainability considerations into planning is a long-term process, utilities may also want to consider codifying a policy that builds sustainability considerations as outlined in this handbook into their planning processes. A policy can provide for long-term planning continuity and drive continual improvement even as utility leadership and oversight changes over time. A policy can also convey the commitment to sustainability in the utility's strategic direction and day-to-day operations support a process of internal communication to board members and employees.

Purpose and Intended Use of this Handbook

This handbook is intended to provide information about how to *enhance* current planning processes by building in sustainability considerations. It is designed to be useful for various types and scales of planning efforts, such as:

- Long-range integrated water resource planning
- Strategic planning
- Capital planning
- System-wide planning to meet regulatory requirements (e.g., combined sewer overflow upgrades and new stormwater permitting requirements)
- Specific infrastructure project planning (e.g., for repair, rehabilitation, or replacement of specific infrastructure)

A plan's scope and time period will determine the scale of projects considered. For example, comprehensive, long-range planning will typically focus on large-scale infrastructure, watershed, and/or aquifer management decisions, while more routine, smaller scale project planning may focus on narrower investments in new or existing infrastructure components or operational changes.

In practice, the planning elements described in this handbook can enhance several planning processes at a utility. For example, a utility can establish goals and objectives reflecting sustainability considerations in a strategic planning process with a 10- to 15-year time horizon, then use them to guide 5-Year Capital Plan decisions.

Where applicable, utilities are also encouraged to engage with other municipal departments during the planning process. For example, there may not be enough sludge generated by the utility alone to justify the purchase and operation of a digester, but in combination with other organics collected by the solid waste department, there may be enough energy generated to make the purchase.

This handbook is intended to be used by utilities of various sizes and levels of capability regardless of their use of SRF or other federal water infrastructure funding. EPA recognizes that some elements of the handbook may pose challenges for utilities delivering water and wastewater services at a smaller scale, those that may have limited resources or capacity, or those that have not adopted a formal planning process. The handbook describes steps these utilities can undertake to enhance their planning. It also includes examples and resources specifically for utilities implementing activities at a smaller scale.

Finally, EPA recognizes that some period of testing and refinement of this handbook will be necessary to improve the document over time.

Approach

Utility planning processes typically involve a series of consistent and predictable activities that encompass identifying goals, setting objectives, assessing alternatives, and developing a financial strategy. In many cases, this process is complemented by ongoing asset management programs and stakeholder involvement and communication. Based on this typical planning process, this handbook identifies four "core" elements where consistent and predictable practices can help utilities effectively build sustainability considerations into their planning processes. The elements will help utilities set sustainability goals and associated measurable objectives, consider a range of infrastructure alternatives (including various watershed, conservation, or "green" alternatives), and implement a financial strategy to ensure that the infrastructure alternatives selected are adequately financed, maintained, and replaced over time. The elements (along with any related measurable results) can also be revisited on an ongoing basis to ensure continuing implementation and improvement.

These core elements are:

1. **Goal-Setting**: Establish sustainability goals that reflect utility and community priorities.
2. **Objectives and Strategies**: Establish explicit, measurable objectives for each sustainability goal and identify strategies for meeting the objectives.
3. **Alternatives Analysis**: Based on sustainability goals and objectives, set explicit and consistent evaluation criteria to analyze a range of infrastructure alternatives.
4. **Financial Strategy:** Implement a financial strategy including adequate revenues so that new infrastructure and operational investments—as well as the overall system—are sufficiently funded, operated, maintained, and replaced over time on a full lifecycle cost basis, with appropriate considerations for disadvantaged households.

These elements are intended to build on each other as utilities go through a specific planning process or they may be inter-related parts of separate planning processes. Some utilities, however, may be adequately implementing one or more of the elements and therefore choose to focus greater attention on other elements as a means of enhancing their planning.

For each element, this handbook describes specific steps to enhance utilities' planning processes to aid effective and balanced consideration of sustainability in the selection of infrastructure projects. The steps for each element, along with brief case examples and call-out boxes, also describe suggested practices from utilities that have incorporated sustainability considerations into their planning. Each element also includes diagnostic questions for gauging how thoroughly each element is addressed.

> **Planning Terms as Used in this Handbook**
>
> Goals: Broad, qualitative statements of what the utility hopes to achieve.
>
> Objectives: Specific, measurable statements of what will be done to achieve goals within a particular time frame.
>
> Strategies: General approaches or methods for achieving objectives and resolving specific issues. Strategies speak to the question "How will we go about accomplishing our objectives?"
>
> Alternatives: Within a strategy, specific infrastructure investments or operational changes for achieving objectives.
>
> Criteria: Measures or considerations used to evaluate alternatives.

Figure 1 summarizes the elements and illustrates how two sustainability goals—increasing energy efficiency and supporting infrastructure in existing communities—could be addressed in the process.

Figure 1: Core Planning Elements for Sustainability

1. Goal-Setting	2. Objectives and Strategies	3. Alternatives Analysis	4. Financial Strategy
Consider goals that reflect utility and community sustainability priorities	*Establish objectives and strategies for each sustainability goal*	*Based on sustainability objectives, set explicit and consistent evaluation criteria to analyze a range of alternatives using.*	*Develop a financial strategy reflecting full lifecycle costs and adequate revenues to ensure the system is sufficiently funded, maintained, and replaced over time.*

Energy Use Example…

<u>Sustainability Goal</u>:	<u>Objective and Strategies</u>:	<u>Alternatives Analysis</u>:	<u>Financial Strategy</u>:
Utility seeks to reduce its energy use consistent with the community's energy efficiency program	Utility sets objective of reducing energy use by 25% in 5 years; it conducts an energy audit to determine its baseline energy use and identifies potential projects to meet its objective	Utility evaluates all projects, in part, on their relative lifecycle energy efficiency costs (e.g., installation of high efficiency heat pumps) and their relative ability to meet the 25% energy use reduction objective	Utility revenue and borrowing strategy ensures sustainable financing of new projects, taking advantage of lower energy costs

Supporting Infrastructure in Existing Communities Example…

<u>Sustainability Goal</u>:	<u>Objective and Strategies</u>:	<u>Alternatives Analysis</u>:	<u>Financial Strategy</u>:
Utility aligns itself with community goal to accommodate most expected growth by revitalizing urban areas rather than through new development	Utility sets objective to serve 75% of expected growth within its existing service boundary; it analyzes its current capacity to accommodate new growth within its existing service area and identifies strategies for increasing capacity	Utility evaluates all projects, in part, on the extent to which they increase the ability to serve growth within the service boundary (e.g., projects providing service near planned public transit services)	Utility revenue and borrowing strategy ensures sustainable financing of new projects, taking advantage of avoided costs of service boundary expansion (e.g., by ensuring that costs associated with growth outside of the existing service boundaries are paid by new users)

Providing a Solid Foundation for Planning through Asset Management and Community Engagement

Throughout the planning process, two aspects of utility management and operations—asset management and ongoing engagement with communities and customers—strengthen and reinforce the four elements.

Asset Management

An ongoing asset management program that includes detailed information on what assets a utility has, how long they will last, and how much it will cost to replace them, is essential to effective utility management. An infrastructure inventory; condition assessment; risk-based schedule for maintenance, repair, rehabilitation, and replacement of infrastructure; and financial plan are specific parts of a utility's asset management strategy. Asset management supports sustainability planning in many ways, including:

- Providing infrastructure capacity and condition information;
- Generating options for the repair, rehabilitation, and replacement of existing assets; and
- Providing information on full lifecycle costs of existing assets.

Beyond implementing asset management, utilities are also encouraged to perform an assessment of their operations using the *Effective Utility Management Primer* developed by EPA and six national water sector associations.[3] The Primer helps utilities to assess their operations based on a series of *Attributes of Effectively Managed Utilities* and to identify specific actions they can take to improve their performance (see call-out box).

Effective Utility Management

Effective planning is essential for an effectively managed utility. In 2007, EPA and six national water associations entered into a historic agreement to promote effective utility management based on a series of *Attributes of Effectively Managed Utilities* and *Keys to Management Success*. The Attributes describe a range of outcomes utilities should strive to achieve across all facets of their operations—from infrastructure and finances to building stakeholder understanding and support. *The Keys to Management Success* describe a series of frequently used management approaches that can help utilities achieve the outcomes called for in the Attributes.

The EUM partnering organizations have also developed a Primer to help utilities assess their operations and identify actions to improve their performance. Utilities are encouraged to learn more about the Effective Utility Management Initiative and use the Primer to do an assessment of their operations by going to http://www.watereum.org/.

The planning steps described in this handbook can help utilities manage their infrastructure and operations and achieve the outcomes embodied in the Attributes. In addition, two of the Keys to Management Success—Strategic Business Planning and using a Plan-Do-Check-Act management systems approach—are particularly relevant to implementing this handbook. Appendix B contains a description of the relationship between the four elements described in this handbook and in the *Keys to Management Success and Attributes of Effectively Managed Utilities*.

[3] The Primer and other information about Effective Utility Management can be found at: http://water.epa.gov/infrastructure/sustain/upload/2009_05_26_waterinfrastructures_tools_si_watereum_primerforeffectiveutilities.pdf

Guidance and other resources on asset management and effective utility management are included in Appendix A.

Community Engagement

Ongoing community engagement—including in-person involvement and outreach and communications with communities—is important for establishing and maintaining community understanding of the value of utility services and the resources needed to deliver them. Ideally, utilities undertake long-term planning in the context of an ongoing relationship and active engagement with their communities and customers. In the specific planning context, community input about sustainability goals and values can inform utility service levels, reliability standards, revenue strategy, and other considerations.

Communication and transparency throughout the planning process can lead to greater support for utility decisions by increasing public understanding of the value of water infrastructure and utility services. Building customer and community appreciation of infrastructure investment value is likely to require proactive, ongoing stakeholder education and involvement. For example, changes to utility rates and fees typically require the approval of a governing body (e.g., utility board, municipal or county council) and can be difficult in the absence of reasonable customer support. Utilities that have established and clearly communicated a case for infrastructure investment value and that have a reputation for effective management and transparency are more likely to garner support for needed rate and fee increases.

> **Building Customer Appreciation for Water Infrastructure Value in Rural New Mexico**
>
> A small water and wastewater utility (approximately 50 connections) serving a community located near Gallup, New Mexico, used an asset management process to prepare infrastructure and financial plans. The plans addressed infrastructure reaching the end of its useful life in 10 years. Replacement would require rate increases. Through transparency with the public using information from the asset management process, the utility made an effective case for infrastructure investment and general community support for a \$6/month rate increase.

Ongoing community engagement can support the planning process by:

- Providing necessary input early in the process;
- Providing understanding of community goals and values (e.g., for green space or economic redevelopment) to guide the utilities' strategic direction and the identification and weighting alternatives assessment criteria;
- Generating specific ideas about strategies to meet goals, which may be also considered as part of the alternatives analysis where specific projects are selected; and
- Building a base of community understanding and support for selecting service levels, establishing reliability standards, and meeting revenue needs through rate changes or other mechanisms.

Recording and tracking issues raised by community members should be carefully undertaken and can help utilities be transparent and responsive. Appendix A includes several guides, tools, and case studies with other strategies for engaging with the community.

What Comes Next

The remaining chapters focus on the four planning elements. Each chapter includes:

- A description of the element and how it enhances existing planning approaches;
- Key steps to implement the element;
- Approaches to implement the element on a smaller scale;
- Diagnostic questions for gauging how thoroughly an element has been addressed; and
- One or more illustrative examples

Planning Element 1: Goal Setting—*Establish Sustainability Goals that Reflect Utility and Community Priorities*

Element Description

Utilities should consider and set sustainability goals to provide a foundation for incorporating sustainability considerations throughout the planning process. These goals should reflect internal assessment of sustainability priorities as well as community sustainability priorities identified through information gathering and consultation with local institutions and stakeholders. Utilities are also encouraged to engage other municipal departments, as appropriate. For example, there may not be enough biosolids generated by the utility to cost-effectively operate a digester, but in combination with organics collected by the solid waste department, there may be enough energy generated to justify a major equipment purchase.

Ideally, utility consultation with communities and customers about sustainability goals occurs as part of ongoing engagement about services, key decisions, and revenue needs. Information gathering about community sustainability priorities, however, can take many forms, from review of existing community plans or other documents to direct consultation with community representatives (e.g., planning agencies, elected officials, and stakeholder groups).

Sustainability goals are critical for guiding utilities as they move through the other three elements to set measurable objectives and strategies, analyze alternatives, and develop a financial strategy to support chosen investments.

Internal and Community-Wide Considerations for Developing Sustainability Goals

Sustainability goals will be strongly influenced by several factors internal to the utility, including:

- The utility's mission and strategic direction
- Regulatory and legal requirements
- An assessment of vulnerability related to sustaining operations and financing
- Customer expectations about services and rates
- Other considerations related to the effective operation of the utility

Sustainability goals should also support, where feasible, other community sustainability priorities related to economic development, quality of life, and environmental quality.

Potential Sustainability Goals

This list describes a range of sustainability goals along with examples of utility approaches to address them. The examples are illustrative only. More information on how to use the goals to make appropriate infrastructure and operational decisions is contained in the remainder of the handbook.

Improve compliance

- *For example, establish collaborative partnerships with neighboring utilities to increase or maintain technical, managerial, or financial capacity or to share information and expertise.*

Reduce energy cost

- *For example, invest in more energy efficient equipment or explore operational changes that can enhance energy optimization (such as pumping at night when the rate is lower).*

Reduce overall infrastructure costs to communities

- *For example, partner with other community agencies to coordinate infrastructure projects such as road repairs with lead service line replacement and installation of rain gardens.*

Extend the projected adequacy of current water supplies

- *For example, implement consumer water conservation programs, implement water metering, fix distribution system leaks, or make use of reclaimed water.*

Address wet weather impacts

- *For example, implement a mix of non-traditional infrastructure alternatives such as green infrastructure solutions with integrated stormwater and combined sewer overflow control.*

Preserve critical ecological areas in the community

- *For example, adopt management programs for septic systems to reduce nutrient loadings to lakes or employ "green" treatment chemicals.*

Improve the economic vitality of the existing community

- *For example, target water infrastructure projects to support existing community infrastructure and encourage redevelopment.*

Enhance community livability.

- *For example, incorporate green space or recreational opportunities into projects.*

Reduce long-term system operational costs

- *For example, use natural treatment systems, such as functioning wetlands, to reduce the input of energy and chemicals for treatment or re-use water treatment solids.*

Improve operational resilience

- *For example, understand operational, financial, and potential climate vulnerabilities and incorporate them into alternatives analysis as part of a broader risk management strategy.*

Reduce vulnerability to water supply disruption or contamination

- *For example, conduct real-time water quality monitoring, install isolation shutoff values, or provide connections to alternative water supplies.*

Ensure a sustainable workforce

- *For example, implement steps to ensure a safe workplace, knowledge retention, and incorporating new knowledge through training.*

Lenexa, Kansas: Aligning Community and Utility Sustainability Goals to Ensure Compliance

Lenexa, Kansas is a Kansas City suburb of 45,000 people. It's "Rain to Recreation" program illustrates how a utility can meet regulatory requirements by aligning its programs with community sustainability goals.

In the late 1990s, to respond to rapid population growth, Lenexa undertook a citizen-led community planning process that resulted in a community strategic visioning report, "Vision 2020" (released in 1997). The community's vision statement was:

> *"Showing commitment to a superior quality of life and respect for the natural environment, Lenexa will provide an atmosphere where people desire to live, work, and play. Our unique villages and parklands, residential, commercial and industrial developments will reflect a community in which the heritage of the past and the pride of the present are preserved for citizens of the future."*

In Vision 2020, the community showed a strong interest in stormwater management to reduce flooding, improve water quality, enhance recreation, and preserve open space in the community. To address this community priority, the city developed an integrated Stormwater and Watershed Management Master Plan in 2001. This plan became the foundation for the community's "Rain to Recreation" program.

In 2004, Lenexa—along with many other cities of similar size around the country—faced new Municipal Separate Storm Sewer System (MS4) permit requirements. To comply with the permit, the city strengthened Rain to Recreation through a local ordinance and design manual that favored stormwater management practices that infiltrated and reused runoff and facilitated evapotranspiration.

With its origins in community visioning and in response to new regulatory requirements, Rain to Recreation now includes both regulatory and non-regulatory components, including:

- Regulatory requirements for stormwater management practices at new and redeveloped properties, such as rain gardens, bioswales, and other forms of green infrastructure in private development projects
- Major capital projects, such as new stormwater facilities and infrastructure repair funded by a 1/8 cent sales tax levy
- Land acquisition to provide flood mitigation, stream protection, water quality improvements, and recreational amenities

Funding for Rain to Recreation is provided by a sales tax levy, stormwater charges based on runoff surface area on land parcels, one-time capital improvement fees for new developments, state and federal grants for water and transportation infrastructure, and permitting fees charged to developers. Overall, the program has allowed the utility and community to comply with regulatory requirements, protect natural resource areas in the watershed, create greenways along streams, and implement green infrastructure practices. Functional and aesthetically-pleasing green infrastructure projects resulting from the program complement neighborhood revitalization plans and generate multiple benefits for the environment and community.

Additional reading:

- City of Lenexa's Rain to Recreation Web site at www.raintorecreation.org
- Map of Lenexa's green infrastructure: http://maps.lenexa.com/greeninfrastructure/greeninfrastructuretour.html
- EPA, Green Infrastructure Case Studies: http://cfpub.epa.gov/npdes/greeninfrastructure/gicasestudies_specific.cfm?case_id=75
- City of Lenexa, "Rain to Recreation: Making the Case for a Stormwater Capital Recovery Fee": http://www.environmental-expert.com/Files%5C5306%5Carticles%5C11741%5C299.pdf
- City of Lenexa, Vision 2020: http://lenexa.com/main/pdfs/Vision2020.pdf

Current Planning Process

In their existing planning processes, utilities often set goals based on community planning information that defines the amount, type, and location of future demand for the utilities' services. Relevant information often includes population growth projections, the location and nature of planned development, and zoning changes. This information typically flows one-way from community development plans, master plans, and growth management plans to the water utility. Water sector utilities are then in a position to describe how they will be able to help address other community priorities in the future. However, utilities typically have a limited role in helping communities understand the expected impacts of planned growth, such as infrastructure needs and associated costs. For example, projections of the lifecycle infrastructure costs of accommodating planned growth can allow for better informed community decisions.

Building Sustainability Considerations into Goal Setting

For purposes of this handbook, setting sustainability goals at the outset of the planning process should involve information gathering and, where feasible, consultation with community members or other planning institutions about community sustainability priorities. This activity can take several forms depending on the utility's capabilities, needs, and relationship to the community. Figure 2 illustrates a continuum of different types of up-front information gathering and/or consultation between a utility and the community.

Figure 2: Continuum of Utility-Community Information Gathering and Consultation

The left side of the continuum represents the utility gathering information from existing community planning documents or key individuals (such as the town manager or town clerk) about sustainability priorities related to areas such as transportation, recreation, and housing. Although this approach may be appropriate for some utilities and communities (particularly in cases where utility capacity or resources are constrained), most utilities will find significant value added from more active community consultation.

The center of the continuum represents more active engagement between the utility and the community to discuss community sustainability priorities. This engagement can be through meetings with planning officials, involvement in ongoing community forums about desired growth and development, or convening stakeholders representing community organizations to better understand their priorities.

The right hand side of the continuum represents active partnership between the utility and the community to jointly formulate sustainability goals that both the utility and the community can actively pursue. Partnerships, either formal or informal, allow the utility and community not just to understand each others' priorities but also to enable each others' activities. For example, the water utility that serves Hidden Valley Lake, California worked over time to enhance drinking water source protection. It ultimately influenced the nature and location of development through a role in land use permitting under the direction of the local planning department (see call out box later in this section).

Any of the approaches along this continuum can be used depending on the utility's capacity and resources, as well as local conditions. Regardless of the approach taken, the following steps can help utilities effectively engage in consultation at the beginning of the planning process and set sustainability goals.

Step 1. Identify sustainability priorities and potential opportunities for the utility

Utilities first consider their own sustainability priorities by internally assessing infrastructure and operations that may provide opportunities for increased sustainability and improved performance. For example, utilities may want to assess operations using the Effective Utility Management Primer described in the Introduction to this handbook. Similarly, many aspects of a utility's asset management plan can provide useful information for identifying sustainability opportunities. A vulnerability assessment can pinpoint opportunities for improved system resilience. It can also identify gaps in technical, managerial, and financial capacity that, when address, can help utilities achieve sustainability goals. For many utilities, sustainability priorities may focus almost exclusively on strategies for meeting regulatory requirements or approaches for sustaining existing infrastructure and operations as opposed to new projects.

Although Step 1 is internally focused, it can be informed by ongoing customer and community relationships and their expectations about the role and operation of the utility. It can also be informed by the range of incentives utilities have to become more sustainable, including cost savings, financial benefits, and alignment with the utilities' traditional mission or sustainability policies.

Step 2. Identify community sustainability priorities

As a second step, utilities should gather information to understand broader community sustainability priorities. Utilities can utilize planning documents or ongoing planning efforts to gather relevant community sustainability priority information, such as transportation plans, climate action plans, watershed plans, or community "vision" documents.

As part of considering these plans, utilities should develop familiarity with the community-wide priorities these plans seek to address. Furthermore, utilities should improve understanding of the institutions (and key contact personnel) responsible for planning, and opportunities for involvement in ongoing planning processes (e.g., as part of steering committees, or through direct agency-to-agency dialogue).

Step 3. Engage the community about its sustainability priorities

In many cases, utilities will find value in pursuing active engagement or partnerships with the community. These utilities will need to identify forums or other opportunities for consultation with community planning institutions or stakeholders. (Some utilities with limited resources or capacity may not be able to engage the community actively but can still gather available information as described in Step 2). In some cases, effective engagement can also be accomplished through discussions with key individuals, such as the town manager or clerk.

Active community engagement seeks to identify sustainability priorities, describe how water infrastructure decisions affect a community's ability to achieve priorities, and provide an opportunity to discuss how the utility and community can align sustainability efforts. These discussions should address what communities are willing and able to afford if new infrastructure is needed or if other costs

Approaches for Involving Stakeholders in Planning

A variety of approaches for involving stakeholders in planning can be used in various stages of the planning process:

- Using existing boards or other governing bodies to provide stakeholder perspectives or as a means for collecting information about community priorities and communicating about utility activities
- Establishing and maintaining an informal network of community opinion leaders periodically consulted on community priorities or utility sustainability objectives
- Ongoing communications through websites, press releases, and other channels to keep the broad community informed about the utility planning process and decisions
- Public meetings to inform the community about key milestones in the planning process and solicit feedback on key decisions
- Focus groups, surveys, or related strategies for soliciting information about community goals, priorities, values, and ideas
- A stakeholder steering committee to advise throughout the process on key planning decisions, such as setting long-range goals and establishing project selection criteria and/or weighting schemes

To select an approach, assess how much stakeholder input and support is needed to make decisions consistent with both utility and community priorities. Consider:

- What are the potential rate implications, including for disadvantaged households?
- What is the potential for community disruption?
- What is the overall cost and duration of the effort?
- Do we need consensus for a timely and effective implementation?

The answers will help utilities determine what stakeholders to involve, how often, over what period of time, and what outcome is needed. This information will inform the time and other resources for stakeholder engagement.

necessitate increases of rates or fees. Such discussions help set realistic expectations about levels of service and community costs, and inform the process for evaluating alternatives (described in Element 3).

Consulting stakeholder groups can help build support for utility goals and specific infrastructure decisions. For example, utilities considering watershed protection goals may benefit from consultation with local land use agencies, private land owners, developers, or local watershed groups. Among other things, these stakeholders may see utility vulnerabilities not identified by internal personnel.

As part of the consultation process, utilities may want to consult with neighboring utilities to understand how peer institutions are addressing sustainability. This consultation can also create an opportunity to explore potential collaboration opportunities and partnering relationships.

Other important stakeholders include economic development, transportation, or other agencies that set local long-term growth and development strategies. The forum and nature of discussions on these topics can vary widely depending on institutional context. For example, a utility housed in a public works or other department may have consultation with another department facilitated through the leadership of the mayor, city manager, or city council and governed by city-wide policies. In contrast, an independent enterprise utility seeking to consult with municipal or county planners may need to establish new institutional relationships, such as a formal or informal steering committee made up of the senior management from the relevant agencies.

Consultation opportunities are as varied as the communities in which they take place, including the following examples:

Hidden Valley Lake, California: Encouraging the Community to Engage with Water Utilities about Planning

For certain sustainability goals—such as source water protection—utilities will need to work with other community institutions that guide local land use and economic development. Water utility experience in Hidden Valley Lake, California illustrates how utilities and communities need to work together on sustainability goals—in this case by developing community planner appreciation for what utilities have to say about sustainable growth and development.

Hidden Valley Lake is a rural community of around 4,000 people in northern California. The Hidden Valley Lake Community Service District (CSD) provides drinking water to around 1,500 lots from three high quality domestic water supply wells. In the early 1990s, CSD sought a greater role in commenting on development permits issued by the county planning department. CSD sought to avoid development that might harm groundwater resources and potentially lead to increased treatment costs.

The county planning department was initially reluctant to increase CSD's role in its existing permitting process. By working with the local County Board of Supervisors and other means, CSD eventually obtained a role in commenting on permits on a project-by-project basis. CSD recognized, however, that commenting on individual projects was insufficient to protect the area's water resources over the long term. With continued support from the County Board of Supervisors, CSD moved from commenting on individual permits to playing a deeper role in county planning—both on a working level and as a "critical stakeholder" in the county's Master Plan development. Today, CSD maintains a productive working relationship with county planners and has a strong voice in how the community grows.

- ***Participating in direct discussions with other planning institutions and community bodies early in their planning processes***. Utilities can go directly to other local planning institutions to discuss sustainability priorities. In some cases, community institutions, such as county councils or city managers, may need to support and encourage the consultation, and utilities may need to build relationships with planning agencies and encourage support for collaboration over time.

> **Cross-sector Coordination for Sustainability at the Federal Level: The HUD-DOT-EPA Partnership on Sustainable Communities**
>
> At the federal level, the Departments of Housing and Urban Development (HUD) and Transportation (DOT), along with EPA, have joined together through the HUD-DOT-EPA Partnership on Sustainable Communities to help improve access to affordable housing, more transportation options, and lower transportation costs while protecting the environment in communities nationwide. Through a set of guiding livability principles and a partnership agreement, this partnership will coordinate federal housing, transportation, and other infrastructure investments to protect the environment, promote equitable development, and help address the challenges of climate change. One goal of the federal partnership is to have this kind of cross-sector coordination occur at all levels of government. More information about this Partnership is available at http://www.epa.gov/smartgrowth/partnership/.

- ***Getting involved with existing community-wide planning efforts***. Where communities are already involved in community-wide planning or "visioning," utilities can play an active and important role in helping to define community goals and the actions supporting them. For example, the city of Portsmouth, New Hampshire undertook a master planning process (culminating in a plan in 2004) that involved many citizens and community institutions in discussions to define a future vision for the city. The role of water infrastructure was an integral part of the plan, which called out as a key priority "water and sewer policies and infrastructure [that] make use of best practices in environmental protection and provide incentives for conservation." The development of the community's Master Plan was influenced by utilities' existing water and wastewater plans. The Master Plan then drove subsequent infrastructure decisions by the local utilities, including construction of a LEED-certified water treatment plant (see case study at the end of this section for more information on the Portsmouth, New Hampshire case).
- ***Aligning utility planning with existing community plans***. If community plans already exist, utilities can incorporate the plans' goals into their own planning efforts. This may not involve active utility participation in community planning itself, but rather a strategic decision to incorporate community goals into the utility's own planning efforts. For example, the City of Portland, Oregon Water Bureau aligned with Portland's Climate Action Plan by setting specific objectives in its Strategic Plan to reduce carbon emissions. It then identified (and monitored) specific carbon reduction actions through the Water Bureau's Sustainability Action Plan. (See more about the Portland case at the end of the next section.)

Convening a stakeholder process for water planning. Absent ongoing processes, utilities may need to take the initiative to convene and consult directly with members of the community. For example, Quay County, New Mexico convened a stakeholder steering committee representing the rural county's 10,000 residents to outline a vision and goals and to guide development of its 40-year water plan. Similarly, the Envision Utah program, a community-wide conversation about the future of the state, outlined a "Community Design Workshop" process providing communities with a water conservation plan development blueprint involving "teams of citizens representing a cross-section of local interests."[4]

Step 4. Identify and document sustainability goals

Regardless of the up-front consultation approach, the utility should document and make available a description of its process and identify the sustainability goals that emerged from the consultation. These goals will guide development of the remaining elements, including decisions about infrastructure investments and other potential utility operational changes. Documentation can also help communicate sustainability goals to boards, other oversight bodies, and utility employees.

As utilities develop goals, maintaining regular communication with stakeholders and relevant regulatory agencies will help lay the foundation for (and engender support for) subsequent decisions about specific strategies and investment alternatives. A transparent decision-making process will help utilities gain the support of the community.

Implementing These Steps on a Smaller Scale

EPA's *Strategic Planning: A Handbook for Small Water Systems* describes a process for small systems to identify goals as a component of a strategic planning process and to carry those goals through to implementation.[5] The document describes the development of a "strategic roadmap" consisting of the utilities' ideals, goals, and values. Utilities implementing on a smaller scale can incorporate sustainability considerations into the development of this type of strategic roadmap and inform the development of sustainability goals through information gathering and consultation with the community.

In the goal setting process, utilities implementing on a smaller scale may not have the staff or funding resources to consult actively with other community institutions or stakeholders through a formal process. These utilities should consider employing less resource-intensive approaches to identifying community sustainability priorities. These approaches include gathering information through documents, such as community comprehensive plans, or holding discussions with key individuals in the community with access to this information, such as the town manager or clerk.

Depending on resources and capacity, some utilities may only be able to pursue Steps 1 and 2. These utilities may also find that Steps 1 and 2 are sufficient to understand community priorities.

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[4] See: (http://www.envisionutah.org/eu_qgs_waterconserv.html) (call out pp. 119)
[5] See: http://www.epa.gov/ogwdw/smallsystems/pdfs/guide_smallsystems_stratplan.pdf

Neighbors Helping Neighbors: Regional Cooperation and Partnerships in New Mexico

New Mexico covers over 121,000 square miles and has a population of slightly more than two million people. A majority of the population is located within the metro areas of Albuquerque, Las Cruces, and Santa Fe. The state is served by over 600 community water systems, of which 93% serve fewer than 10,000 people. While the smaller community water systems must be resourceful to meet their own needs, many simply do not have the resources and the talent pool to do everything—so neighbors help neighbors.

Regionalization is an active concept in New Mexico, and there is a concerted effort by public officials to encourage physically connected regional systems … but regionalization does not always mean connected systems, nor does it have to be nudged by governmental action in all cases.

In the mountains east of Albuquerque, within a 600 square mile area, there are 19 community water systems (CWS) with various organizational forms, including non-profit privately-owned cooperatives, private for-profit companies and corporations, public mutual domestic associations—and four community sewer associations. To ensure high quality and efficient service for their customers, these systems work together in a variety of ways pursuant to both written and unwritten agreements.

- The largest CWS provides a certified water operator (under contract) to three much smaller CWSs and certified wastewater expertise for two community sewer associations serving less than 100 homes each. It frequently helps troubleshoot problems and provide managerial expertise and regulatory knowledge to the smallest entities at no charge.
- The owner of a private for-profit CWS also owns a construction company and provides construction and repair crews for its neighbors below its normal rates.
- A private for-profit CWS provides a certified wastewater operator, under contract, to a public mutual domestic sewer association.
- Some of the smaller systems share billing and work order systems, share expenses for a back hoe and operator, and assist one another in repairing damage.
- As drought reduces the availability of ground water, systems within proximity of each other have created interconnections to provide temporary assistance to resolve a water supply challenge of their neighbors—and in many cases, that water can flow in both directions.

Neighbors in rural communities help each other; the same is true for the CWSs and sewer associations that serve them. In rural New Mexico, necessity is the mother of invention.

In most cases, utilities in smaller communities will find it beneficial to pursue active engagement with the community, with community planning institutions, or with stakeholders. Even smaller communities will occasionally need to garner community support for critical decisions. Community-wide planning has multiple benefits in this context. For example, utility managers in the City of Live Oak, Florida worked with the local water management district to develop plans for wastewater reuse before any funding was available to do so. When state legislation established a funding source for reuse, Live Oak was well-positioned to receive the money, which funded a significant amount of its reuse infrastructure.[6]

Key Diagnostic Questions

Utility managers can use the following questions to evaluate their implementation of this element:

[6] Bob Farley, 7/1/10

- What was the internal process your utility undertook to identify its sustainability opportunities? What opportunities did the utility identify?
- What community plans or information sources did your utility consult to identify community sustainability priorities?
- If applicable, how did your utility consult with other community members or community planning organizations about utility and community sustainability priorities and the relationship between them?
- If applicable, how did your utility consult with neighboring utilities about potential partnership opportunities to share information or services?
- As a result of your own internal discussions and upfront information gathering and consultation with the community, what sustainability goals did your utility set and why?
- How were your utility's sustainability goals documented and communicated internally and externally?
- How will the community and others consulted be kept informed of subsequent decisions and developments?

Example of Sustainability Planning in Practice: Portsmouth, New Hampshire Incorporates Water and Wastewater Decisions into Community-Wide Master Planning

Portsmouth, New Hampshire, a community of approximately 20,000 people, provides an example of how utility planning informed community Master Plan development. It also illustrates how utilities can help implement parts of a Master Plan through ongoing water system operations.

Portsmouth produced a community-wide Master Plan in 2005.[7] The Master Plan established goals, objectives, and strategies for the city for a ten year period. It covered land use, housing, economic development, transportation, natural resources, and a range of other topics—including the city's water and wastewater utilities.

The city's residents and public officials contributed to plan development—mainly through "Portsmouth Listens," a process that convened citizens through small discussion groups and included several meetings with City boards, regional institutions, neighborhoods, and private interest groups. This process resulted in a vision reflecting citizen aspirations for the city's future, and it informed identification of community action priority areas. The vision read, in part:

> *Portsmouth should be a livable, walkable city that preserves its history, lives in balance with its natural resources, protects its waterfront and views, provides a good climate for entrepreneurial opportunity, acts on its belief in socio-economic diversity through affordable housing, and connects neighborhoods through multiple and innovative modes of transportation.*

[7] City of Portsmouth. 2005. *Portsmouth Master Plan*: http://www.cityofportsmouth.com/masterplan/MasterPlanFinalComplete-Aug2005.pdf

Key plan priorities included maintaining a vital downtown area (including increased public transit, mixed-use buildings, and higher density housing options), enhancing certain transportation corridors, and housing affordability. Sustainable development—including environmental, economic, and social sustainability—was also called out as a key priority. As a component of sustainable development, the plan said that "water and sewer policies and infrastructure should make use of best practices in environmental protection and provide incentives for conservation."

The Portsmouth Master Plan incorporated, and benefited from, strategies identified in existing water and wastewater plans (i.e., the *Water System Master Plan*, the Sewerage Improvement Program, and the *Combined Sewer Overflow Long Term Control Plan*). It also outlined new strategies for water conservation, energy efficiency, "green infrastructure," and others to be implemented by the water and wastewater systems. Table 1, below, provides examples of goals, objectives, and strategies related to water and wastewater from the Master Plan.

Under the goal to "provide drinking water that meets federal and state regulatory requirements and serves the needs of Portsmouth's residents and businesses," the Master Plan called out upgrading or replacing the Madbury Treatment Facility to meet future regulatory requirements and rectify past violations—an action also identified in the Water System Master Plan. Driven by the sustainability goals in the City's Master Plan, the new facility was designed according to sustainability principles, including promoting energy efficiency, minimizing waste, being durable over its lifecycle, reducing the City's carbon footprint, and reusing existing structures wherever possible. The design followed LEED (Leadership in Energy and Environmental Design) principles, including using 30 percent less energy than conventional designs (including technologies such as solar hot water collectors, heat pumps, and "daylight harvesting"), saving costs and reducing the facility's carbon footprint.

Table 1: Examples of Water and Wastewater Goals, Objectives, and Strategies from the Portsmouth Master Plan

Selected Master Plan Goals	Selected Objectives Related to Water and Wastewater	Selected Strategies Related to Water and Wastewater
Promote new development and redevelopment that supports the Master Plan vision.	• Promote new development and redevelopment that…minimize demands for new infrastructure and services.	• Revise site review regulations to allow for a fuller consideration of off-site and neighborhood impacts (e.g., stormwater). • Consider fiscal impacts when reviewing proposals for zoning changes or zoning map updates.
Provide drinking water that meets federal and state regulatory requirements and serves the needs of Portsmouth's residents and businesses.	• Protect and improve the quality and supply of the City's groundwater and surface water resources. • Maintain and upgrade water distribution and treatment systems to meet current and future domestic, commercial, and fire protection standards.	• Protect reservoir watershed areas and wellhead zones. • Promote water conservation and increase public awareness of best practices in watershed management. • Implement recommendations made in…the *Water System Master Plan* (e.g., improve the distribution system efficiency, upgrade and/or replace the Madbury Treatment Facility).
Protect the Region's water resources through effective collection and treatment of wastewater and stormwater.	• Operate and maintain the City's wastewater treatment facilities and expand and upgrade as needed to comply with regulatory requirements and to accommodate growth. • Minimize impacts to the City's waterways from combined sewer overflow. • Participate in regional approaches to wastewater treatment and disposal.	• Continue to implement…the Sewerage Improvement Program. • Review site review regulations with respect to stormwater management and upgrade to current best practices. • Implement the *Combined Sewer Overflow Long Term Control Plan*. • Consider implementing a stormwater enterprise fund to provide for and fund the construction, operation, improvement, and maintenance of stormwater facilities.
Develop an approach to natural resource protection and planning that is based on watershed boundaries, wildlife habitat areas, and open space corridors.	• Direct new growth to areas that are already developed and where adequate infrastructure for growth is in place.	• Consider adopting the "green infrastructure" concept as a component of open space planning and site plan review.
Incorporate sound environmental practices into all municipal policies and projects.	• Develop and adapt an environmental policy to guide City projects and operations in order to achieve City-wide goals of improving and sustaining environmental quality.	• Identify goals for reducing water consumption….improving energy efficiency, [and] implementing natural landscaping techniques.
Maintain and improve the quality of wetland and waterfront areas.	• Protect significant wetlands. • Reduce non-point source pollution.	• Require the design of stormwater management systems to maximize habitat value. • Minimize runoff by clustering development on the least porous soil and using infiltration devices and permeable pavements. • Limit impervious surfaces and add green spaces.

Planning Element 2: Objectives and Strategies—*Establish Objectives and Strategies for Each Sustainability Goal*

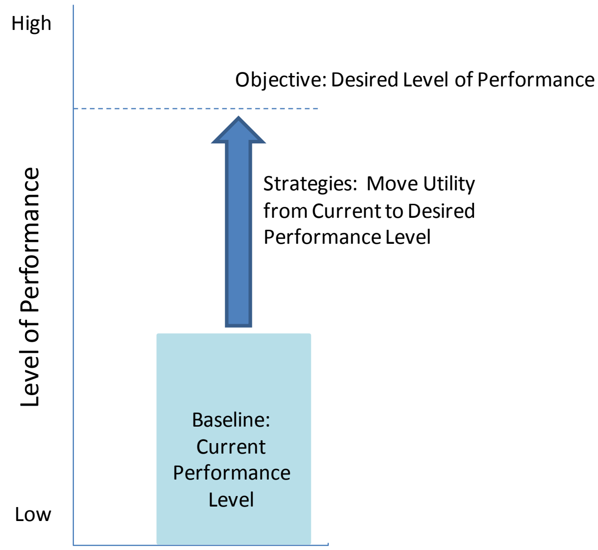
Element Description

Utilities should develop one or more explicit and measurable objectives for sustainability goals selected in Element 1. These objectives translate sustainability goals into the specific achievements the utility will work toward. Utilities should also assess their current performance (or "baseline") relative to each sustainability objective and identify general strategies to meet them.

For example, if a utility has a sustainability goal to manage runoff effectively in wet weather events using green infrastructure, it might set an objective, baseline, and strategies as follows.

- **Objective**: Reduce projected wet weather combined sewer collection system capacity needs by 10 percent through green infrastructure.
- **Baseline**: Current CSO capacity needs given historical and anticipated precipitation event flows.
- **Potential Strategies**: Green infrastructure alternatives and deployment options that will meet the 10 percent objective.

Illustration of Objective, Baseline, and Strategies



Specific project and program alternatives based on the strategies identified at this stage of planning will be specifically evaluated through alternatives analysis later in the planning process (Element 3). Strategy implementation should include measurement and evaluation to determine if further advances and improvements can be made over time.

Current Planning Process

Some utilities establish planning objectives or, similarly, establish "levels of service" through asset management programs.[8] Many utility planning documents, however, never explicitly identify objectives. Whether or not objectives are explicitly stated, utility plans typically focus on conventional

[8] Levels of service describe desired performance on issues that are a high priority to customers or are required by regulators. They represent a commitment on the part of the utility to offer service that meets an expected quality standard. Utilities that establish service levels typically also seek to collect and report performance data that assess the utility's success in meeting the established levels.

drinking water or wastewater objectives, such as providing adequate and reliable services, providing high quality water, protecting water resources, and operating cost-effectively. When evaluating baselines, utilities typically analyze current and projected service demand, the adequacy of current supply capacity, the ability to meet current and anticipated regulatory requirements, and the baseline condition of existing infrastructure. Strategies typically focus on infrastructure repair, rehabilitation, or replacement.

Setting Objectives for Drinking Water Quality and Quantity

The quality and quantity of available water are sometimes not given sufficient attention in long term planning. Drinking water utilities should consider setting both near- and long-term water source quantity and quality objectives. For example, it is possible that the community's water source might not meet its long term needs or the community may not be able to adequately address a source water contamination challenge—thus ultimately rendering the source unusable. Water utilities should work closely with their communities to determine water supply needs and demands in conjunction with land use planning and zoning for development (or redevelopment) while ensuring those plans are protective of the environment and the drinking water source(s). Planning processes to address these issues can include consideration of the following types of questions:

- How much water is available from the water supply source(s)?
- What are the legal and regulatory implications for water withdrawals, while maintaining ecological flows?
- What are the water supply needs and demands of the community, including energy and industry, and projected growth?
- How much storage capacity is built-in to the water supply?
- Does the utility have back-up or alternative sources and interconnections with other water systems in case of extreme weather events, such as droughts and floods?
- Does the utility have a conservation plan in case of a water shortage?
- Is the water supply susceptible to saltwater intrusion from over-withdrawals of groundwater or climate change?
- Does the community's land use plan and zoning include provisions for determining adequate water supply production, and protection of drinking water sources and environmentally sensitive areas?
- Does the water utility have a source water protection plan?
- Does the water supply have natural filters and barriers (e.g., riparian buffers, land conservation, and wellhead protection) in place to prevent pollution, or are there opportunities to implement them?

Building Sustainability Considerations into Objective Setting

For the purpose of this handbook, developing objectives, analyzing baselines, and identifying strategies may involve enhancements to existing planning processes, including:

- Incorporating a broader range of objectives, which are aligned with sustainability goals, into the planning process;
- Analyzing baselines for the sustainability objectives, which may require utilities to undertake new (and possibly unfamiliar) types of monitoring and analysis, such as conducting an energy or water audit;
- Identifying different types of (and also possibly unfamiliar) strategies for meeting objectives, such as assessing green infrastructure options or opportunities to partner with other utilities.

- Using the sustainability objectives and related strategies as the basis for making subsequent project decisions through alternatives analysis (Element 3) and developing a supporting financial strategy (Element 4).

The following steps will help utilities establish effective sustainability objectives, measure baselines, and identify strategies.

Step 1. Identify sustainability objectives

Utilities should identify an objective or objectives for each sustainability goal. Any vulnerabilities in technical, managerial, or financial capacity of the utility that would preclude achieving sustainability goals should be targeted for specific objectives and strategies. Measuring performance relative to vulnerabilities is critical to achieving a sustainable course of action.

In some cases, utilities may want to express sustainability objectives in terms of specific quantitative targets. For example, a utility may want to reduce energy consumption by 10 percent or increase water efficiency by 25 percent. In other cases, a utility may want to develop procedural objectives, such as developing policies that target infrastructure investments to existing communities. Utilities may also want to establish a procedural objective to create a level playing field among options—including those that are more sustainable. For example, a utility could set an objective to evaluate non-traditional project alternatives (e.g., decentralized wastewater solutions, green infrastructure for stormwater, etc.) along with conventional "grey" infrastructure or to evaluate partnership opportunities in any analysis of system expansion options.

The City of Walla Walla, Washington Sets Water Conservation Objectives

Washington State requires that all utilities develop and implement a cost-effective water conservation program in order to have Water System Plans approved and when applying for new water rights. The State's planning handbook outlines a conservation program planning approach that includes setting objectives as an early step in program development.

Following the state guidance, the city of Walla Walla—a community of 58,000 people in arid Eastern Washington—set the following objectives for its conservation program:

- Reduce unaccounted-for-water;
- Increase customer awareness of water-use habits;
- Reduce peak water consumption;
- Protect natural resources; and
- Comply with state guidelines.

These objectives are all aimed at achieving a measurable conservation program goal set by the City "to reduce losses before customer meters of an average of 0.2 percent per year until 2010, with a goal of reaching a 10 percent [unaccounted for water] level by 2024."

Walla Walla identified several strategies for achieving the objectives, including source meters, service meters, leak detection, and conservation pricing.

Further Reading:

- Washington State Department of Health. "Water System Planning Handbook," April 1997, Chapter 4. (On file)
- City of Walla Walla. "Comprehensive Water System Plan Update—Final Report." October 2006. See: http://www.ci.walla-walla.wa.us/vertical/Sites/{5C31B82F-5E63-4200-9CF4-237E5245E279}/uploads/{06C6AB02-467C-4C10-BDAB-9E4944C6698A}.PDF

Step 2. Ensure that objectives are SMART

The most effective objectives are SMART:

- **S**pecific: Utilities specify exactly what they want to achieve
- **M**easurable: Utilities are able to measure whether they are meeting the objectives
- **A**ttainable: Utilities can realistically achieve the objective in the time period specified
- **R**ealistic: Utilities can achieve the objective with the capacity, funding, and other resources available
- **T**ime-based: Utilities set a timeframe for achieving the objective

An example of a SMART objective, which was developed by the City of Portland Water Bureau, is: "Reduce the bureau's overall electrical use by 5 percent (excluding variation due to weather and groundwater operation) by July 2012, compared to a 2005-08 baseline."

While these objectives clearly establish a target, other types of objectives can be similarly "SMART." For example, a utility could establish an objective to evaluate green infrastructure alternatives for any proposed infrastructure investment of over $10 million and revisit the investment threshold in five years.

Utilities should strive to set objectives that are "achievable" and "realistic." They may, however, be operating in an environment where information on their baseline and realistic objectives is lacking. In this case, utilities may want to set provisional objectives that can be refined later. As part of a continual improvement process, these objectives may be refined and adapted over time as more information is gathered and project alternatives are evaluated and selected. For example, a utility may identify current energy consumption and the relative costs and benefits of energy efficiency alternatives before setting a specific target. Utilities with "low hanging fruit" may set an ambitious objective, while utilities with few remaining low-cost efficiency options may set a more conservative target.

Step 3. Analyze baseline performance

Utilities should conduct and document a baseline analysis for each sustainability objective.

For some objectives, the analysis of baselines will be data-driven and quantitative. For example, a utility with an objective to reduce energy use by 10 percent over five years could conduct an energy audit to identify baseline energy use. The analysis can use publicly available tools, such as EPA's Portfolio Manager for water utilities, and readily-accessible information such as utility bills (see Appendix A for links to a variety of energy audit and analysis tools).

Examples of other useful baseline analysis information sources include:

- Asset inventories and condition assessments to establish the degree of baseline deployment, effectiveness, and cost;

- Population and land use projections to forecast future demand inside and outside of service areas to understand needs and opportunities for infrastructure investments focused on existing communities; and
- Water service supply and demand data to establish a baseline for water efficiency and use (e.g., for an analysis of water conservation opportunities).

Where objectives are procedural, the analysis of baselines can be qualitative. For example, a utility may set the following objective: "For all proposed infrastructure investments to accommodate new growth, consider alternatives that can accommodate the same amount of growth through investment in existing communities." In this case, the utility would describe its current (i.e., baseline) capacity to analyze and implement alternatives that focus growth in existing communities.

There are a number of tools and resources available to support quantitative and qualitative baseline analysis. They are included in Appendix A.

Envision Utah: A Guide to Baseline Analysis in Water Conservation Planning

Envision Utah is a stakeholder-based statewide effort to establish a vision "to keep Utah beautiful, prosperous, and neighborly for future generations." Although it is a state plan rather than a utility plan, Envision Utah's toolkit on water conservation illustrates a step-by-step guide for conducting baseline analysis that utilities could follow. Key steps are:

1. *Describe the water storage and delivery system*, including the size of the physical system, the number of people and connections, services, land use, demographics, and any unique characteristics that affect supply or demand.
2. *Inventory the water supply system*, including sources of water supply, the status of water rights, and any limits on system capacity.
3. *Estimate present water demand* (e.g., with information from current billing records).
4. *Estimate future water demand* based on population growth projections and other relevant information.
5. *List and rank water problems*, including high per capita use, significant losses, constraints on system capacity, and/or insufficient water rights.
6. *List and analyze potential solutions*, including water conservation through infrastructure investments (e.g., repairing leaks, replacing old lines and tanks, etc.) and/or demand reduction.

The first five steps establish a baseline for the current system. Step 6 describes the identification of potential strategies.

Further Reading:

- Envision Utah. "Urban Planning Tools for Quality Growth," Chapter 5 (pp. 115-118)

Examples of Potential Types of Baseline Analysis

- Although the specific kinds of baseline analyses utilities will undertake will be driven by their specific objectives, some examples are listed below.
- Through asset management, evaluation of the baseline condition of existing infrastructure and needs for repair, rehabilitation, and replacement to maintain target service levels, reliability, etc.
- Assessment of current revenue adequacy and needs to cover full costs of asset repair rehabilitation, or replacement.
- Assessment of service demand that could be addressed through green infrastructure and opportunities for deployment (i.e., what kind, where located, capacity, etc.).
- Energy audit and associated analysis of conservation/efficiency opportunities.
- Water audit and analysis of conservation/efficiency opportunities, including consumer-based strategies (e.g., water conservation programs).
- Assessment of service demand or other needed technical, financial, and managerial capacity that could be met through joint infrastructure development or other types of collaboration with adjoining utilities.
- Assessment of opportunities to more cost-effectively use existing collection capacity through in-fill development within the existing service area.
- Assessment of community land use options and the impact on water utility infrastructure operation and maintenance costs.

Step 4. Identify key strategies

Baseline analysis can help utilities identify general strategies for achieving sustainability objectives and for conducting in-depth alternatives analysis (described later in this handbook). In addition to considering strategies that would involve new infrastructure, utilities can consider, where appropriate, collaboration and partnering relationships as a way to meet objectives. In many cases, it may be useful to undertake a basic "brainstorming" approach.

As utilities begin this step, they should keep in mind basic tips about brainstorming:

- Don't judge, challenge, evaluate, or criticize suggested strategies;
- Emphasize the quantity of ideas, not quality; and
- Put analysis and organization in the background.

The City of Panora, Iowa, Improves Water Quality and Saves Money by Partnering with a Neighboring Utility

The City of Panora, Iowa, serves a population of 1,175 people through 700 residential connections. To address nitrate levels that were exceeding water quality standards, Panora chose a strategy of partnering with a neighboring utility. Through this partnership, Panora purchased low-nitrate source water from the neighboring Panorama Lake Association and blended it with Panora's source water to meet the water quality standards. This partnership strategy was more cost-effective than installing expensive new nitrate treatment infrastructure at Panora's treatment plant.

Further Reading:

- EPA, System Partnership Solutions to Improve Public Health Protection: http://www.epa.gov/ogwdw/smallsystems/pdfs/publichealthstudyv1.pdf

Resources listed in Appendix A describe sustainability strategies and best practices related to sustainability. Examples include:

- State of Wisconsin "Water and Wastewater Energy Best Practice Guidebook";
- Water Infrastructure Finance Authority of Arizona, "Sustainable Infrastructure: A Best Practices Guide for Arizona Wastewater Utilities" (chapter on "sustainable design strategies");
- Water Environment Research Foundation (WERF): "Performance and Whole-Life Costs of Best Management Practices and Sustainable Urban Drainage Systems";
- EPA, "Gaining Operational and Managerial Efficiencies Through Water System Partnerships";
- EPA, "Setting Small Drinking Water System Rates for a Sustainable Future"; and
- Vermont Agency of Natural Resources, "Growth Center and Growth Management Guidance Document."

Step 5. Document objectives, baselines, and strategies

Once a utility has set objectives, it should incorporate them into utility planning documents along with information about baselines. Utilities should document how progress towards objectives will be measured and should be willing to adapt their strategies over time. Some utilities may choose to document objectives through an Environmental Management System (see call-out box about Camden County, at right). EPA has developed a variety of tools to help water and wastewater utilities adopt environmental management systems. These tools are listed in Appendix A.

Utilities should also document general strategies (and related tools and resources) that suggest project alternatives to be considered in alternatives analysis (Element 3). For example, a utility evaluating the feasibility of non-traditional strategies for meeting future drinking water needs would identify a range of strategies that include source water protection, reduction of non-point sources of pollution, and potential service interconnections with adjacent utilities. The most promising strategies can be further analyzed as part of alternatives analysis.

Camden County, New Jersey Municipal Utilities Authority: Documenting Objectives in an Environmental Management System

The Camden County Municipal Utility Authority (CCMUA) serves a population of around 500,000 people. It has codified its specific objectives related to water quality, odor control, and cost minimization in its Environmental Management System (EMS) manual. All of the decisions that the utility makes have to be consistent with these objectives, which are expressed in the manual as:

"The CCMUA will do its utmost to:

1. Optimize the quality of its effluent
2. Minimize adverse impact from odors emanating from the wastewater treatment and sludge disposal processes.
3. Minimize cost impacts to ratepayers."

The EMS Manual goes on to describe the ways in which the utility will achieve its objectives, such as:

- Operating the plant in a manner which will minimize the potential for odors from the wastewater treatment and sludge thickening, dewatering and drying processes.
- Implementing and maintaining a comprehensive record keeping and reporting system that tracks water quality, odor minimization and cost minimization efforts.
- Providing regular training opportunities to personnel associated with the wastewater treatment and biosolids management program.

Further Reading:

- Camden County Municipal Utilities Authority EMS Manual: http://www.ccmua.org/ccmuaems.pdf

Implementing These Steps on a Smaller Scale

All utilities should set realistic sustainability objectives. When implementing this handbook at a smaller scale, utilities may want to set qualitative rather than quantitative objectives. For example, a utility may choose to set an objective to "reduce energy use" and, based on further experience, consider setting a specific quantitative objective later on, such as "reduce energy use by 10% over 5 years."

Utilities setting qualitative objectives can also do a qualitative analysis of baselines. For utilities implementing on a smaller scale, basic information gathering on baseline conditions may be enough to understand strategies available to pursue sustainability objectives (see call-out box on Arenas Valley, below). All utilities can take advantage of the range of tools described above (and listed in Appendix A) that have been developed to estimate baselines and identify strategies.

Arenas Valley, New Mexico Establishes an Asset Baseline through an Inventory and Condition Assessment

The Arenas Valley Water District Association—which maintains around 430 connections in the small community of Arenas Valley, New Mexico—used an asset inventory and condition assessment to better understand baseline infrastructure conditions. This analysis revealed that small investments in repair of existing pipes made much more sense than large-scale pipe replacement—a solution that saved the community money and allowed it to invest in other system upgrades.

Concerned about leaks from the distribution system, the AVWDA Board sought to replace significant portions of the water distribution system, which were old and degraded. With assistance from the New Mexico Environmental Finance Center, AVWDA undertook an asset inventory and condition assessment to understand the utility's baseline infrastructure condition and needs for upgrades. As part of this work, AVWDA also established a level of service agreement, which described the kind of service it sought to provide. The service levels addressed operating costs, responsiveness, reliability, regulatory requirements, water quantity, and customer satisfaction. This information enabled AVWDA to assess how to fill the gap between its current baseline and desired service levels.

The asset inventory and condition assessment helped AVWDA realize that replacing PVC pipe was not the most cost-effective strategy for reducing leaks and upgrading service. The analysis revealed that the existing PVC pipe should remain in good condition for 25 years. Replacing it would not help prevent breaks related to junctions with service lines or damage from construction contractors, which accounted for a large number of breaks and service disruptions. An analysis of full lifecycle costs identified pipe repair (rather than replacement) as a more cost-effective strategy.

Key Diagnostic Questions

Utility managers can use the following questions to evaluate their implementation of this element:

- How was each of your utility's sustainability goals reflected in specific, measurable objectives?
- In what ways were your utility's sustainability objectives articulated consistent with the *SMART* principles?
- For each sustainability objective, what kind of baseline analysis did you conduct to assess your current status?
- What types of tools and resources did you use for the baseline analysis?

- Are there monitoring programs already in place to generate data for baseline analysis and to monitor progress toward objectives?
- For each sustainability objective, what traditional and non-traditional strategies did your utility identify?
- How and where were the sustainability objectives described and codified in a planning document?
- What is your plan for measuring and tracking the accomplishment of sustainability objectives over time?

Example of Sustainability Planning in Practice: The Portland, Oregon Water Bureau Turns Goals from the Portland Climate Action Plan into Specific Objectives

The Portland, Oregon Water Bureau provides drinking water to nearly 900,000 residents in Northwestern Oregon. Its role in implementing the Portland Climate Action Plan illustrates how a utility can set SMART objectives to achieve sustainability goals and help achieve an important community priority.

The City of Portland issued a City-wide Climate Action Plan in October 2009.[9] The plan outlined several actions to be accomplished by 2012. Since that time, the Portland Water Bureau has become a partner in the City's effort to reduce greenhouse gas emissions by incorporating the community's goals into its own strategic and sustainability planning.

The Portland Water Bureau's 2008-2011 Strategic Plan[10] reflects both a general commitment to support community goals and specific objectives and tactics related to the City's Climate Action Plan. As an indication of the Bureau's high level commitment to support community goals, its mission is "to provide the citizens and the City Council with a water system that supports their community objectives and overall vision for the City of Portland." Accordingly, the Water Bureau incorporated reducing greenhouse gas emissions into its strategic plan as a commitment to:

> *"Develop and implement a carbon emissions mitigation strategy. Continue to make improvements in energy-efficient operation and design [and] increase both use and generation of renewable energy."*

The commitment was further elaborated through utility service levels described in the plan:

- Bureau's carbon emissions are reduced from 2007 levels.
- Percentage of energy generated from renewable sources increases from 2007 levels.

[9] See the City of Portland and Multnomah County *Climate Action Plan* at: http://www.portlandonline.com/bps/index.cfm?a=268612&c=49989
[10] See the Portland Water Bureau *Strategic Plan: 2008-2011* at: http://www.portlandonline.com/water/index.cfm?a=328185&c=55152.

The Water Bureau spelled out its specific action plan for reducing carbon emissions and increasing renewable energy use in the 2009 update to its "Sustainability Action Plan." The Action Plan contained the Bureau's goals and actions to reduce energy use, transportation-related emissions, paper use, water use, and toxics use and to enhance neighborhood livability.

The 2009 update included specific actions to reduce Portland's carbon footprint in its sections on energy use and transportation. The plan identified specific, measurable goals, which are very similar to the concept of "SMART objectives."[11] For example, under the heading of energy, the Water Bureau listed:

- Reduce the Bureau's overall electrical use by 5 percent (excluding variation due to weather and groundwater operation) by July 2012, compared to a 2005-08 baseline.
- Reduce electrical use by 5 percent at top 10 facilities (highest electrical use) by July 2012, as compared to a 2005-2008 baseline.
- Install renewable energy facilities with minimum capacity of 400 kW by July 2010.
- Take energy efficiency and renewables generation opportunities into account when planning for facilities to comply with Long Term 2 Enhanced Surface Water Treatment Rule requirements.

The specificity of these objectives allowed the Bureau to identify specific actions related to each and to develop annual status reports. Greenhouse gas emissions are tracked through the Bureau's annual carbon footprint report.[12]

[11] See: http://www.portlandonline.com/water/index.cfm?c=49430&a=279197.
[12] See: http://www.portlandonline.com/water/index.cfm?a=246396&c=31525

Planning Element 3: Alternatives Analysis—*Analyze a Range of Alternatives Based on Consistent Criteria*

Element Description

Effectively integrating sustainability goals and objectives into an analysis of infrastructure alternatives is a critical component of planning. It allows utilities and local officials to make infrastructure decisions consistent with sustainability goals and objectives best suited for the utility and the community.

Alternatives analysis can be conducted at many scales, from an analysis of system-wide infrastructure alternatives to specific engineering decisions about the repair, rehabilitation, or replacement of specific equipment. The steps and examples described below focus on project-level alternatives analysis linked to utility goals and objectives but can be translated to different scales.

For alternatives analysis to be effective, utilities need to establish explicit and consistent project selection criteria for each sustainability objective. Identifying and applying sustainability criteria is the critical juncture at which utilities choose the specific economic, environmental, and social benefits they will weigh in selecting among alternatives. A replicable, consistent, and transparent approach will ensure that each alternative is considered on a level playing field. When done well, this approach will enable utilities to choose a mix of projects that meets customers' service expectations, optimizes the sustainability of utility infrastructure and operations, and supports other community sustainability priorities whenever feasible. The selected alternatives will thus represent "best value" projects for the utility and for the community as a whole.

Sustainability Criteria and Conventional Criteria

When analyzing alternatives, utilities should use sustainability criteria along with conventional project selection criteria.

Examples of potential sustainability criteria include:

- Ecological and economic impacts, such as the extent to which projects damage (or create) important habitat, or create green space and recreation opportunities.
- Preference for treatment or operational functions that rely on natural systems for lower lifecycle operating costs through reduced energy and chemical inputs.
- Reduced reliance on the energy grid through greater energy efficiency or self-generation of energy.
- The extent to which projects focus on sustainability of infrastructure in a utility's existing service area.
- Cost-effectiveness based on an assessment of full lifecycle costs.

Conventional criteria often include considerations such as:

- Ability to meet future demand growth.
- Ability to improve reliability.
- Ability to meet regulatory requirements.

Following and documenting a consistent set of steps for alternatives analysis can help utilities explain the logic of decisions to utility boards, local elected officials, and others. These steps also provide utilities with information that may be useful for guiding the work of consultants to analyze and document a variety of traditional and non-traditional alternatives.

Current Planning Process

Utilities commonly undertake alternatives analysis as part of planning. They then document selected or recommended alternatives in planning documents. Alternatives often involve the repair, rehabilitation, or replacement of aging infrastructure or investment in new infrastructure to meet demand growth or regulatory requirements, including those driven by enforcement actions. As typically practiced, alternatives analysis considers criteria such as technical performance, cost, maintainability, and reliability. These criteria screen for alternatives that deliver the highest reliable performance at the lowest overall cost. Conventional alternatives analysis, however, rarely explicitly and consistently incorporates broader economic, social, and environmental sustainability considerations.

Building Sustainability Considerations into Alternatives Analysis

Incorporating sustainability considerations into alternatives analysis may involve the following adjustments to current planning processes:

- Using a broader set of assessment criteria that explicitly link to the utility's specific sustainability goals, objectives, and other community priorities, where applicable;
- Using a consistent and documented methodology for evaluating and comparing projects using the criteria;
- Including specific consideration of natural or "green" systems; and
- Potentially using other relevant community input to inform the assessment methodology (e.g., by weighting criteria according to community priorities).

> **Evaluating Green Infrastructure Alternatives**
>
> As part of alternatives analysis, utilities should assess what types of non-traditional or "green" infrastructure alternatives may help achieve objectives. Lack of familiarity or experience with these alternatives, however, can create challenges. In particular, utilities may face uncertain operations and maintenance costs for green infrastructure alternatives.
>
> In response, utilities can phase in green infrastructure investments and then consider further deployment based on what they learn about effectiveness and cost. In alternatives analysis, utilities may want to examine a range of deployment options—from pilot scale to "maximum technically achievable"—and identify the right level of deployment given their needs and the level of knowledge or uncertainty about green infrastructure.

The following steps will help utilities incorporate sustainability considerations into alternatives analysis.

Step 1. Identify alternatives

Utilities should list and describe a broad range of project alternatives that, individually or in combination, support the stated objectives. Many project alternatives will come from the general strategies identified in Element 2. For example, a facility may have identified source water protection as a viable strategy for protecting groundwater to meet future demand. In the alternatives analysis, the utility would evaluate options that specifically identify candidate source water areas, protection strategies, time frames, and other specific characteristics.

Step 2. Develop sustainability criteria

The criteria used to assess and select projects in the alternatives analysis should reflect a utility's sustainability objectives identified in Element 2. Utilities will also likely include criteria related to other utility objectives (reliability, risk management, etc.). Setting and applying project selection criteria is the critical juncture at which utilities choose the economic, environmental, and social benefits they will weigh in selecting among alternatives and choosing the mix of projects that optimizes the sustainability of utility operations.

Community stakeholder views are also important when evaluating alternatives. Where feasible, utilities should consider using community input to identify project selection criteria and their relative importance. For example, Louisville and Jefferson County Metropolitan Sewer District in Kentucky convened community stakeholders to identify community values for analyzing and selecting among options for reducing wet weather flows. The community values, which included "public health enhancement" and "economic vitality" among others, were used to calculate benefit scores for each project alternative. These scores were combined with cost information for a

Orange Water and Sewer Authority Plans for Future Water Demand

Orange Water and Sewer Authority (OWASA) provides drinking water, wastewater, and reclaimed water services to the Chapel Hill-Carrboro community in North Carolina. Its long-range planning approach illustrates how utilities are altering their planning and investment decisions in response to greater uncertainty about factors such as climate change.

After experiencing the worst drought on record in 2001-2002—and the second worst drought in 2007-2008—OWASA began to question the reliability of its conventional planning assumptions about rainfall patterns and the yield of its water supply sources. In response to this increased uncertainty, the utility began to consider potential low yield scenarios outside of historical trends and extended its water supply planning horizon out from 15 years to 50 years. These scenarios identified substantial vulnerabilities to the utility's future water supply and pointed to the need to examine an expanded suite of water supply and demand management strategies that could address increased variability in future supply and demand conditions.

As a result of its new planning approach, OWASA selected several strategies to increase the long-term reliability of its water supply. These included immediate acquisition of an active quarry which will provide increased water storage capacity when rock quarrying ends in 2030. OWASA also adopted a demand management program with an emphasis on conservation rate structures and year-round water use restrictions. Additionally, OWASA developed, in partnership with the University of North Carolina at Chapel Hill, a reclaimed water system (in operation since April 2009) which provides a reliable source of non-potable water that offsets more than 10% of the community's drinking water needs. The reclaimed water system uses 40% less energy than pumping, treating, and delivering raw drinking water, and it provides the University and UNC Hospitals with supply redundancy for critical water needs. OWASA has also increased attention on the energy and greenhouse gas footprint of its operations and now includes these factors in the analysis and selection criteria of major capital project alternatives.

As part of its Climate Ready Water Utilities (CRWU) program, EPA has provided a number of resources for the water sector to adapt to climate change by promoting a clear understanding of the climate science and adaptation options by promoting consideration of integrated water resources management (IWRM) planning in the water sector. These resources can be found at http://water.epa.gov/infrastructure/watersecurity/climate/

benefit-cost comparison across alternatives (see the Louisville case study at the end of this section).

Blacksburg, Virginia Selects a Decentralized Solution with Input from the Community

The Blacksburg, Virginia Public Works Department owns and manages wastewater infrastructure serving approximately 95,000 people. Blacksburg's approach to serving a growing community demonstrates use of a public stakeholder engagement approach to evaluate project alternatives. The process resulted in a money-saving decentralized solution that met service needs and protected the environment.

Blacksburg established a workgroup to evaluate wastewater treatment system alternatives, including building a decentralized system or extending its existing centralized sewer system. The workgroup and town considered factors such as cost, construction-related traffic disruptions, floodplain and creek impacts due to centralized sewer main construction, collection system infiltration/inflow and leakage, and treatment effectiveness.

After careful review, Blacksburg conducted a pilot project to test the feasibility of a decentralized, clustered system. Approximately 200 residents implemented a hybrid collection system including a Septic Tank Effluent Pump (STEP) pressure system combined with a Septic Tank Effluent Gravity (STEG) system. Each house had an individual septic tank that required resident maintenance.

This decentralized, clustered system saved the community more than $1 million in construction costs. Operations and maintenance costs were similar to those of conventional centralized systems. This system also addressed key community concerns: centralized sewer collection system leakage. During heavy rains, the decentralized, clustered system avoided infiltration/inflow problems, showed no leakage, and maintained a stable treatment level.

Step 3. Assess the benefits of each alternative

Each alternative should be analyzed on an individual basis using Step 2 criteria. Different types of analysis may be appropriate for different plans or for utilities with different levels of capacity. Options include:

- A narrative, qualitative assessment of potential benefits and risks of each alternative (may be most appropriate for utilities with limited resources or capacity). For example, to develop a capital improvement plan, Bloomington, Indiana's water utility qualitatively evaluated several alternatives according to criteria including redundancy, consequences of a failure, capital and operations and maintenance costs, and flexibility for expansion.
- A qualitative "scoring" of potential benefits and risks. For example, Louisville and Jefferson County Metropolitan Sewer District used a -5 to +5 scale to rate alternatives' impacts on ecosystems; the community then calculated an overall score across the criteria. (See Louisville case study at the end of this section. The Tualatin Valley Water District also used this approach, as described in a call-out box in this section.)
- A quantitative assessment, such as monetizing benefits and risks using economic valuation techniques. For example, Seattle Public Utilities used economic valuation techniques to quantify benefits and costs for infrastructure investment alternatives (see the call-out box in this section).

The evaluation of each alternative should be documented using a common template. To aid comparison, utilities should use the same methodology for all alternatives. Consistent tools and templates allow for efficient analysis and documentation of a potentially large number of projects.

A “scorecard” approach is one way to analyze a range of alternatives across several criteria. This approach helps utilities organize both qualitative and quantitative information to make decisions. Implementation can range from fairly simple to complex depending on the number of alternatives assessed and criteria used. Once developed, it can be reused whenever necessary.

An illustration of a scorecard approach is shown on the next page. This scorecard demonstrates scoring of two alternatives in a consistent manner using three criteria. The alternatives represent two odor control strategies at an aging wastewater treatment plant with poor odor control systems. Alternative 1 reduces wastewater volumes and avoids the older infrastructure most of the time by connecting to an adjacent system. Alternative 2 builds tanks with modern odor control systems in riparian areas adjacent to the current plant. The alternatives are compared using three criteria: habitat protection, odor control, and non-obtrusive construction techniques (in reality, these alternatives would be compared using additional criteria related to cost, effectiveness, etc., but these criteria serve to illustrate the scorecard approach). While the first alternative is less effective in controlling odors because the old tanks are used intermittently, it wouldn’t affect the riparian area; laying some additional pipe along a few miles of road is the only disruption. The second alternative is highly effective in controlling odors, but would involve significant impacts on the riparian area and potentially disruptive construction impacts (e.g., truck traffic, noise, etc.)

Because the utility is utilizing several criteria, a weighting approach can be helpful to provide an overall score. Utilities may choose to weight each criterion equally, or choose to weight certain criteria more highly. To weight criteria the utility can distribute a total number of points among criteria. In this example, the utility distributes ten points among the three criteria. Riparian area protection and odor control are considered equally important—and more important than construction-related disruptions. The utility then gives a weight of 4 points each to riparian area protection and odor control, and 2 points to non-obtrusive construction techniques. (In some cases—as in the Louisville example described at the end of this section—utilities base their weighting approach on community priorities, increasing the likelihood of acceptance by the community.)

Illustration of a Scorecard Approach to Alternatives Analysis

Alternative 1: Connect to Adjacent System to Reduce Volume of Wastewater Treatment

Criteria	Range of Impacts and Scores					Score for Each Criterion	Weight (out of 10 points)
	-3	-1	0	1	3		
Riparian Area Protection	Substantial impairment of riparian area	Moderate impairment of riparian area	**No impact on riparian area**	Moderate enhancement of riparian area	Significant enhance-ment of riparian area	0	4 points
Odor Control	Generation of frequent odor	Generation of occasional odor	No impact on odors	**Elimination of 50% of odor events**	Elimination of 90% of odor events	1	4 points
Non-obtrusive Construction Techniques	Frequent dust, noise, truck traffic, and/or street closures	**Occasional dust, noise, truck traffic, and/or street closures**	No construction impacts	Not applicable	Not applicable	-1	2 points
Total Weighted Score: (0 x 4 points) + (1 x 4 points) + (-1 x 2 points) = **2 points**							

Alternative 2: Build New Wastewater Treatment Tanks on Adjacent Property

Criteria	Range of Impacts and Scores					Score for Each Criterion	Weight (out of 10 points)
	-3	-1	0	1	3		
Riparian Area Protection	**Substantial impairment of riparian area**	Moderate impairment of riparian area	No impact on riparian area	Moderate enhancement of riparian area	Significant enhance-ment of riparian area	-3	4 points
Odor Control	Generation of frequent odor	Generation of occasional odor	No impact on odors	Elimination of 50% of odor events	**Elimination of 90% of odor events**	3	4 points
Non-obtrusive Construction Techniques	**Frequent dust, noise, truck traffic and/or street closures**	Occasional dust, noise, truck traffic, and/or street closures	No construction impacts	Not applicable	Not applicable	-3	2 points
Total Weighted Score: (-3 x 4 points) + (3 x 4 points) + (-3 x 2 points) = **-6 points**							

The highlighted boxes of the scorecard show how each alternative scores against the three criteria. When the individual scores are multiplied by the weights and summed, Alternative 1 scores two points and Alternative 2 scores negative six points. All else equal, Alternative 1 would be the preferred option.

Tualatin Valley, Oregon used a scorecard approach to evaluate potential projects according to economic, social, and environmental criteria (see call-out box later in this section). The utility applied consistent criteria and a consistent methodology across all projects, increasing transparency, providing better "apples to apples" comparisons, and, once established, reducing the time and effort required for alternatives analysis.

Steps for Using a "Scorecard" Approach to Assess Alternatives

1. Identify criteria
2. Establish a scale (e.g. -3 to +3) for each criterion
3. Assign weight factor to each criterion
4. Score each criterion
5. Multiply each score by the criteria's weighting factor
6. Sum weighted scores across all criteria
7. Identify alternative with highest calculated score

For scoring some criteria, utilities can use readily available analytical tools that show the effectiveness, cost, and other characteristics of project alternatives. Examples, which are also listed in Appendix A, include:

- EPA's Energy Star/Portfolio Manager for water utilities to calculate energy reductions;
- Center for Neighborhood Technologies (CNT) Green Values Stormwater Management Calculator to calculate the effectiveness and cost of certain green infrastructure; and
- EPA's Check Up Program for Small Systems (CUPSS) to calculate the 10 year financial projection based on project operating and capital requirements (i.e., cost of asset maintenance and annual revenue and expenditures entered into the software).

Tualatin Valley Water District Uses "Triple Bottom Line" Criteria for Alternatives Analysis

The Tualatin Valley Water District (TVWD) serves 200,000 customers through 58,000 connections (http://www.tvwd.org/). The system covers 44 square miles of incorporated and unincorporated Washington County in northwestern Oregon. The District uses a triple-bottom line methodology to evaluate, score, and compare alternatives against a consistent set of criteria. Once the District developed the methodology, it could then be reused whenever major infrastructure decisions were needed.

The methodology has three main components:

1. Criteria. TVWD uses nine criteria to evaluate each alternative—three each for economy, society, and environment.
2. Consistent "scores." For each criteria, TVWD defines scores that range from 1 (low) to 5 (high).
3. Weighting. TVWD assigns 10 weighting points allocated among the three criteria within each category (i.e., economy, society, and environment) to reflect the relative importance.

The approach assigns an overall score to each alternative by multiplying the criteria score by the criteria weight and summing across all of the criteria. The overall scores can then be compared to select the highest value alternative. Representatives from TVWD say this structured approach is an efficient way to organize qualitative and quantitative information about each alternative. In practice, TVWD staff has found that the discussions spurred by implementing the methodology have been one of its most useful characteristics. The table below shows the criteria and scoring approach used by TVWD.

Category	Criteria	Weight	Scoring Guidelines	
			Score	Characteristic
Economy total weight=10	Supports economic growth and development	3	5 3 1	Project will directly allow increased development Project will only serve existing development Project incidental to existing and/or new development
	Utilization of local employment and manufacturing	3	5 3 1	Oregon/Washington employment and manufacturing US employment and manufacturing Outside US employment and manufacturing
	Improves efficiency (1) Improves effectiveness (1) Improves reliability (1) Reduces long-term costs (1) Other economic benefit (1)	4	5 3 1	Five criteria addressed Three criteria addressed One criterion addressed
Society total weight=10	Meets regulatory or contractual requirement or recognized standards of practice	5	5 3 1	Corrects current violation of regulation, contract, or standards of practice Prevents future violation of regulation , contract, or standards of practice Not related to regulation, contract requirements or standards of practice
	Supportive of community esthetics and livability	2	5 3 1	Elements of the project enhance esthetics and livability Project is neutral to esthetics and livability Project reduces esthetics and livability
	Improves public/employee safety, including fire protection capacity; improves drinking water quality	3	5 3 1	Exceeds standards for safety/water quality Meets standards for safety/water quality Not related to safety/water quality
Environment total weight=10	Construction impact on natural environment	3	5 3 1 0	Minimize impact with significant improvement of natural systems Minimize impact with some improvement to natural systems Minimize impact with restoration as found Negative impact on natural environment
	Project Sustainability	3	5 3 1	Significant incorporation of sustainability principles Modest incorporation of sustainability principles Low incorporation of sustainability principles
	Supports conservation and/or demand management goals	4	5 3 1	Significant support Modest support Project not related to conservation or demand management

Step 4: Assess the full lifecycle costs of each alternative

Utilities should assess the full lifecycle costs of each alternative to provide a full accounting of the project's annualized cost and revenue impacts. Lifecycle costs are the net present value of all costs for a project over its lifetime, including primary project costs, secondary financing costs, operations and maintenance and the cost of rehabilitation, repair, and replacement.

> **Taking the Long View in Alternatives Analysis**
>
> When analyzing alternatives, utilities should look to the future to maximize long-term benefits and reduce long-term costs. For example, when considering replacing underground pipes in the existing service area that are likely to experience increasing demand from urban infill, a utility should also consider installing extra capacity for the future. While this may involve additional up-front expenses, it may reduce costs over the long term by avoiding the need to re-excavate the lines.

Primary project costs include:

- Construction;
- Engineering and technical services (e.g., surveying and subsurface investigations);
- Pilot studies;
- Environmental review and permitting;
- Bidding and contracts;
- Administration and legal services;
- Land and right-of-way acquisition;
- Bond issuance;
- Commissioning costs;
- Construction management; and
- Decommissioning.

Indirect financing costs include the cost of capital (i.e., interest), capital acquisition costs (such as financial advisory fees, rating agency fees, closing costs, etc.), and costs related to creating any required reserve funds and/or meeting debt coverage covenants. Utilities should be aware that grants or other financing incentives can affect indirect costs and potentially influence which alternatives appear to be most cost-effective.

> **The Cost of the "No Action" Alternative**
>
> When assessing whether to make new investments, utilities should account for the costs of the "no action" alternative—or maintaining the status quo. These costs may be hidden and substantial. They include:
>
> - The cost of inefficient operations and excess maintenance for older "underperforming" capital;
> - The cost of expensive reactive emergency repairs to aging infrastructure (vs. predictive and preventive maintenance for newer infrastructure); and
> - Fines or other penalties (e.g., for not meeting regulatory requirements).
>
> The longer utilities wait to replace underperforming capital, the more these costs are likely to increase. When utilities examine all costs of inaction, they may find that new investments can save money and improve sustainability over the long term.

New project operating costs can include energy use, chemical use, operating staff, and the project's share of general utility overhead expense. Basic maintenance costs will likely include the personnel, equipment, and materials needed to keep the project infrastructure operating properly and reliably. Alternatives that require more ongoing monitoring and maintenance will generally have higher lifecycle operations and maintenance costs. Effective asset management programs can help utilities assess these costs, as well as costs for rehabilitation, repair, and replacement.

Key considerations in assessing lifecycle costs are the time period analyzed and the discount rate. A long period analyzed will tend to favor longer-lived infrastructure not requiring replacement during the time period. Take as an example a utility considering two alternatives for managing stormwater: 1) an underground storage basin with a 110-year life, and 2) high-capacity remote treatment technology with a 40-year life. With a 100-year view, the utility might favor the storage basin because the remote treatment technology would need to be replaced twice over the 100-year period. If that same utility only looked out 35 years, the analysis might turn economically favorable for the remote treatment technology.

San Antonio Water System: Saving Money and Protecting Habitat by Conserving Water

The San Antonio Water System (SAWS) in South Central Texas serves 1.3 million people. Its water comes primarily from the Edwards Aquifer, a fractured limestone formation spanning 8,000 square miles. With San Antonio's population growing 2 percent per year, a finite water supply (which also sustains habitat for 14 threatened and endangered species), and limits on pumping during drought conditions, the system faced a need to either buy additional water rights from an adjacent aquifer or conserve.

After detailed analysis, San Antonio concluded that investments in conservation technology and programs to achieve water use reductions would allow the system to serve its growing population and would cost less than purchasing and delivering additional water. Specifically, investing $4.8 million per year in conservation allowed the city to reap $7.4 million in avoided water purchase and infrastructure costs (a cost-benefit ratio of 1: 1.5).

For residences, conservation strategies included efficient toilets, rebates, hot water on demand, garden irrigation evaluations, and education. Commercial sector strategies included whole facility retrofits, industry certification for water use, water audits, and rewards. San Antonio also instituted water use regulations governing water waste, irrigation system design and timing, drought restrictions, and on-site water reclamation.

With these conservation strategies, San Antonio residents reduced their per-capita water usage 49 percent between 1982 and 2007, while the city's water customer base increased 30 percent. With these results, San Antonio achieved its water use reduction goal for 2008 seven years early. The system has also kept pumping rates stable in the Edwards Aquifer and maintained water prices that are significantly less than the national average (i.e., $0.12/100 gallons vs. a national average of $0.28/100 gallons).

Further reading:

- City of San Antonio, Texas. 2008. San Antonio Trends, Challenges and Opportunities (presentation) http://www.sanantonio.gov/planning/powerpoint/Growth_Trends_092506.pps#1
- San Antonio Water System. 2008. Conservation. http://www.saws.org/conservation.

Step 5. Compare and select alternatives

Utilities should employ a consistent approach for comparing projects and ranking alternatives in terms of benefits and costs. The approach should allow for the comparison of a wide range of alternatives. Again, different types of analysis may be appropriate for different types of plans or utilities. Options include:

- A qualitative comparison of each alternative's advantages or disadvantages, referencing the evaluation criteria and cost analysis.
- Cost-benefit analysis that either uses a "scoring" approach or monetized costs and benefits to rank alternatives according to their cost-benefit ratio. For example, the project alternatives in the example above can be compared to each other and to the scores of other possible project alternatives, taking into account total direct and indirect costs.

Seattle Public Utilities: Triple Bottom Line Decision-Making Using a Quantitative Approach for Monetizing Costs and Benefits

Seattle Public Utilities (SPU) in Seattle, Washington has adopted a "triple bottom line" approach for key infrastructure investment decisions. Although focused on asset management rather than long-range planning, this example illustrates how a utility can operationalize sustainability goals in the project selection process.

SPU has a formal asset management program to assess infrastructure asset condition, understand the likelihood and consequence of failure, consider lifecycle costs of investment decisions, and manage a range of other asset-related issues. SPU sums up the purpose of their program as "meeting agreed customer and environmental service levels while minimizing lifecycle costs."

An executive-level Asset Management Committee meets regularly to make decisions about what project alternatives to select and whether or not a project is needed. Decisions are based on information contained in Project Development Plans (PDPs), which contain pertinent information about projects' financial, social, and environmental costs and benefits. To the extent possible—especially for larger projects—projects' economic value is calculated and compared with project costs to allow a quantitative cost-benefit analysis.

For the triple bottom line analysis, SPU does not use a standard set of cost and benefits criteria for every project. Rather, relevant costs and benefits are identified on a project-by-project basis. In addition to assessing costs and benefits that accrue to SPU customers (i.e., internal costs and benefits), SPU economists also analyze costs and benefits that accrue to those external to SPU and its customer base, such as the general public, other city departments, other jurisdictions, Tribes, and the environment (i.e., external costs and benefits). In addition, analysts generate a "risk signature" for each project that quantifies financial, social, or environmental risk. Projects with higher risk may warrant more thorough analysis or steps to mitigate risk.

Further Reading:

- Seattle Public Utilities. "2007 Water System Plan," (November 2006). (http://www.cityofseattle.net/util/About_SPU/Water_System/Plans/2007WaterSystemPlan/index.asp)
- Compendium of Best Practices in Water Utility Asset Management (SPU example; on file)
- Seattle Public Utilities. "Asset Management at Seattle Public Utilities" (undated). (On file)

Step 6. Document the alternatives analysis

Utilities should document what projects were selected through the alternatives analysis and why they were selected—with reference to the criteria and scoring system. As part of this description, utilities should also describe what other alternatives were considered and why they were not selected. Utilities should also document their criteria and methodology.

Implementing These Steps on a Smaller Scale

Some utilities use highly sophisticated quantitative approaches for conducting alternatives analysis (see, for example, the Louisville example at the end of this section). Utilities implementing on a smaller scale can use a more qualitative and descriptive approach to alternatives analysis. This kind of approach can still be rigorous, well documented, and consistent across projects being assessed.

Key Diagnostic Questions

Utility managers can use the following questions to evaluate their implementation of this element:

- Did you describe, analyze, and rank all alternatives?
- What were the methods for analyzing alternatives and the criteria for ranking them?
- Were all planning objectives—including sustainability objectives—reflected in the specific ranking criteria or in the alternatives analyzed? How?
- How were alternatives ranked according to the criteria? In what ways did the ranking process reflect specific consideration of non-traditional alternatives to integrate the use of natural or "green" systems?
- Were alternatives all assessed on a full lifecycle cost basis?
- Was the alternatives analysis transparent, and were the approach, rationale, and results communicated to community members?
- To what extent was the community involved in, or kept up to date on, the alternatives considered and selected?

Example of Sustainability Planning in Practice: Louisville, Kentucky Combined Sewer Overflow Project Selection Process Uses a Consistent Alternatives "Scoring" Approach

In response to water quality, public health, and regulatory issues related to sanitary and combined sewer overflows, Louisville and Jefferson County Metropolitan Sewer District (MSD) in Kentucky used a range of community values to inform project evaluation and selection criteria.[13] Over 400 projects were evaluated, with 23 selected. The evaluation and selection process was based on benefit-cost analysis ratios calculated in terms of reductions in community threats and enhancements to community amenities. Costs were calculated using a comparative cost model that incorporated (among other costs) construction costs, administrative costs, land purchases and easements, operations and maintenance, and salvage values.

[13] Swanson, Gary, CH2M Hill, Inc. "Values-Based CSO LTCP Project Selection Process."

Key steps used to identify, evaluate, and select projects were:

- Defining a list of potential CSO control projects including traditional infrastructure, green infrastructure, and customer-based solutions;
- Developing project cost estimates (based on conceptual designs) using a comparative costs model;
- Calculating a “benefit” score for each initial solution using multiple criteria; and
- Ranking projects based on benefit-cost ratios.

The “benefit” score was based on a set of eleven stakeholder-derived community values. These included both “project-specific” values for evaluating individual projects and “programmatic” values for evaluating effects of a package of projects on a specific neighborhood, a watershed, or the entire project area (Table 2 provides the values used in the analysis). Each value was represented by specific, measureable criteria. Louisville then employed a methodology for “scoring” each alternative using a consistent scale and approach. These scores allowed the utility to use values generated from a qualitative assessment for quantitative analysis. For example, projects might be scored on a scale from -5 to +5 based on how they impact aquatic habitat. Scores across all project-specific values were summed into a total benefit score, using a weighting procedure to reflect the relative importance of different values. When combined with cost information, the benefit score could be used to develop a cost-benefit ratio. Following initial project selection, the suite of recommended projects was assessed using the six programmatic values.

Throughout the process, a stakeholder group was instrumental in identifying community values and contributing to the analytical approach. The group reviewed detailed information on the analysis of specific alternatives and provided endorsement of the selection of alternatives.

Table 2: Louisville Community Values Used to Analyze CSO Project Options

Values	Criteria/Factors Considered
Project-Specific Values	
Environmental Enhancement	Aquatic habitat protection, surface water dissolved oxygen, aesthetics, stream flow, and biochemical oxygen demand reduction
Public Health Enhancement	Peak flow measurements and characteristics of the release
Regulatory Performance	Discharge frequency, discharge peak flow rates, average annual overflow volume, and release point characteristics
Asset Protection	Flood damage and basement backups
Eco-Friendly Solutions	Energy consumption, use of natural systems, multi-use facilities, pollutant control, construction techniques, land use, and permeable surfaces
Programmatic Values	
Economic Vitality	Affordability criteria, costs for general sewer service, and drainage and flood protection costs
Financial Stewardship	Cost-effectiveness of the solution set developed (first costs, total present worth cost, dollars per gallon of annual average overflow reduced)
Education	Number of people contacted by various means, their knowledge of issues, and number of pollution prevention devices installed
Environmental Justice and Equity	Distribution of resources, project impacts and benefits, consistent application of project development criteria
Customer Satisfaction	Adequate and reliable sewer capacity, implementing response procedures to unauthorized overflows, and notifying customers regarding issues of concern
Financial Equity	Fair assignment of cost, volume and type of waste introduced into the system, and socioeconomic status

Planning Element 4: Financial Strategy—*Ensure that Investments are Sufficiently Funded, Operated, Maintained, and Replaced over Time*

Element Description

Once utilities have identified projects or other actions to achieve sustainability objectives, they need to determine how best to pay for them. This involves incorporating new investments into a successful financial strategy that ensures revenues cover costs over the long term. Pricing and rate structures should cover all costs of constructing, operating, maintaining, and replacing the selected infrastructure assets.

Under Element 4, utilities should use Element 3 cost and asset management program information to understand how the selected project alternatives affect costs and revenues. This understanding will inform a financial strategy that ensures adequate revenues to support the investments over their complete lifecycle. Ideally, this effort builds on an ongoing process of identifying future needs and planning ahead to finance future investments.

The Element 3 alternatives analysis should provide a complete picture of direct capital, operations, and maintenance costs for selected project(s). The utility's asset management program will provide full lifecycle project costs by articulating anticipated operational and maintenance needs and timeframes for renewal or replacement.

A maintained or improved bond rating (if relevant) is an indicator of a successful financial strategy. A strong rating reflects that the utility is meeting required or desired debt coverage ratios and required reserves. Healthy financial conditions will help maintain operating budgets, avoid future deferred infrastructure maintenance conditions, and support capital planning projects and other capital expenditures.

Current Planning Practice

Utilities engaged in long-term utility planning processes that result in recommendations for major capital or operational expenditures typically also develop a supporting capital and operations and maintenance financing strategy. Conventional practice generally involves the following activities:

- Articulation of anticipated project costs (capital, operations, and maintenance) on an annualized net present value basis;
- Selection of a project capitalization approach (e.g., capital financing from current revenues, government grants/loans, or revenue bonds); and

- Articulation of project-driven revenue requirements (based on costs and capitalization approach) and the development of a strategy to ensure revenue adequacy.

A 2002 EPA study estimated that water utilities face a 20-year operations and maintenance funding gap of $148 billion for clean water utilities and $161 billion for drinking water utilities.[14] A General Accounting Office report from the same year concluded that over 25 percent of drinking water utilities and over 40 percent of wastewater utilities did not collect enough in user fees and other local sources of revenue to cover their full cost of service (including operations and maintenance, debt service, depreciation, and taxes).[15] The remainder of this section describes financial strategies to help utilities close or avoid such funding gaps.

Building Sustainability Considerations into Financial Strategies

For the purposes of this handbook, building a sustainable project financing strategy may involve altering or emphasizing various aspects of the traditional project financing strategy, as follows:

- Ensuring a complete accounting of all project-related capital, operations, maintenance, and replacement costs on a full lifecycle cost basis (making sure to account for asset depreciation and full costing of predictive and preventive maintenance);
- Undertaking a fair and complete comparison of capital financing alternatives, covering interest, acquisition, and implementation costs; and
- Reviewing and adjusting, as needed, the timing, amount, and structure of rates, fees, charges, and other revenue sources consistent with projections for new project related revenue requirements.

> **Strategies for Reducing Direct Capital Costs of Projects**
>
> Utilities can employ a number of strategies to reduce construction-related direct costs, including:
>
> - Value engineering;
> - Using construction management to minimize cost over-runs and change orders; and
> - Providing clear project specifications.

The following steps will help utilities build sustainable financial strategies for their selected project alternatives, as well as maintain or improve the overall financial health of their organization.

Step 1: Account fully for all project capital costs

There are two types of project capital costs. *Primary* project capital costs should have been built into costs used for alternatives analysis. They typically include construction, engineering and technical services, environmental review and permitting, bidding and contracts, legal services, land and right-of-way acquisition, commissioning costs, and construction management. These costs represent the base

[14] Reported amounts are central estimates assuming no increase in revenues. EPA, "The Clean Water and Drinking Water Infrastructure Gap Analysis," http://www.epa.gov/ogwdw000/gapreport.pdf.

[15] General Accounting Office, "Water Infrastructure: Information on Financing, Capital Planning, and Privatization," http://www.gao.gov/new.items/d02764.pdf

capital funding requirement associated with the selected alternatives, and it is critical to ensure their full accounting as part of alternatives analysis.

Secondary capital costs are linked to the capital financing method. They include the cost of capital (interest rate), capital acquisition costs (such as financial advisory fees, rating agency fees, closing costs, etc.), and costs related to creating any required reserve funds or meeting debt coverage covenants. Even grants have some costs, such as grant application and administration costs.

The example on this page shows a cost analysis from the Quay County, New Mexico "Forty Year Water Plan." The analysis is for a conventional treatment and pumping system that includes an intake structure, pumping station, storage tanks, treatment plant, pipelines, and other pieces of component infrastructure. Primary costs include construction, design services, funding activities, public education, and other items—along with 5-year projected costs for operations and maintenance and replacement. In addition, the cost estimate includes the secondary capital cost of "debt service on financed share" for the financed component of the project.

Example Cost Analysis from the Quay County, New Mexico "Forty Year Water Plan"

FIXED COSTS	
Total Construction Cost	$216,000,000
Capital Outlay for Federal Share (80%)	$172,800,000
Capital Outlay for State Share (10%)	$21,600,000
Capital Outlay for Local ENMRWA Member Share (10%)	$21,600,000
NON-CONSTRUCTION COST	
Detailed Design Services	$13,000,000
Funding Activities	$250,000
Public Education Programs	$250,000
Environmental and Permitting	$1,500,000
Construction Management Services	$13,000,000
TOTAL NON-CONSTRUCTION COST	$28,000,000
Capital Outlay for ENMRWA Member Share	$2,800,000
Total Fixed Costs—All Phases Full Delivery	$244,000,000
Federal Share (80%)	$195,200,000
State Share (10%)	$24,400,000
ENMRWA Member Share (10%)	$24,400,000
RECURRING COSTS	
Raw Water Cost ($35 per acre foot to ISC)	$600,000
Debt Service on Financed Share (20 year period)	$1,950,600
Cost of Operation and Maintenance (5 yr period)	$9,815,000
Replacement Costs (5 year period)	$478,000
ISC Ute Reservoir O&M Fee ($5.60 per acre foot)	$134,400
Sub-total Annualized Costs	$12,978,000
System Average Water Rate Projection ($/gal)	$1.66

Source: Quay County, New Mexico "Forty Year Water Plan," September 2004

It is critical that the utility account fully for all capital financing costs—using up-to-date information on interest rates and other factors—and build them into future revenue requirements analysis. Calculating new projects' overall impact on average annual capital financing costs and the maximum annual future debt service payment will help utilities understand the effects of new projects on the utility's cost structure.

Step 2: Account fully for operations and maintenance costs

The selected project alternatives will likely change overall operations and maintenance costs for the utility (either up or down). Although these costs should have been fully profiled during alternatives analysis, it is important to thoroughly review the estimates at this point in the process. This will ensure revenue requirement estimates are fully reflective of any changes in O&M costs resulting from the new project(s).

From a project financial sustainability point of view, asset depreciation is an additional operating cost area to consider. Establishing a project depreciation expense, an area of potential weakness in many revenue adequacy determinations, is critical to estimating revenue requirements sufficient to replace aging infrastructure. Revenue requirements reflecting depreciation costs can provide the means to establish and fund repair and replacement accounts.

> **Operations and Maintenance Funds in Greeley, Colorado and Salem, Oregon**
>
> To ensure that operations and maintenance expenses are adequately funded, some utilities establish separate funds for them. For example, the City of Greeley, Colorado (serving a population of 93,000 people) separates its enterprise funds for operations from several other capital improvement funds. The operations fund is primarily funded by water and wastewater rates and has a minimum reserve of 90 days of O&M expenses. Transfers of funded depreciation from operating funds are used to pay for the replacement and renewal of capital assets.
>
> Similarly, the City of Salem, Oregon (serving a population of 177,000) has established rehabilitation and replacement funds to cover future infrastructure rehabilitation and replacement costs as determined by the city's capital improvement plans.
>
> For further reading, see EPA, "Case Studies of Sustainable Water and Wastewater Pricing"

Underfunding predictive and preventive maintenance (i.e., failing to fully estimate costs as part of the revenue requirements determination) is a key vulnerability of revenue adequacy determinations. Ongoing condition assessment costs of any new infrastructure also need to be accounted for, consistent with the utility's asset management program requirements. Overall, maintenance costs will be unique to the particular assets involved, but should be driven by the utility's asset management program, which will set the type and frequency of desired maintenance. Because underfunding predictive and preventive maintenance is a common problem, thorough consideration of project maintenance costs with the underpinning of the utility's asset management program is critical to ensuring maintenance needs are fully represented when establishing funding adequacy. A 2002 GAO report estimated that 29 percent of water utilities deferred maintenance due to inadequate funding.[16]

[16] General Accounting Office, "Water Infrastructure: Information on Financing, Capital Planning, and Privatization," http://www.gao.gov/new.items/d02764.pdf

Increasing Resilience and Saving Money through Energy Efficiency in New Mexico

Entranosa Water & Wastewater Association serves slightly more than 3100 residential connections in a suburban and rural area east of Albuquerque, New Mexico. Its decision to pursue infrastructure investments to save money, become more energy efficient, and make its electrical supply more resilient illustrates how a utility can set and act on sustainability priorities.

Entranosa's ground water supply is fed from seven deep wells (ranging from 605 to 1080 feet of depth). The water is delivered to two booster/disinfection stations, from which it is lifted to an array of tank storage at varying elevations. Entranosa uses a lot of electrical energy to fulfill its mission. The electrical supply is provided by a rural electric cooperative, and it is subject to outage from snow storms, occasional hurricane-force winds, and cattle knocking down power poles.

To address these challenges, Entranosa took some common sense, relatively low-cost steps to reduce its operational costs and meet the needs of its customers. The Association changed energy from electric to natural gas on one highly productive well helping to cut operational cost (depending on the cost of gas) and providing an emergency source of power to provide baseline flows to meet the needs of its membership. It also installed variable speed pumps that operate with greater energy efficiency at low flow rates. Taken together, these changes reduced the Association's annual operational costs by approximately $7,000.

Step 3: Account for the impacts new projects may have on overall utility system costs and revenues

In addition to affecting direct capital, operations, and maintenance expenses, selected project alternatives may also affect overall cost and revenue structure. To ensure revenue requirements associated with the new projects are correctly established, the following potential impacts should be examined:

- Changes in the cost of service to different classes of customers;
- Changes in the utilization and expense of existing infrastructure by the addition of new infrastructure (e.g., bigger new pipes that bring larger volume flows to an existing treatment facility);
- Changes in the type and utilization rates of personnel;
- Changes in the need to provide emergency services; and
- Changes in the resiliency of existing infrastructure and facilities (with potential implications for emergency preparedness and insurance costs).

Water Conservation and Financing in Marin County, California

An example of how projects can explicitly (and intentionally) affect utilization and revenues comes from the Marin Municipal Water District in California, which serves 190,000 people. The Marin Municipal Water District operates under a comprehensive integrated resource management plan that includes a demand-management program to reduce water use. Through conservation and water recycling, the utility has kept demand at 1980 levels in spite of a rising population.

While water conservation reduces the revenues for the utility, it also allows the utility to avoid or delay the financial costs of developing new water supplies. Monthly service and usage charges (using increasing block rates) cover the full operating costs of the utility, and connection fees cover past and future capital costs.

As indicated above, new project(s) may also affect revenues available to the utility. The utility should therefore examine if the project(s) will affect any of the assumptions used in its revenue projections. Key areas for consideration are any change to the size of the customer base or to customer utilization rates. For example, conservation pricing has the potential to decrease utilization rates as customers conserve water, which may reduce revenues and potentially make them less predictable.[17] Similarly, an economic downturn can reduce the number of utility customers or their ability to pay. This decreased rate-paying base can place substantial financial pressure on the utility.

Step 4: Develop a capital financing strategy

An effective capital financing strategy is critical to the financial sustainability of the selected project alternatives and the utility system as a whole. A utility should seek a capital financing strategy that keeps capital acquisition and interest costs as low as possible and keeps the repayment schedule (principal and interest) consistent with revenue capacity (cash flow). The mix of financing options used by the utility and how debt is structured will affect financial sustainability. There are two basic building blocks of an effective capital financing strategy: 1) identifying and comparing the full range of project financing options available, and 2) managing capital commitments and debt structure on an ongoing basis consistent with utility revenue capacity and borrowing conditions.

Cash vs. Debt Financing

When considering financial strategies for new projects, utilities should consider the pros and cons of cash vs. debt financing. Key considerations include:

- The opportunity cost of using cash that could be deployed elsewhere or kept as a liquid asset;
- The need to manage and protect asset replacement funds over time;
- The cost of capital (i.e., don't use cash for something you can inexpensively finance);
- Whether or not benefits will accrue to future customers, which favors spreading out the repayment terms through debt financing; and
- The useful life of an investment (i.e., don't borrow for 30 years if the useful life is 10 years).

Examining the Options

It is critically important to look at all funding options and carefully consider the differences in financing costs they represent. Four basic options exist for capitalization of proposed project(s): rates and other utility direct revenue sources, federal or state loan or subsidy programs, revenue bonds, and state grants. The mix of capitalization approaches used can substantially affect borrowing costs and repayment schedules.

In general, utilities have two choices when funding new capital investments—using revenues to "pay as you go" for new investments, or using long-term debt financing. Under a "pay as you go" approach, capitalization through utility rates and other revenues does not carry debt financing costs, but it is typically reserved for routine replacement of existing facilities, system extensions, and basic improvements that can fit comfortably into annual utility revenue capacity. Major capital replacements

[17] EPA, Water and Wastewater Pricing: An Informational Overview,"
http://www.epa.gov/owm/waterinfrastructure/pricing/pdfs/waterpricing_final2.pdf

and improvements, on the other hand, are typically financed using long-term debt. The use of long-term debt allows for capital costs to be distributed over a number of years and better matches customer charges with the long-term benefits provided by the new projects. The primary options for addressing major capital financing needs are federal and state loan programs and the private bond market. Each will subject the utility to different interest, acquisition, and implementation costs.

EPA's "Financing Alternatives Comparison Tool" (FACT) provides an illustration of how different financing affects borrowing costs. [18] FACT compares alternative financing strategies taking into account interest rates, financing periods, amortization methods, and other financing factors. The table below shows key input assumptions and results for an illustrative example for the "Town of Clean Water." It compares two financing approaches—SRF Direct Loan and Revenue Bond—to illustrate how different capitalization approaches can substantially influence borrowing rates and the associated long-term costs. Because the interest rate for the SRF option is substantially lower than the revenue bond alternative (along with no reserve requirements), total net present value financial costs for the SRF alternative are substantially lower for the utility. (Note that there may be other considerations in weighing different financing approaches; for example SRF-funding is subject to Davis-Bacon wage requirements while a revenue bond approach does not have these requirements.)

Table 3: FACT: Illustrative Example for "Town of Clean Water"

Key Financial Assumptions and Results	SRF Loan	Revenue Bond
Project Cost to be Financed	615,000	615,000
Construction Period Interest Rate (24 months)	2%	5.5%
Repayment Period Interest Rate (20 years)	2%	5.5%
Reserve Interest Rate (20 years)	(no reserve)	5.5% (interest rate on a reserve fund that equals 10% of the loan principal)
Other selected costs specific to financing method	Reporting	Bond counsel, underwriter, rating agency fee, bond insurance, SEC disclosure
Results		
Total Financed	$616,230	$699,744
Total Costs	$800,260	$1,114,407
Net Present Value (NPV) of Total Costs (5.5% discount rate)	$428,810[19]	$617,945
Average cost per year	$36,375	$50,655
Source: EPA, FACT Overview presentation (on file)		

As illustrated above, government loan programs, such as the Clean Water and Drinking Water State Revolving Loan funds, will often carry lower interest rates than private bond issues. (In practice, the comparison of rates will depend on factors such as a state's or community's bond rating.) Depending on

[18] See: http://water.epa.gov/grants_funding/cwsrf/fact.cfm

[19] Readers will note that the NPV under the SRF financing as calculated by FACT is lower than the financed amount. This results from the difference between the interest rate charged on the principle (2%) and the discount rate used for calculating NPV in the tool (5.5%).

community eligibility, government loan programs may also provide interest and principal forgiveness options. These features can reduce debt financing costs substantially. These subsidies provide an incentive for utilities to make sound investments (including investments in sustainability) that they would not otherwise be able to make using commercial debt. SRF eligibility, review, and selection processes are intended to ensure that utilities are making the best possible use of the subsidy.

Capital acquisition costs will be different for SRF funding and private capital. Government loan programs will have loan application and ongoing reporting-related administrative costs. Private capital acquisition costs typically include financial advisory services, bond counsel, underwriting fees, rating agency fees, closing costs and fees, and bond insurance, and will have a mix of recurring costs including those for reporting, accounting, and general administration. Further major project capitalization costs include contributions to specified reserves (e.g., reserve account needs related to annual principal and interest payments, for emergency repairs, and for replacements) or meeting coverage covenants imposed by the indenture. There are no specific federal SRF requirements for reserves or coverage covenants, although many state SRF programs require one or the other. Through coverage covenants, state SRFs can require that, after operating and maintenance expenses are met, net annual revenues must equal some increment above 100 percent (e.g., 120 percent) of the annual debt service payments for principal and interest.

Although more favorable borrowing terms—including incentives in some states for "green" project investments—are a principal reason utilities seek SRF financing, not all utilities are eligible. For those that are eligible, there are other considerations to take into account. For example, a utility with many capital projects may choose to seek SRF funding only for those most likely to be approved or that would have the most difficulty getting favorable terms in private markets. SRF funding can also help accelerate project implementation because utilities with SRF loans can often obtain accelerated consideration of environmental and other permits. SRF funding, however, covers only a small portion of the funding needed for water and wastewater capital needs and cannot be used for operations and maintenance.

Camden County Municipal Utilities Authority and the Benefits of SRF Financing

The Camden County (New Jersey) Municipal Utilities Authority (CCMUA) financing approach for a new sludge drying facility at its 80 million gallon per day wastewater treatment plant provides an example of the benefits of SRF financing. The capital cost of the project is approximately $27.5 million. CCMUA considered financing through the low interest New Jersey SRF and also through normal government revenue bonds. According to the Deputy Executive Director at CCMUA, "the difference in total cost and annual cost was startling."

Specifically, CCMUA was able to obtain 75 percent interest-free funding through the New Jersey SRF. As a result, the annual cost to CCMUA with SRF financing is approximately $1.65 million per year for 20 years. This compares very favorably to the $3 million per year that the CCMUA would have paid had it utilized commercial funding. Paying $1.35 million per year less in annual debt service enabled the CCMUA to implement this important plant improvement without having to raise rates. Over the 20-year life of the loan, CCMUA will save approximately $27 million for its ratepayers by financing this project through the SRF program.

Structuring Capital Commitments and Debt

Debt structure is the second critical aspect of a financing strategy. It is linked to prevailing borrowing conditions and the phasing of capital project implementation. A utility, when structuring debt, should consider prevailing and anticipated future bond market conditions (to the extent that revenue bonds are an important element of the capital financing approach). Key variables a utility can manage, depending on conditions, are the timing of borrowing, the amount of each increment of borrowing, and the mix of interest and principal paid on an annual basis over the life of the repayment schedule. Maintaining ongoing awareness of bond market conditions can provide refinancing opportunities throughout the life of the project, particularly in cases where a utility has strategically deferred principal payments as a result of financing during an unfavorable interest rate climate. Regardless of the public or private financing option(s) selected, a utility can adjust project phasing, and therefore the associated annual capital principal and interest cost requirements. Project phasing can smooth revenue requirements over a several year period and help strike an effective balance with utility revenue capacity over the debt financing period.

Step 5: Determine current revenue adequacy and develop future revenue strategy

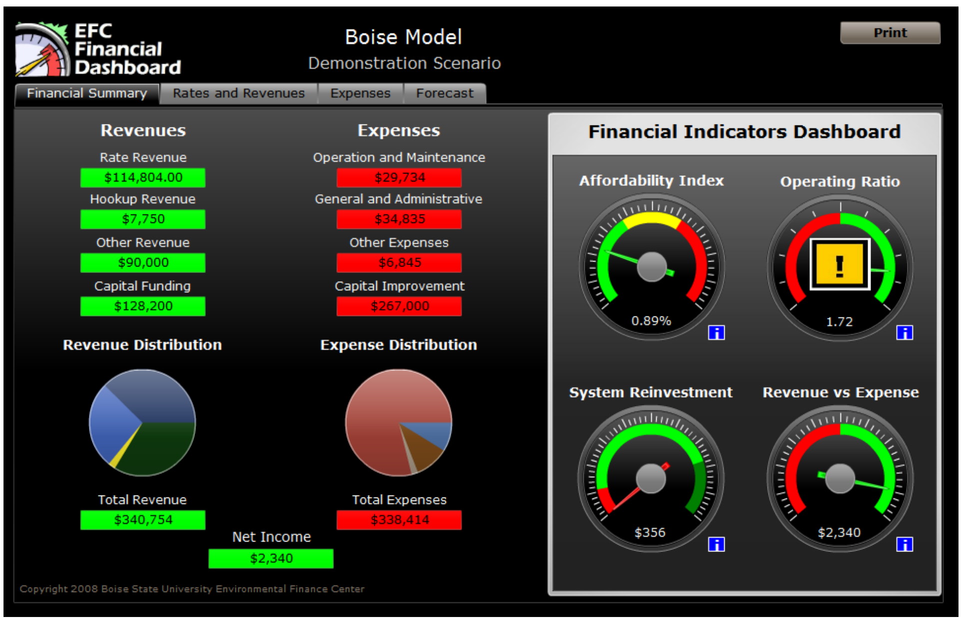
Steps 1 through 4 will provide the utility with a full accounting of the annualized costs and revenue impacts of the new projects. This information can be overlaid on the utility's current revenue projections to determine revenue adequacy. In some cases, cost savings from new capital projects (e.g., from reduced maintenance costs or more efficient operations) and current revenue generation will be sufficient to cover new debt payments. In other cases, major capital projects may shift cost structures in a manner that requires increasing revenues, unless rates, in particular, have been previously structured with future capital project financing needs in mind.

Assessing Revenues Using the Financial Dashboard from the Environmental Finance Center at Boise State University

The Financial Dashboard, developed by the Environmental Finance Center at Boise State University in Idaho, provides drinking water, wastewater, and stormwater utilities with a concise way to track, view, and evaluate the adequacy of revenues and other elements of their financial sustainability. To use the dashboard, utilities enter information on expenses, rates, other revenue sources, and service demand. The dashboard quickly shows how total revenues compare to total expenses, and provides several indicators of financial sustainability, such as:

- Affordability—the percent of annual median income to pay for water service;
- Operating ratio—the ratio of ongoing operating revenues to operating costs;
- System reinvestment—a measure of funds for replacement compared to annual depreciation; and
- Revenues vs. expenses—the difference between annual revenue and annual expenses.

The dashboard can be used to assess the utilitiy's current structure of revenues and expenses and evaluate alternative approaches.



The financial dashboard can be found at: http://efc.boisestate.edu/Tools/Dashboard/tabid/154/Default.aspx

Once the level of adequate revenues has been established—and if a utility determines that increased revenues are required—the utility will need to decide how to generate the necessary revenues through customer rates and fees. Several considerations will need to be balanced:

- The timing, amount, and structure of any needed rate increases (e.g., phasing in increases over time);
- Alterations of the rate structure to reflect changes in the full cost of service to different classes of customers (e.g., industrial, commercial, and residential) or explicit acknowledgement of any transfer of revenues generated from one class to investments that serve another class;

- Deviations from full cost of service pricing to accommodate special community conditions, such as low income customers (typically, states have their own guidelines regarding identification and accommodation of disadvantaged households);
- The structure and amount of system development fees (placed on, for example, developers) to help offset the capital cost of providing service to new customers; and
- The structure and amount of direct customer service connection fees.

Newport, New Hampshire: Setting the Stage for Raising Rates

Newport, New Hampshire is a small town of approximately 6,500 residents in West Central New Hampshire. Its city water system provides drinking water from a protected watershed and a single groundwater well to approximately 5,000 people, commercial customers, municipal agencies, and a single large industrial user. Newport is an example of a system that had to re-evaluate its revenues in light of a changing revenue and cost structure and adjust rates to put the system on a sustainable (and equitable) foundation.

Newport invested in an expensive new treatment plant for its surface water supply in the early 1990s. To cover debt service and part of the capital project costs Newport raised its water rates at that time.

By 2002, however, a study by the city showed that rates were not adequate to cover ongoing operating costs and anticipated infrastructure upgrades. Costs included administration, treatment, distribution services, and debt service. Rates would also have to cover part of future infrastructure upgrades, because the city anticipated that the costs would not be fully covered by capital reserve funds, Drinking Water State Resolving Fund loans, and Community Development Block grant funds. With expenses increasing and capital investments on the horizon—at the same time that rates were static and usage was declining—the revenue adequacy study predicted that cash and working capital balances would decline to critical levels by 2004-2005.

Based on a 10-year planning horizon, the city chose to raise rates 10 percent over four years. For residential customers, the new rates were a straight usage charge based on metering. To soften the impact on lower income ratepayers and shift more of the cost burden to larger users, the city also reduced the minimum usage charge from 5,000 gallons per month to 3,000 gallons. The utility estimated that it will not have to raise rates again until 2013.

As the city was considering the need to raise rates, it informed the town selectmen and residents about the need for the increase and was ultimately successful in getting rates approved.

Further Reading:

- EPA, "Case Studies of Sustainable Water and Wastewater Pricing:
  http://www.epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_fullcost_pricing_case_studies.pdf

Resources that can help utilities calculate revenue requirements and set rates are included in Appendix A. They include:

- EPA, *Setting Small Drinking Water Rates for a Sustainable Future*—a step-by-step rate setting guide for small utilities to assessing annual costs, revenue needs, and reserve requirements and setting appropriate rates; and
- American Water Works Association (AWWA), *Principles of Water Rates, Fees, and Charges*—a comprehensive guide for assessing costs and revenue requirements and setting rates.

Implementing These Steps on a Smaller Scale

Utilities implementing at a smaller scale may face several financing challenges, including lack of credit, lack of asset management programs, or pressure not to increase rates. These utilities need to be aware of and utilize resources that are available to help them obtain favorable financing rates and receive technical assistance. Resources include various Federal and State resources for building technical, financial, and managerial capacity, such as EPA's resources for small public water systems and capacity development, including the rate-setting guide "Setting Small Drinking Water System Rates for a Sustainable Future."[20]

A number of utility associations also provide resources for utilities. While EPA does not formally endorse the resources, they include:

- The Rural Community Assistance Partnership, which works with small, rural communities to build sustainable water systems.[21]
- The National Rural Water Association, which has state affiliate "circuit riders" that can provide assistance to smaller utilities, including assistance in applying for SRF loans.[22]
- The American Water Works Association's Capacity Assistance Program, which assists smaller utilities with "business planning."[23]

Utilities implementing at a smaller scale may have a more limited range of options for generating revenues or obtaining financing than larger systems—or at least they may not realize what options are open to them. For example, the small community of Hidden Valley Lake, California achieved significant cost savings by merging a public and private utility. The merger opened up new opportunities for financing drinking water infrastructure (see call-out box below).

[20] See: http://water.epa.gov/type/drink/pws/smallsystems/index.cfm
[21] See http://www.rcap.org/
[22] See: http://www.nrwa.org/
[23] See: http://www.awwa.org/files/Resources/SmallSystems/CAPSelfAssessmentChecklist.pdf

Hidden Valley Lake Community Services District: Changing Ownership and Operation for a Sustainable Financial Strategy

The example of Hidden Valley Lake Community Services district demonstrates how a small utility can change its ownership and operations structure to put itself on a sustainable financial footing. Hidden Valley Lake is a community of 2,400 residential lots and 34 commercial lots within a 1,400 acre service boundary.

Prior to 1993, Stonehouse Mutual Water Company (established in 1968) supplied water to the Hidden Valley Lake subdivision and sewer to 200 lots around Hidden Valley Lake. As the community grew, the financial future of the company became increasingly uncertain. As a private company, it had no access to low interest loans or grants for infrastructure projects that the community would inevitably need.

Stonehouse Mutual Water Company's financial problems led to discussions of a merger with Hidden Valley Lake Community Services District, a public utility that provided sewer service to most of the community. A merger into one utility company could provide large benefits, including:

- $300,000 savings per year in administrative and operational costs;
- Additional protection to the community through state oversight with full transparency; and
- Access to low cost loans and grants.

The two utilities merged in 1993. State law transitioned full ownership of water rights to the Community Services District and exempted the transfer of funds from Stonehouse Mutual Water to the Community Services District from taxation. For the merger to occur, a vote from the Hidden Valley Lake property owners was required—1,544 votes were in favor with only 46 opposed.

The shift from a private to a public agency gave the utility the ability to access low interest loans and grants that were greatly needed for water and sewer infrastructure improvements and expansion for the rapidly growing Hidden Valley Lake community. In addition, the $300,000 annual savings from the merger was used to offset new infrastructure investment. For example, the savings allowed the Community Services District to issue four sewer bonds and receive a state loan to pay for a Water Reclamation Plant project while keeping rates stable.

In 2004, the Community Services District obtained a low interest $3 million loan as a public agency and launched the Water Infrastructure Improvement Project (WIIP) to add capacity for an additional million gallons of stored water, implement SCADA system improvements, replace water regulator valves throughout the water system, and establish new pump stations. Community Services District was also able to operate its pumps during off peak hours, accessing the lowest energy costs. These savings helped sustain the water rate structure.

Moving from the private sector to the public sector gave customers a say in decision making. Full transparency under a public agency created more confidence from the public at large.

Currently, drinking water revenues are generated through:

- Water rates, which pay for the cost of operating and maintaining the water system (including improvements to increase system reliability and sustainability); and
- Water service hook-up fees, which reimburse the District for the incremental costs of capital investment and funding for improvements necessary to provide the capacity for growth.

Key Diagnostic Questions

Utility managers can use the following questions to evaluate their implementation of this element:

- Was a full range of capital financing options considered and were their interest, acquisition, and implementation costs fully identified and thoroughly compared?
- Does the capital financing strategy keep capital acquisition and interest costs as low as possible and keep the repayment schedule (principal and interest) consistent with utility revenue capacity (cash flow)?
- What was considered in determining whether to use cash versus debt financing?
- Are rates, fees, and charges sustainable and do they generate sufficient revenue to fully cover long-term, full lifecycle costs of the selected project alternatives?
- Are costs allocated fairly/appropriately (e.g., reliability costs to current customers, cost recovery for industrial wastewater permitting and treatment, growth costs to new development, rates for disadvantaged households)?
- Does the rate structure create appropriate customer incentives consistent with your utility's objectives (e.g., conservation pricing)?
- Does the financial strategy maintain or improve the bond rating, debt coverage ratio, or capital financing reserves where relevant?

Example of Sustainability Planning in Practice: Camden, New Jersey Invests in New Infrastructure and Benefits the Environment without Raising Rates

The Camden County Municipal Utilities Authority (CCMUA) operates an 80 million gallon per day wastewater treatment plant in Camden, New Jersey (population approximately 500,000). The sewage treatment plant was completed in 1987 and, as a result, many of its key process units were due for replacement during the period 2007–2012. As these process units aged, CCMUA noted steadily increasing maintenance costs; overtime costs also increased due to the increased incidence of unplanned repairs. In addition, the CCMUA was aware that newer technology was available that could reduce energy and operating costs. Camden provides an example of using an environmental management system (EMS) and associated asset management program to support infrastructure upgrades and reduce environmental impact while maintaining current rates.

As part of its EMS, CCMUA embarked on a five-year plan to replace its five main treatment process units, which included sedimentation tanks, pure oxygen aeration tanks, sludge thickening facilities, sludge dewatering facilities, and sludge drying facilities. These capital improvements resulted in significantly reduced maintenance and overtime costs, when compared to maintaining aging equipment. Moreover, the pure oxygen system upgrade utilized new technology that resulted in reduced electricity costs. Similarly, the new sludge thickening, dewatering, and drying facilities produced drier sludge cakes, resulting in significant reductions in sludge disposal costs.

In all cases, CCMUA utilized the New Jersey State Revolving Fund which offered 75 percent interest free loans. The much lower interest rate corresponded to much lower annual debt service costs. The annual operations and maintenance cost savings associated with the plant upgrades exceeded the annual debt service costs. As a result, CCMUA was able to replace or upgrade all of its main treatment process units without raising user rates. Furthermore, public support for these plant improvements was quite easy to obtain.

In addition to the economic benefits realized through this EMS and its associated asset management plan, CCMUA also improved its environmental performance. The new sludge thickening and dewatering facilities increased the treatment plant's capability to capture more sludge through the treatment process. Effluent quality improved by about 70 percent. Reducing the weight and volume of biosolids also reduced disposal needs and odor potential.

Overall, CCMUA's asset management program, as part of its overall EMS, identified replacement of underperforming, high maintenance capital with new, more efficient equipment as a key opportunity. These changes, coupled with the use of low interest New Jersey State Revolving Loan Fund financing, enabled 1) replacing the main treatment plant process units, 2) reducing annual operating and maintenance costs, and 3) improving environmental performance without raising rates.

Conclusion

Incorporating sustainability considerations into water and wastewater utility planning can produce substantial benefits. It can help utilities:

- Reduce lifecycle costs by operating more efficiently, pursuing cost-effective investment strategies and optimizing investment choices.
- Optimize social, environmental, and economic benefits by selecting projects through a systematic process of setting sustainability goals and objectives that also support community priorities.
- Increase community support through upfront dialogue with community members and active consideration of other community priorities as alternatives are considered.
- Balance assessment of a range of traditional and non-traditional infrastructure alternatives using consistent criteria.
- Increase fiscal sustainability by analyzing the full lifecycle costs of investments, developing low cost financing strategies, and ensuring that revenue needs are accurately assessed to support maintenance, renewal, and replacement of infrastructure while meeting all regulatory requirements.
- Provide sustainability benefits information for making replicable, consistent, and transparent decisions and for explaining decisions to board members, local elected officials, the public, and others.
- Increase customer support through clear rate expectations (and avoided "rate shocks"), increased system reliability, and increased responsiveness when disruptions occur.
- Enhance the technical, financial, and managerial capacity of the utility.

The case studies in this handbook provide examples of how to undertake certain aspects of planning. The guidance and tools referenced in the handbook and Appendix A provide further helpful resources. Utilities applying this guidance and these tools should utilize the identified processes on an iterative basis, refining them over time. This will help support the sustainability and responsiveness of the planning process.

As the practice of planning for sustainability evolves, more effective practices will emerge. EPA envisions this handbook as a resource that can be updated to provide water utilities with the most current advice and resources. These resources can help utilities more effectively use this planning approach over time and further optimize their infrastructure and operational decisions.

Appendix A: Useful Sustainability Planning Resources

Asset Management

- EPA, "Asset Management: A Best Practices Guide": http://epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_assetmanagement_bestpractices.pdf
- EPA, "Asset Management: A Handbook for Small Water Systems": http://epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_asset_mgmnt.pdf
- Association of Metropolitan Water Agencies, NACWA, and the Water Environment Federation, "Implementing Asset Management: A Practical Guide": https://www.e-wef.org/Home/ProductDetails/tabid/192/Default.aspx?ProductId=4130
- EPA Office of Wastewater Management Asset Management resources: http://www.epa.gov/owm/assetmanage/index.htm
- New Mexico Environmental Finance Center Asset Management resources: http://nmefc.nmt.edu/AssetManagement.php
- EPA, Check Up Program for Small Systems (CUPSS)—tool for inventorying assets, maintenance, and associated costs and short and long term budgeting: http://epa.gov/safewater/cupss/

Collaboration and Partnerships

- EPA, "Gaining Operational and Managerial Efficiencies Through Water System Partnerships": http://www.epa.gov/ogwdw000/smallsystems/pdfs/casestudies_smallsystems_gainingoperational.pdf

Community Engagement

Guides and Tools

- EPA, Public Involvement Tools website—compendium of public involvement manuals, tools, and techniques for public involvement in environmental decisions: http://www.epa.gov/publicinvolvement/involvework.htm
- Envision Utah Community Planning Process—describes a participatory planning process that involves a stakeholder steering committee, community "values analysis," and a community information and education campaign: http://www.envisionutah.org/eu_about_euprocess.html
- American Water Works Association Public Communications Toolkit—members-only resources for public relations and public communications for water utilities: http://www.awwa.org/Government/Content.cfm?ItemNumber=3851&&navItemNumber=3852

- Water Environment Federation, "Survival Guide: Public Communications for Water Professionals"—public communications guidance and best practices for water managers: http://www.wef.org/WorkArea/DownloadAsset.aspx?id=7120
- International Association of Public Participation (IAP2) website—compendium of public involvement tools and resources: http://www.iap2.org/

Case Studies

- University of Arizona Water Resources Research Center, "Best Practices for Stakeholder Engagement in Water Resources Planning"—summary of poster sessions for 2009 conference that briefly describe case studies of various efforts to involve stakeholders in water planning: http://cals.arizona.edu/AZWATER/programs/conf2009/posters.pdf
- peopleandparticipation.net case studies—international collection of public participation case studies: http://www.epa.gov/publicinvolvement/involvework.htm

Effective Utility Management

- Effective Utility Management Collaboration Effort: www.watereum.org

Energy Efficiency

- EPA, Energy Efficiency for Water and Wastewater Utilities—provides links to several guides and tools for tracking and understanding water utility energy use: http://water.epa.gov/infrastructure/sustain/energyefficiency.cfm
- EPA, "Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities" http://www.epa.gov/owm/waterinfrastructure/pdfs/guidebook_si_energymanagement.pdf
- EPA, "Report on Evaluation of Energy Conservation Measures for Wastewater Treatment Facilities": http://water.epa.gov/scitech/wastetech/upload/Evaluation-of-Energy-Conservation-Measures-for-Wastewater-Treatment-Facilities.pdf
- Energy Star/Portfolio Manager for water utilities—tool for plant managers to assess and track energy use, energy costs, and associated carbon emissions and benchmark performance against other similar facilities: http://www.energystar.gov/index.cfm?c=water.wastewater_drinking_water
- EPRI. "Energy Audit Manual for Water/Wastewater Facilities"—guide for assessing energy use at the process level: http://www.cee1.org/ind/mot-sys/ww/epri-audit.pdf
- New York State Energy Research and Development Authority (NYSERDA), "FlexTech Program"—technique for energy assessments for facilities that will receive CWSRF funding: http://nyserda.ny.gov/en/Page-Sections/Commercial-and-Industrial/Programs/FlexTech-Program.aspx?sc_database=web

- State of Wisconsin "Water and Wastewater Energy Best Practice Guidebook": http://www.werf.org/AM/Template.cfm?Section=Home&CONTENTID=10245&TEMPLATE=/CM/ContentDisplay.cfm
- Alliance to Save Energy. "Watergy: Taking Advantage of Untapped Energy and Water Efficiency Opportunities in Municipal Water Systems" http://www.munee.org/files/watergysummary.pdf
- Rural Community Assistance Corporation, "Sustainable Infrastructure for Small System Public Services: A Planning and Resources Guide": www.rcac.org/assets/green_infra/gig.pdf

Environmental Management Systems

- Resources on Environmental Management Systems for Water and Wastewater Utilities: http://www.peercenter.net/sas/water.cfm

Green Infrastructure

- Center for Neighborhood Technologies (CNT) Green Values Stormwater Management Calculator—assesses hydrological impacts and cost-effectiveness of green infrastructure options: http://logan.cnt.org/calculator/calculator.php
- EPA, Green Infrastructure website—provides background and resources on green infrastructure strategies: http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm
- Water Environment Research Foundation (WERF): "Performance and Whole-Life Costs of Best Management Practices and Sustainable Urban Drainage Systems": http://www.werf.org/AM/CustomSource/Downloads/uGetExecutiveSummary.cfm?FILE=ES-01-CTS-21Ta.pdf&ContentFileID=10452 (Executive Summary)
- Water Infrastructure Finance Authority of Arizona, "Sustainable Infrastructure: A Best Practices Guide for Arizona Wastewater Utilities" (chapter on "sustainable design strategies"): www.azwifa.gov/publications/BestPracticesGuideForWastewaterUtilities.pdf

Support for Existing Communities

- Vermont Agency of Natural Resources, "Growth Center and Growth Management Guidance Document"—guidance on strategies to support existing communities for wastewater utilities: http://www.anr.state.vt.us/dec/fed/financial/docs/GROWTH%20CENTER%20AND%20GROWTH%20MANAGEMENT%20GUIDEANCE%20November%202010.pdf

Sustainable Financial Strategy

- Financial strategy: EPA, Financing Alternatives Comparison Tool (FACT)-- financial analysis tool that calculates and compares the costs of various financing options for water quality projects: http://www.epa.gov/owm/cwfinance/cwsrf/fact.htm

- EPA, "Setting Small Drinking Water Rates for a Sustainable Future"—a step-by-step rate setting guide for small utilities for assessing annual costs, revenue needs, and reserve requirements and setting appropriate rates: http://www.epa.gov/owm/waterinfrastructure/pdfs/final_ratesetting_guide.pdf
- American Water Works Association (AWWA), "Principles of Water Rates, Fees, and Charges"—a comprehensive guide for assessing costs and revenue requirements and setting rates: http://apps.awwa.org/ebusmain/OnlineStore/ProductDetail/tabid/55/Default.aspx?ProductID=6695
- American Water Works Association, *CAP: Capacity Assistance Program Self Assessment Workbook Checklist*—a series of self-assessment questions to help utilities "operate like a business": https://www.awwa.org/files/Resources/SmallSystems/CAPSelfAssessmentChecklist.pdf
- Government Finance Officers Association, guidance manuals and reports on financing topics: http://www.gfoa.org/index.php?option=com_content&task=view&id=332. Key publications include:
    - *Debt Issuance and Management: A Guide for Smaller Government*—introduces the essential concepts of tax-exempt debt financing and compares and contrasts options.
    - *Benchmarking and Measuring Debt Capacity: GFOA Budgeting Series Volume 1 (Putting Recommended Budget Practices into Action)*—provides a useful analytic approach to implementing budget practices.
    - *Capital Project Planning and Evaluation*—discusses considerations associated with most capital project types (e.g., public participation, cost estimation and budgeting, and project oversight) and a short description of twelve important capital project types.

- Rowan Miranda, Ronald Pincur, and Doug Straley, "Elements of a Comprehensive Local Government Debt Policy," Government Finance Review (October 1997): http://www.gfoa.org/downloads/GFRElementsofDebtPolicy.pdf
- Margaret C. H. Kelly and Matthew Zieper, "Strategies for Passing a Bond Referendum," Government Finance Review (June, 2001): http://www.gfoa.org/downloads/GFRPassingBondReferendum.pdf
- California Debt and Investment Advisory Commission, "Bond Insurance as a Form of Credit Enhancement in California's Municipal Bond Market": http://www.gfoa.org/downloads/CDIACCreditEnhancementReport.pdf

Water System Vulnerability Resources and Assessment Tools

- EPA, Water Security Website—provides a wide range of resources on water security, vulnerability, and resilience: http://water.epa.gov/infrastructure/watersecurity/

- American Water Works Association (AWWA), “J100 RAMCAP Standard for Risk and Resilience Management of Water and Wastewater Systems”—voluntary consensus standard encompassing an all-hazards risk and resilience management process for use specifically by water and wastewater utilities: http://www.awwa.org/Resources/standards.cfm?ItemNumber=54453&navItemNumber=55050
- EPA, Vulnerability Self-Assessment Tool (VSAT)—risk assessment software tool that assists drinking water and wastewater utilities in assessing security threats and natural hazards and updating utility Emergency Response Plans; appropriate for any water system size or type: http://water.epa.gov/infrastructure/watersecurity/techtools/vsat.cfm
- National Rural Water Association, Security and Emergency Management System (SEMS)—software to assist small water systems in completing a vulnerability self-assessment: http://semstechnologies.com/RAMCAP.asp
- Sandia National Laboratories, Risk Assessment Methodology (RAM-W)—a vulnerability self-assessment tool appropriate for small, medium, or large systems: http://www.sandia.gov/ram/RAMW.htm
- EPA, Community-Based Water Resiliency Website and Tool—resiliency resources for communities and water utilities, including a tool to help communities conduct a self-assessment of resiliency to service disruptions and identify actions to enhance resiliency: http://water.epa.gov/infrastructure/watersecurity/communities/index.cfm
- EPA, Climate Resilience Evaluation and Awareness Tool (CREAT)—a software tool to assist drinking water and wastewater utilities in understanding potential climate change threats and in assessing the related risks at their individual utilities: http://water.epa.gov/infrastructure/watersecurity/climate/creat.cfm (Related resources for increasing water system resilience to climate change are available at: EPA, Climate Ready Water Utilities: http://water.epa.gov/infrastructure/watersecurity/climate/index.cfm

Water Quality

- EPA, “Small Systems Guide to Safe Drinking Water Act Regulations”—resource for understanding current and anticipated drinking water regulations with which utilities need to comply: http://epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_sdwa.pdf

Water Utility Sustainability and Climate Change Adaptation

- Cheryl Welch, *The Green Utility: A Practical Guide to Sustainability*, American Water Works Association (2010)—includes ideas, plans, and tools to reduce environmental impacts, positively impact communities, and deliver high quality service: http://www.normas.com/AWWA/pages/20706.html
- The Institute for Sustainable Infrastructure—developed and provides a civil engineering infrastructure sustainability rating system: http://sustainableinfrastructure.org/

- EPA, "Climate Change Indicators in the United States"—presents 24 indicators, each describing trends related to the causes and effects of climate change: http://www.epa.gov/climatechange/indicators.html
- EPA, "Climate Change Vulnerability Assessments: Four Case Studies of Water Utility Practices"—presents a series of case studies describing the approaches currently being taken by four water utilities to assess their vulnerability to climate change: http://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=233808

Water Utility Strategic Planning

- EPA, "Strategic Planning: A Handbook for Small Water Systems, Simple Tools for Environmental Protection (STEP) Guide"—a strategic planning guide and workbook for small water systems: http://www.epa.gov/ogwdw/smallsystems/pdfs/guide_smallsystems_stratplan.pdf
- Honolulu Board of Water Supply, "Development of a Strategic Planning Process: Tailored Collaboration Project," American Water Works Association Research Foundation

Working with Boards and Commissions

- EPA, "Talking To Your Decision Makers: A Best Practices Guide"—describes the role of board and commissions and provides information about effective engagement and communication: http://www.epa.gov/ogwdw/smallsystems/pdfs/guide_smallsys_decision_makers_08-25-06.pdf

Appendix B: Relationship Between Core Elements of *Planning for Sustainability* and Effective Utility Management

Core Elements of Planning for Sustainability	Effective Utility Management	
	Keys to Management Success	Attributes of Effectively Managed Utilities
Element 1: Goal Setting	• Strategic Business Planning • Continual Improvement Management	• Customer Satisfaction • Community Sustainability • Stakeholder Understanding & Support • Water Resource Adequacy
Element 2: Objectives and Strategies	• Strategic Business Planning • Measurement	
Element 3: Alternatives Analysis	• Strategic Business Planning	• Customer Satisfaction • Infrastructure Stability • Product Quality
Element 4: Financial Strategy		• Financial Viability

For more information on Effective Utility Management, please see: www.watereum.org.