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# **WATER SECTOR UTILITY SUSTAINABILITY: THE PATH FORWARD**

***September 25-26, 2012***

## *Meeting Summary*

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The Office of Water at the United States Environmental Protection Agency sponsored, in cooperation with several water and public works professional associations, a meeting on current and future water sector utility sustainability. Titled “Water Sector Utility Sustainability: The Path Forward,” the meeting was held September 25 – 26 at EPA Headquarters in Washington, DC and engaged utility and state regulatory leaders (see Attachment A for the roster of meeting participants).

The overall purpose of the meeting was to identify ways to help utilities move toward sustainable operations over time, building on the many activities EPA, utilities, and states have undertaken over the past several years. The meeting was preceded in May, 2012 by a meeting with various water sector associations and by a series of one-on-one interviews conducted with meeting participants in July and August to obtain their perspectives on the nature of, trends related to, and future needs in support of water sector utility sustainability. These interviews provided discussion content to seed discussions at the meeting (see Attachment B for the interview synthesis, including additional observations provided during the meeting), as well as help inform the objectives and format for the meeting. There were four meeting objectives:

- Generate an enhanced and refined understanding of the challenges and opportunities facing water sector utilities as they strive for increased sustainability;
- Identify areas of effective utility practice that can anchor efforts to promote more sustainable utility management in the future;
- Characterize gaps in current knowledge, tools, and collaborative efforts that hinder greater progress in utility sustainable management;
- Identify a suite of ideas for new knowledge, tools, and collaborative efforts to address the identified gaps in support of improved progress on sustainable utility management under both conventional and emergent business models. A description of these two models is provided in Attachment D.

### **Opening Remarks**

The meeting was opened by Jim Horne of the U.S. Environmental Protection Agency (EPA), who welcomed participants and introduced Nancy Stoner, the Acting Assistant Administrator for Water, at EPA. Ms. Stoner provided opening remarks, identifying challenges facing the utility sector, including: population growth; increased development; infrastructure aging and deterioration; and impacts on water resources (e.g., climate change). However, she noted that these challenges can be met by the countless innovators throughout the nation, in areas such as green infrastructure, drinking water systems, and the water-energy nexus. Following Ms. Stoner’s remarks, Randy Hill (Office of Wastewater Management Acting Office Director) and Andrew Sawyers (Deputy Office Director, Office of Groundwater and Drinking Water)), provided brief remarks. Meeting facilitator, Rob Greenwood of Ross Strategic, provided an overview of the meeting agenda and objectives, and highlighted the EPA’s role as a convener, rather than a primary subject for discussion, of the meeting.

## **Review Compendium of Current Efforts**

Prior to the meeting, participants were provided with a compendium of resources and tools related to sustainable utility practices. Morgan Hoenig, Ross Strategic, gave a brief overview of the compendium sections, and described how resources were chosen. The compendium is not an exhaustive list of tools and resources, but instead is meant to act as a reference point for discussions on current efforts in the sector. (See Attachment C for the compendium.)

## **Overview of Interview Findings: Trends Affecting the Water Sector, Successful Practice, and Tools, Knowledge & Collaboration**

In the two months prior to the meeting, interviews with all direct meeting participants were conducted. These interviews were structured around the following questions:

1. *When you look across the water sector utility landscape, have you seen an organization that has been successful in tackling current challenges? If so, can you identify the keys to their success?*
2. *What economic, technical, or programmatic developments or trends are you seeing as the biggest opportunities and constraints for achieving success?*
3. *The challenges facing the sector are expected to continue. What do you see as needed (in terms of tools, knowledge, etc.) to build on the progress over the past several years and perhaps accelerate progress toward sustainability over the next several years?*
4. *In working toward sustainability, what areas do you see as the most promising opportunities for collaboration within the sector?*

During a sequence of morning sessions, Mr. Greenwood presented an overview of the interview findings, and meeting participants provided comments and discussed general observations on the three major topics. Attachment B provides the interview synthesis as refined through discussions at the meeting.

## **Break Out Working Groups: Conventional and Emergent Business Model Sustainability**

In two separate sessions, break out groups discussed the characteristics of conventional and emergent utility business models within the framework of five major utility management *domains*: **Technology & Innovation; Operations & Management; Workforce; Leadership & Culture; and Customer & Community**. The concept of conventional and emergent business models emerged during the pre-meeting participant interviews. These concepts were then used as a means to organize the break out group discussions (see Attachment D for a list of conventional and emergent business model characteristics). Participants also arranged the practices under the Conventional framework into three additional groupings—Basic, Intermediate, and Advanced. Emergent Practices, reflecting their relatively new state of adoption in the water sector, were not characterized as basic, intermediate, or advanced. Attachment E provides the summary matrix of practices resulting from the break out group discussions, as well as plenary discussions held on day 2 of the meeting.

## **Future Needs in Support of Utility Sustainability**

Meeting participants, after taking efforts to refine the matrix of practices developed during the break-out sessions on day 1, turned their focus to identifying and discussing tools, knowledge, and collaborative efforts in support of utility sustainability. This discussion was designed to build off of the practices discussion and add to the list of tools, knowledge, and collaboration opportunities identified during the pre-meeting interviews (and

captured in the interview synthesis). The ideas generated during this discussion are presented in three categories below: Tools; Knowledge; and Collaborations

### Tools

- Create a baseline expectation description for utility capabilities – this could act as the “floor” of the effective practices continuum.
- Create the capacity with regulatory impact analysis to explicitly account for sustainability considerations and impacts.
- Identify mechanisms that can support the ability of utilities to make water quality improvement investments outside of their jurisdiction in support of such strategies as water quality trading and multi-barrier source water control.
- Enable the ability to better account for the value of eco-system services (e.g., alternative asset value of land stewardship practices) particularly in the context of presenting financial conditions to bond rating agencies.
- Create (or document) example models of joint venture partnerships between utilities and other sectors, and among utilities.
- Create cost recovery models that address the various aspects of the emergent utility business model (e.g., providing high strength waste services).
- Improve business case capabilities in the context of the emergent utility business model with evaluation methods tailored to new lines of business (e.g., the application of ROI and IRR methods used in the context of public utility decision-making contexts) and in support of the ability to undertake effective, multi-attribute alternatives analysis.

### Knowledge

- Research
  - o More research into use of collection system for treatment
  - o Expanded research on natural treatment systems – as bridges to ecosystems
  - o Research what reuse means for potable water (this is already generally known for wastewater)
  - o Compile (and share) experiences with sustainable practices that are mainstream/commonplace to increase uptake (relates to the desire to adopt proven technologies/practices)
- Transfer
  - o Expand on-line learning options in support of utilities interests in expanding training opportunities for staff
- Outreach
  - o Conduct focused outreach to the financial community to better understand and influence factors included in bond rating surveillance questionnaires and decisions to bring better acknowledgement of sustainability performance
  - o Refining communications tools and approaches to speak more effectively to the “hearts” of community members.
  - o Improve the effectiveness of communications related to climate change impacts to better enable utilities to make the case for adaptation and mitigation investments.

- Continue and expand the sector's emphasis on creating general environmental awareness and a deeper appreciation of the value of water (key audiences include K-12 students, community decision makers, and state and local policy makers).

### Collaboration

- Support coordinated efforts between water, stormwater, and wastewater utilities on water reuse initiatives.
- Encourage collaborative risk sharing between utilities and regulators to support the ability to undertake innovative approaches and investments (e.g., permits with a compliance timeframe safety net).
- Bring nonpoint sources to the table for water quality/quantity discussions.
  - Increase conservation emphasis in the Department of Agriculture.
  - Make utilities eligible for nonpoint funding grants to enable them to be catalysts and act in support nonpoint source pollution control progress.
  - Update the Clean Water Act to expand coverage to agricultural nonpoint sources.
  - Develop collaborative process models that speak to agricultural nonpoint source priorities to increase the likelihood of establishing point-nonpoint partnerships.
- Continue to emphasize and expand on the opportunities for regional collaboration among utilities with an emphasis on business operations sharing arrangements (e.g., meter reading partnerships).

### **Next Steps Discussion**

Meeting participants wrapped up their 1.5 day meeting with a session focused on identifying possible next steps for moving forward. The ideas generated during this session fell in to six categories: Building out a Road Map; Improving Utility Collaboration; State-Federal Role in the Utility of the Future; Knowledge Transfer and Community of Practice; Incentives for Sustainable Practice Adoption; and EUM Phase II.

### Build Out of Road Map and Alignment with "Utility of the Future" efforts

- Sustainable Practices Road Map :
  - Based on the practices identified at the metering, create an adaptive roadmap to point utilities in the right direction through continual improvement and help them see what they can do next to leap ahead, depending on their current efforts. Take into account different utility sizes (i.e., not a one-size-fits-all map)
  - Organize the practices in this meeting around the 10 Attributes of Effectively Managed Utilities. Effective utility management is the key to sustainability
  - Update the emergent business model characteristics and figure out how to get it vetted at a wider scale.
  - As appropriate, link this effort with the "Utility of the Future" effort led by NACWA, WEF, and WERF.
- Provide more clarity on "future state":
  - Where is this all leading?
  - What is the nature of a future utility's relationship with its community?
  - What is a future utility's role in environmental stewardship?
  - Develop a better story about the future state of a utility. Answer the 'so what?' and 'why should we care?' questions.
  - Identify industry strengths and how to leverage them to move forward.

- Identify what we want to do for the long-term before making too many short-term goals.

### Improved Utility-to-Utility Collaboration

- Find a way to show utilities what it means to be “the other guy” (i.e., show drinking water what it means to be wastewater, wastewater what it means to be stormwater, etc.). This will enable utilities to collaborate more effectively.

### State-Federal Role in Utility of the Future

- Identify how state regulators can support utilities (e.g., what can a state permitting authority do to assist utilities?)
- Define the role of state regulators more clearly.
- Identify how EPA can support utilities and state regulators.
- EPA to promote this type of dialogue among other sectors and in other agencies (i.e., USDA and the Ag sector, DOE and the energy sector, etc.). They too are critical to water sustainability.
- Think about what the state’s role is in sustainability (recognize barriers, silos, etc.)
- Examine regulations to identify whether they are barriers to sustainable practices.
- Conduct discussions with political leadership (mayors, etc.). They have to be in the dialogue.
- Engage state regulators in dialog regarding utility of the future needs and aspirations.

### Knowledge Transfer and Community of Practice

- Establish a sector-sponsored utility sustainability institute.
- Use the synthesis report to create a presentation or short written pieces that can be shared with associations and other utilities. The more this message gets out, the more it will begin to resonate.
- Share tools and strategies that utilities are using.
- Create benchmarking standards for utilities of similar sizes and characteristics.
- Create a forum to share what utilities are doing and the problems that they are struggling with (example of City Managers website – sharing ‘wicked’ problems with each other – one-on-one connectivity)
- Create a forum for sharing and creative thinking between utility managers. ‘Lean on each other’
- Capture case studies and examples of how utilities are implementing these practices.
- Do case studies to identify how this meeting affected participants in a year and how the message was spread.

### Incentives for Adoption and Implementation of Sustainable Practices

- Connect the financial community to this effort. Potentially put together a one-pager or some other material to share with CIFA.
- Explore a certification system for utilities (similar to Energy Star or LEED) → could use this to communicate with the bond market and leverage the effective practices that are already happening.
- Explore regulatory recognition and potential incentives for utilities that are doing things right in sustainability.

### Effective Utility Management --Phase 2

- Create updated agreement with associations based around sustainable practices and geared to support utility of the future efforts.
- Create a strong, common message on emergent utility practice and utility of the future needs and aspirations.

## Attachment A: Meeting Participants

| Direct Meeting Participants   |   |  |
|---|---|--|
| <b>Mary Anderson (APWA)</b><br><i>Highland Park, Illinois Public Works (formerly)</i>       |   | <b>George Martin (WEF)</b><br><i>Greenwood Metropolitan District, South Carolina</i>         |
| <b>Chris Crockett (AWWA)</b><br><i>Philadelphia Water Department</i>                        |   | <b>Greg Mason (CIFA)</b><br><i>Georgia Environmental Finance Authority</i>                   |
| <b>Lisa Daniels (ASDWA)</b><br><i>Pennsylvania Department of Environmental Protection</i>   |   | <b>Dr. Michael Mucha (APWA)</b><br><i>Madison Metropolitan Sewer District</i>                |
| <b>Todd Danielson (WEF)</b><br><i>Avon Lake, Ohio Municipal Utilities</i>                   |   | <b>Ron Poltak (ACWA)</b><br><i>New England Interstate Water Pollution Control Commission</i> |
| <b>Walter Graf (WERF)</b><br><i>Water Environment Research Foundation</i>                   |   | <b>Chris Rayburn (WaterRF)</b><br><i>Water Research Foundation</i>                           |
| <b>John Hollenbach (NAWC)</b><br><i>United Water of Pennsylvania and Delaware</i>           |   | <b>Dan Roberts (AMWA)</b><br><i>City of Palm Bay, Florida</i>                                |
| <b>Tom Leahy (AMWA)</b><br><i>City of Virginia Beach</i>                                    |   | <b>Tom Sigmund (NACWA)</b><br><i>Green Bay Metropolitan Sewer District</i>                   |
| <b>Kathryn Mallon (AWWA)</b><br><i>New York City Department of Environmental Protection</i> |   | <b>Diane Taniguchi-Dennis (NACWA)</b><br><i>Clean Water Services, Oregon</i>                 |
| Observers   |   |  |
| <b>Julia Anastasio</b><br><i>APWA</i>   | <b>Morgan Hoenig</b><br><i>Ross Strategic</i> | <b>Andrew Sawyers</b><br><i>U.S. EPA</i>   |
| <b>Alex Dunn</b><br><i>ACWA</i>   | <b>Chris Hornback</b><br><i>NACWA</i>         | <b>Michelle Shutz</b><br><i>U.S. EPA</i>   |
| <b>Bonnie Gitlin</b><br><i>U.S. EPA</i>   | <b>Jim Horne</b><br><i>U.S. EPA</i>           | <b>Petra Smeltzer</b><br><i>NAWC</i>   |
| <b>Rob Greenwood</b><br><i>Ross Strategic</i>   | <b>Bridget O’Grady</b><br><i>ASDWA</i>        | <b>Nancy Stoner</b><br><i>U.S. EPA</i>   |
| <b>Randy Hill</b><br><i>U.S. EPA</i>  | <b>Carolyn Peterson</b><br><i>AMWA</i>        | <b>Sonia Brubaker</b><br><i>U.S. EPA</i>   |
|   |   | <b>Carolyn Hayek</b><br><i>U.S. EPA</i>  |

\*Scott Yoo (NAWC, San Jose Water Company) provided input in pre-meeting interviews, but was unable to attend the meeting in person.

## Attachment B: Interview Synthesis

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The following synthesis was derived from interviews based on the questions below with utility and state managers in advance of a meeting at EPA on sustainability in the water sector.

1. What economic, technical, or programmatic developments or trends are you seeing as the biggest opportunities and constraints for achieving success?
2. The challenges facing the sector are expected to continue. What do you see as needed (in terms of tools, knowledge, etc.) to build on the progress over the past several years and perhaps accelerate progress toward sustainability over the next several years?
3. In working toward sustainability, what areas do you see as the most promising opportunities for collaboration within the sector?

## Trends Affecting the Water Sector

### Challenge Areas

- Proof of Concept Conservatism – Proven Technology Culture
  - o The water industry remains very ‘traditional’ in its operations and practices, making adaptation and innovation difficult to accomplish.
  - o Utilities are hesitant to work with new practices without knowing that others have already implemented the practice successfully.
- Capacity Limitations
  - o Small utilities typically lack access to information and capital resources that larger utilities have.
  - o Pioneering work requires resources at a level that is unavailable to most utilities.
- Rate Adequacy
  - o Rates charged by utilities are often inadequate to cover operating expenses, address new requirements, and have sufficient reserves for replacement and rehabilitation remain common in the sector.
  - o Successes in water conservation efforts subsequently lower revenue, challenging the conventional volume basis business model.
- Understanding of Operational Imperatives
  - o Local decision makers (e.g., utility board members, elected officials, city managers) typically lack institutional and technical knowledge related to utility operations, making it difficult to communicate with them and to gain their support on key issues, such as necessary infrastructure upgrades.
- Regulatory Demands
  - o Uncertainty regarding high impact regulatory areas makes long-term planning and investment decisions challenging. Relevant issues include nutrients, micro-constituents, and incineration requirements.
  - o Renewable Portfolio Standards in different states approach biogas and related energy sources from wastewater utilities differently, with some not including biogas as qualifying. This affects resource recovery incentives for treatment plants.



- Substantial interest exists in finding approaches for balancing investments across multiple regulatory areas (e.g., stormwater and wastewater improvements).
  - Highly treated – very clean – water incompatible with broader surface water ecology.
- Weak Economy
  - Considerable pressure exists and is anticipated to persist on the rate base for many utilities. This pressure mainly affects operating revenue and bonding capacity.
  - Cutbacks at state regulatory agencies are leading to lower state responsiveness and less oversight.
  - Prices for labor and construction materials have declined, making infrastructure investments more affordable, presenting an opportunity for utilities to upgrade.
  - Financial pressure has made operational optimization and decision maker communications top priorities, leading to performance enhancements.
- Aging Workforce
  - Pressure remains on the anticipated wave of retirements and the loss of human capital this represents for the industry.
  - At the same time, retirements create opportunities for hiring young and inspired new talent who may be more open (or better equipped) to implementing progressive practices and technologies.
- Infrastructure Funding
  - Capital markets have grown more risk-averse and selective (e.g., demanding higher coverage ratios).
  - Fewer SRF dollars and SRF restrictions, such as the green project reserve, have placed constraints on the use of available funds.
  - Infrastructure bank and trust fund deliberations hold the potential for improved future funding.
- Public Attitudes toward Government
  - Growing public concern relating to the size, role, and performance of the public sector is increasing the already existing challenge of making the case for increased public investments in infrastructure.
- Climate-Related Uncertainty
  - The long-lived asset nature of utility infrastructure investments coupled with the loss of “stationarity” around key climate variables has increased the complexity and risk profile of long-term decision making.

## **Opportunity Areas**

- System Optimization
  - System optimization methods and practices (e.g., energy audits, use of Six Sigma analysis) are increasingly being embraced by the sector driving improvements in energy use, water loss/use, and treatment chemical use.
- Operational Sophistication
  - Advanced asset management is being increasingly embraced by the sector, leading to better maintenance and replacement decisions, as well as the increasing ability to communicate with external stakeholders regarding revenue requirements.
  - Advance decision support methods such as multi-attribute analysis in support of Triple Bottom Line (TBL) outcomes have increased the ability of utilities to systematically integrate a full range of sustainability considerations into capital planning and infrastructure investments.
- Technology

- Advance treatment technologies (e.g., microfiltration) are improving the cost effectiveness of operations.
- Resource recovery technologies are improving and increasing the opportunities for and cost effectiveness of undertaking a broader scope of utility services (e.g., energy and nutrient production).
- New areas of automation (meter reading; dispatching; tablet PCs in the field) increasing efficiency.
- Trenchless technologies are reducing costs and improving efficiency.
- Green infrastructure and practices continue to emerge as viable alternatives to conventional “gray” infrastructure. The availability of more and better performance data coupled with project alternative decision methods that support a balanced and effective comparison of options points to an increasing role for green infrastructure.
- Community Sustainability
  - Utility customer, community decision maker, and general public expectations for factoring long-term (multi-generational) financial, social, and ecological considerations into community development decisions is placing new requirements on as well as opportunities for water sector utilities.
- Resource Recovery Paradigm
  - A fundamental shift in the core business model of wastewater utilities is emerging with an emphasis on moving from providing a basic community service (treating wastewater) to acting as a critical community asset for resource recovery and reuse in the areas of energy, water, and nutrients. This trend holds the potential to substantially alter the economics of and community role played by wastewater utilities.
- Total Water Management Paradigm (One Water)
  - Substantial leadership opportunities for water sector utilities are begin created through growing interest in managing water in an integrated fashion across its full life cycle and full range of uses in response to resource stress, the energy-water-food nexus, and economic pressures.
  - At the same time, this interest leads to substantial requirements for alterations to the conventional business model, organizational frameworks, operating environments, and policy contexts that water sector utilities have conventionally operated within.
- Generational Mega-Trend
  - “Open source generation” – work in teams, share information real time
  - Implies “flat – matrix” organization versus command and control hierarchy – tone and style of how the utility works
- External Party Collaboration
  - A variety of trends (including economic pressures, community sustainability expectations, and utility business model shifts) are driving the need for more and more sophisticated, collaborative efforts with external parties. This signals a move into an operating territory where utilities are more interdependent on external parties and have less direct decision making and operational control.
    - Implementing green infrastructure requires partnerships with other municipal service areas such as parks, transportation, and land use planning\development.
    - Water quality trading requires partnerships with other sectors (e.g., agriculture).
    - Resource recovery activities require partnerships with alternative suppliers of feed stocks (e.g., FOG producers) and the energy sector.

- Community sustainability expectations require partnerships with a variety of local community departments and direct, proactive participation in community long-range planning and similar activities.
- Economic and capacity pressures create the need for more collaborative efforts among neighboring utilities including shared operator programs, packing projects for joint funding, joint promotion of conservation.
- Total water management drives a need for highly collaborative and possibly the full integration of local water service organizations.

## **Tools, Knowledge & Collaboration**

### **Tools and Knowledge Needed to Advance Sustainability Progress:**

- Effective Practice Repository
  - Create a national clearinghouse on sustainable utility best practices, including stories about successes and failures in implementing new technologies and other relevant information.
  - This would reduce cases of ‘reinventing the wheel’ when undergoing research, development, and implementation of new operational procedures and technical practices. It would also serve as inspiration for utilities when looking for new sustainable opportunities.
  - Initiate an organized effort for reporting best practices and stories related to the implementation of new sustainability practices, increasing the ability of utilities to learn from each other.
  - Database of standard unit costs for operations: per bill, per call, per meter read.
- Decision Support Methods
  - Enhanced decision support models and methods to incorporate sustainability considerations into long-range planning and capital investments, as well as responding to new business model opportunities, requires multi-attribute analysis, long-term financial analysis, and asset aging and failure analysis.
- Workforce Training and Development in the Face of Retirements
  - There is an interest in creating common curriculum models and certification approaches that can be effectively shared and used across utilities.
  - Leadership and management training gap, with current leadership training very expensive.
- External Party Engagement
  - Substantial emphasis is emerging on a variety of external collaborative efforts and partnerships. This emphasis creates a need for tools, methods, and practices that support effective partnership building and collaborative process management.
  - Deliberate process to have the right conversations.
- Water Conservation
  - Successful conservation efforts place pressure on volume-based cost recovery business practices. There is an interest in the development and sharing of successful conservation-related cost recovery strategies.
- Regulatory and Recognition Incentives
  - Interest remains in finding ways for the regulatory system to:
    - Be responsive to effective utility management practices (such as the implementation of Environmental Management Systems); and

- Provide flexibility for adaptive management approaches and investment strategies between, in particular, stormwater and wastewater.
  - Recognition for effective utility management can be helpful to utilities particularly in the context of building trust and credibility with customers and local community decision makers.
  - Enhanced coordination among mandates.
  - Refinement of EPA Affordability Criteria – average versus specific community areas.
- Technology
  - Continuing research, development, and proof of concept efforts for resource recovery technologies is of high interest.
  - There is high interest in continuing efforts related to proof of concept and performance characterization of urban best management practices (BMPs) in support of green infrastructure investments, and agricultural BMPs in support of water quality trading initiatives.
  - Sensing technologies – robots in the pipes.
  - Smart metering – eliminate passive meter reading.
- Financial
  - Progressive financial mechanisms – cost recovery strategies.

### **Opportunities for Collaboration:**

- Local Community Services Collaboration
  - Utility and community sustainability efforts require utility managers to connect with other local community service areas such as transportation, land planning, economic development, and parks.
- Regional Utility-to-Utility Collaboration
  - Drinking water and wastewater utilities are beginning to think more holistically about their combined missions, and the interdependencies that they share, creating both a need and many opportunities for collaboration.
  - Regional collaboration between like utilities (i.e., neighboring drinking water utilities) presents a significant opportunity to create more sustainably managed utilities by sharing functions such as meter reading, accounting services, certified operators, and emergency response back up equipment (mutual aid agreements).
  - By consolidating needs and sharing resources between providers and organizations, utilities can work together to package needs for grant funding.
- Utility to Other Sectors Collaboration
  - Collaboration with major water use and impact sectors such as agriculture can lead to expand opportunities for improved watershed management and regulatory response options (e.g., water quality trading).
  - Public Private Partnerships with a variety of actors hold potential for cost and risk sharing including:
    - With local developers for infrastructure investments and conservation measures;
    - Energy utilities for resource recovery investments.
- Academic Institution Collaboration
  - Research and Development partnerships with local universities to produce enhanced treatment and resource recovery technologies.
  - Partnerships with local schools to create a pipeline of qualified (and interested) future employees.
- Regulator Collaboration
  - Greater support for regulatory responsiveness and recognition incentives.

- Greater support for permits, consent decrees, and other regulatory mechanisms that provide for the ability to most cost effectively meet a mix of regulatory requirements.
- Municipal Organizations
  - APWA to reach public works directors who have a broad overview of infrastructure in a community.
  - League of Cities (and other municipal-oriented associations) to reach to mayors and city administrators on matters of critical policy in support of utility sustainability.

## Attachment C: Compendium of Sustainability Resources

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### Water Utility Sustainability and Climate Change Adaptation

#### **Effective Utility Management, Water EUM**

<http://www.watereum.org/>

*Water EUM provides a range of material about the Effective Utility Management (EUM) Initiative, which is supported by EPA and six major water sector associations.*

#### **The Green Utility: A Practical Guide to Sustainability, American Water Works Association**

<http://apps.awwa.org/eBusMAIN/Default.aspx?TabID=401&ProductId=20673>

*This guide, available for purchase from AWWA, provides ideas, plans, and tools to make it easier for utilities to reduce negative effects on the environment, maximize positive impacts in the community, and to deliver water at a cost that reflects its value.*

#### **Confronting Climate Change: An Early Analysis of Water and Wastewater Adaptation Costs, National Association of Clean Water Agencies and Association of Metropolitan Water Agencies**

<http://www.nacwa.org/images/stories/public/2009-10-28ccreport.pdf>

*This report details the impacts that climate change can have on wastewater and drinking water utilities, as well as the adaptation costs for these critical facilities.*

#### **Climate Ready Water Utilities Toolbox, U.S. EPA**

<http://www.epa.gov/safewater/watersecurity/climate/toolbox.html>

*The Climate Ready Water Utilities (CRWU) Toolbox provides access to resources containing climate-related information relevant to the water sector. The Toolbox contains highlighted resources, which are organized into categories to help guide the user to the most relevant information. CRWU resources are updated frequently to provide the most current water sector climate change information.*

#### **White Paper on Climate Change Impacts on Small and Rural Public Water Systems, National Rural Water Association**

[http://www.nrwa.org/benefits/whitepapers/2010\\_Update/Climate%20white%20paper%20June%2022\\_2010%20-%20Final.pdf](http://www.nrwa.org/benefits/whitepapers/2010_Update/Climate%20white%20paper%20June%2022_2010%20-%20Final.pdf)

*This paper presents a critical evaluation of the possible impacts of climate change on small and rural water systems, as well as management and operational techniques and actions that may be affected as a result of the potential impacts.*

#### **Implications of Climate Change for Adaptation by Wastewater and Stormwater Agencies, Water Environment Research Fund**

<http://www.werf.org/a/k/Search/ResearchProfile.aspx?ReportID=CC2R08>

*This report summarizes the current understanding of natural climate variability and the projected global climate changes over the next 20-50 years. It provides utility managers a realistic indication of potential impacts to the storm and wastewater sectors, along with a strategy that can be used to evaluate the vulnerability of their facilities.*

### Strategic Planning

#### **Planning for Sustainability: A Handbook for Water and Wastewater Utilities**

<http://water.epa.gov/infrastructure/sustain/upload/EPA-s-Planning-for-Sustainability-Handbook.pdf>

*This handbook describes a number of steps that 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.*

**Strategic Planning: A Handbook for Small Water Systems**, U.S. EPA

[http://www.epa.gov/ogwdw/smallsystems/pdfs/guide\\_smallsystems\\_stratplan.pdf](http://www.epa.gov/ogwdw/smallsystems/pdfs/guide_smallsystems_stratplan.pdf)

*This is a strategic planning handbook and workbook for small water systems.*

**Strategic Planning and Organizational Development for Water Utilities**, Water Research Foundation

<http://www.waterrf.org/Pages/Projects.aspx?PID=2849>

*This Water Research Foundation report develops an overall strategic planning framework, incorporating various corporate level strategies and business tools that can be customized by individual utilities to respond to their specific customer needs.*

## **Building a Sustainable Workforce**

**The Changing Workforce**, Association of Metropolitan Water Agencies and National Association of Clean Water Agencies

[http://www.amwa.net/cs/ceo\\_resources/books](http://www.amwa.net/cs/ceo_resources/books)

*This website provides many resources that are available for purchase through AMWA and NACWA, including The Changing Workforce... Seizing the Opportunity and The Changing Workforce – Crisis & Opportunity, which are offered as a package. They work to equip utilities with the tools necessary to effectively develop and implement a systematic succession management program to drive effective workforce sustainability, and examine the increasing demand but decreasing availability of qualified and skilled employees.*

**Workforce Sustainability**, Water Environment Federation

[http://www.wef.org/AWK/pages\\_cs.aspx?id=589](http://www.wef.org/AWK/pages_cs.aspx?id=589)

*The Work for Water website provides resources for enhancing the image of water careers. The Work for Water campaign promotes water careers as both professionally fulfilling and aligned to the greatest public health and environmental causes of our day. Resources include information on workforce sustainability, upcoming events, relevant reports, and opportunities for involvement.*

**Workforce Planning for Water Utilities**, Water Research Foundation

<http://www.waterrf.org/Pages/Projects.aspx?PID=4005>

*This Water Research Foundation report, published in collaboration with U.S. EPA, clearly frames the issues of recruiting, training, and retaining drinking water utility operators and engineers. It identifies short-term and long-term strategies that can be implemented by individual utilities and by the industry to address workforce planning issues.*

## **Communicating with Decision Makers**

**A Drop of Knowledge: The Non-operator's Guide to Drinking Water Systems**, Rural Community Assistance Partnership

<http://www.rcap.org/sites/default/files/rcap-files/publications/RCAP-Non-operator%27s%20Guide%20to%20DRINKING%20WATER%20Systems.pdf>

*This guide explains in simple language the technical aspects of drinking water utilities from source to tap. It would be well used as orientation and background for new small utility board members and small community decision makers.*

#### **Talking to Your Decision Makers: A Best Practices Guide, U.S. EPA**

[http://www.epa.gov/ogwdw/smallsystems/pdfs/guide\\_smallsys\\_decision\\_makers\\_08-25-06.pdf](http://www.epa.gov/ogwdw/smallsystems/pdfs/guide_smallsys_decision_makers_08-25-06.pdf)

*This guide includes tips for working successfully with decision makers to meet your water system's needs.*

#### **Communicating the Value of Water, Water Research Foundation**

<http://www.waterrf.org/Pages/Projects.aspx?PID=3113>

*This Water Research Foundation report, published in collaboration with U.S. EPA, is a guidebook to help drinking water utilities effectively communicate the value of their tap water. It identifies the benefits of communicating effectively and consistently to constituents about the value of water. It includes key messages that utilities can use to speak to the value of their product with a variety of stakeholders, and marketing tools that can be used to successfully convey the value of tap water. It also includes case studies of water utilities that have successfully communicated the value of their tap water, tools used, and associated costs.*

#### **Public Communication – Perceptions and Early Communications Tools, Water Environment Research Foundation**

<http://www.werf.org/a/ka/Search/ResearchProfile.aspx?ReportId=SAM1R06a>

*This resource provides insight into elected and appointed officials' perspectives on asset management and infrastructure sustainability. It includes surveys, focus groups, interviews, and case studies, which are presented to help guide public support for infrastructure sustainability.*

### **Education, Outreach, and Collaboration**

#### **Engaging and Involving Stakeholders in your Watershed, U.S. EPA**

<http://cfpub.epa.gov/npstbx/files/stakeholderguide.pdf>

*This guide is meant to provide the tools needed to effectively engage stakeholders to restore and maintain healthy environmental conditions through community support and cooperative action. The guide can help public and private organizations in watershed management activities, specifically those looking to involve stakeholders in local or regional watershed efforts.*

#### **Public Education and Outreach on Stormwater Impacts, U.S. EPA**

[http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min\\_measure&min\\_measure\\_id=1](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=1)

*This website provides local officials and communities with resources to conduct education and outreach about stormwater (what it is, who contributes to it, and best practices).*

#### **Survival Guide: Public Communications for Water Professionals, Water Environment Federation**

[www.wef.org/WorkArea/DownloadAsset.aspx?id=7120](http://www.wef.org/WorkArea/DownloadAsset.aspx?id=7120)



*This guide is meant to help utilities learn how to communicate effectively with their community and customers. It provides an overview focused on learning the basics of public communication and different public communication scenarios.*

**Talking to Your Customers About Chronic Contaminants in Drinking Water, U.S. EPA**

[http://water.epa.gov/drink/contaminants/upload/2007\\_11\\_02\\_contaminants\\_fs\\_contaminants\\_chronic\\_talkingtocustomers.pdf](http://water.epa.gov/drink/contaminants/upload/2007_11_02_contaminants_fs_contaminants_chronic_talkingtocustomers.pdf)

*Guidelines for effectively communicating with customers about the dangers of chronic contaminants and how water systems protect against contamination.*

**Understanding Public-Private Partnerships, United Nations Foundation**

[http://www.globalproblems-globalsolutions-files.org/unf\\_website/PDF/understand\\_public\\_private\\_partner.pdf](http://www.globalproblems-globalsolutions-files.org/unf_website/PDF/understand_public_private_partner.pdf)

*This paper outlines what has been learned to-date about public-private partnerships. It is offered both as a partial lexicon of partnership concepts, and as an initial 'cross-sector' primer on what is known about making them successful.*

**Establishing Public-Private Partnerships for Water and Wastewater Systems, Water Partnership Council**

[http://www.nawc.org/uploads/documents-and-publications/documents/document\\_567764ad-b69f-4715-bc5d-eea32c304fdd.pdf](http://www.nawc.org/uploads/documents-and-publications/documents/document_567764ad-b69f-4715-bc5d-eea32c304fdd.pdf)

*This handbook was prepared by the Water Partnership Council to offer guidance to communities on weather and how to form and manage partnerships to meet their water and wastewater needs.*

**Optimizing the Water Utility Customer Contact Center, Water Research Foundation**

<http://www.waterrf.org/Pages/Projects.aspx?PID=4100>

*This Water Research Foundation report, published in collaboration with U.S. EPA, identifies best practices, processes, and technologies for water utility customer contact center operations to optimize the contact center as a utility-wide resource for communications, resulting in more efficient and effective utility operations, and improved responsiveness to customer contacts. It also identifies the key components and characteristics of the customer contact center of the future.*

**Liquid Assets: The Story of Our Water Infrastructure: Pennsylvania State University**

<http://liquidassets.psu.edu/>

*A public media and outreach initiative that seeks to inform the nation about the critical role that our water infrastructure plays in protecting public health and promoting economic prosperity. Liquid Assets explores the history, engineering, and political and economic challenges of our water infrastructure, and engages communities in local discussion about public water and wastewater issues*

**Gaining Public Support - Experience with Citizen Advisory Committees, Water Environment Research Foundation**

<http://www.werf.org/a/ka/Search/ResearchProfile.aspx?ReportId=SAM1R06f>

*This report identifies the experience of utilities in working citizen advisory committees on a broad range of infrastructure sustainability issues. The research demonstrates that citizen advice and engagement can provide meaningful and effective assistance to decision makers.*

## **Energy Efficiency**

**Energy Efficiency for Water and Wastewater Utilities, U.S. EPA**

<http://water.epa.gov/infrastructure/sustain/energyefficiency.cfm>

*Website provides links to several guides and tools for tracking and understanding water utility energy use.*

**Energy Star for Wastewater Plants and Drinking Water Systems, Energy Star**

[http://www.energystar.gov/index.cfm?c=water.wastewater\\_drinking\\_water](http://www.energystar.gov/index.cfm?c=water.wastewater_drinking_water)

*A tool for plant managers to assess and track energy use, energy costs, and associated carbon emissions and benchmark against other similar facilities.*

**Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities, U.S. EPA**

[http://www.epa.gov/owm/waterinfrastructure/pdfs/guidebook\\_si\\_energymanagement.pdf](http://www.epa.gov/owm/waterinfrastructure/pdfs/guidebook_si_energymanagement.pdf)

*Provides water and wastewater utility managers with step-by-step methods to identify, implement, measure, and improve efficiency and renewable opportunities at their utilities.*

**Energy Efficiency Best Practices for North American Drinking Water Utilities, Water Research Foundation**

<http://www.waterrf.org/Pages/Projects.aspx?PID=4223>

*This Water Research Foundation report, published in collaboration with the New York State Energy Research & Development Authority, develops a compendium of best practices in the energy efficient design and operation of water industry assets. The compendium includes successful strategies to help water utilities reduce energy consumption in water transmission, treatment, storage, and distribution.*

## **Asset Management**

**Asset Management, New Mexico Environment Finance Center**

<http://nmefc.nmt.edu/AssetManagement.php>

*This website provides an overview of what asset management is, its core components, and the benefits of undergoing asset management.*

**Asset Management: A Best Practices Guide, U.S. EPA**

[http://epa.gov/ogwdw/smallsystems/pdfs/guide\\_smallsystems\\_assetmanagement\\_bestpractices.pdf](http://epa.gov/ogwdw/smallsystems/pdfs/guide_smallsystems_assetmanagement_bestpractices.pdf)

*This guide is designed to help owners, managers, and operators for small water systems to understand: what asset management means; the benefits of asset management; best practices in asset management; and how to implement an asset management program.*

**Asset Management: A Handbook for Small Water Systems, U.S. EPA**

[http://epa.gov/safewater/smallsystems/pdfs/guide\\_smallsystems\\_asset\\_mgmt.pdf](http://epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_asset_mgmt.pdf)

*This guide is designed for owners and operators of small community water systems (public or private). It presents basic concepts of asset management and provides the tools to develop an asset management plan.*

**Implementing Asset Management: A Practical Guide, Association of Metropolitan Water Agencies, National Association of Clean Water Agencies, and Water Environment Federation**

[http://www.amwa.net/cs/ceo\\_resources/books](http://www.amwa.net/cs/ceo_resources/books)

*This website provides many resources that are available for purchase through AMWA, NACWA, and WEF, including Implementing Asset Management: A Practical Guide. This guide provides utility professionals with a step-by-step guide to continued improvement in the management of their infrastructure assets. Depending on the availability of resources, utilities can address at a broad, system-wide level by grouping assets, or drill down to individual assets, components, and elements.*

**Office of Wastewater Management Asset Management Resources, U.S. EPA**

[http://water.epa.gov/infrastructure/sustain/asset\\_management.cfm](http://water.epa.gov/infrastructure/sustain/asset_management.cfm)

*This site provides an overview of EPA's Asset Management Resources. It also helps to answer some of the basic asset management, such as what the benefits of asset management are, what the elements of asset management practices are, and who should do asset management.*

**Asset Management Knowledge Portal, Water Research Foundation**

<http://www.waterrf.org/knowledge/asset-management/Pages/default.aspx>

*This website provides summary information and resources on the most important elements of asset management for water utilities, including risk management, breaks & leaks, deterioration & assessment, and renewal techniques.*

**SIMPLE (Sustainable Infrastructure Management Program Learning Environment), Version 2, Water Environment Research Foundation**

<http://simple.werf.org/>

*SIMPLE is an online reference knowledge base, guiding water and wastewater utility managers (beginning through advanced practitioners) step-by-step through best practice-based asset management. The knowledge base contains tools, best practices, case studies, research reports, training aids, and an extensive body of knowledge to help set up an asset management program, advance a program, and increase knowledge. Two versions of SIMPLE exist – subscription-based and free.*

**Leading Practices for Strategic Asset Management, Water Environment Research Foundation**

<http://www.werf.org/a/ka/Search/ResearchProfile.aspx?ReportId=SAM1R06h>

*Compendium of leading asset management practices from the world's top practitioners. Thirty seven utilities completed a survey to compare their asset management practices with those of leading utilities, and their peers, using the WERF gap analysis tool, SAM GAP. The report discusses the results, including their best practices and barriers, and shows how these practices can be adopted by other utilities.*

## **Financial Strategies and Water Pricing**

**Financial Planning: A Guide for Water and Wastewater Systems, Rural Community Assistance Corporation**

[http://www.nmenv.state.nm.us/dwb/Documents/Public%20Info/RCAC%20Financial%20guide\\_final\\_6.pdf](http://www.nmenv.state.nm.us/dwb/Documents/Public%20Info/RCAC%20Financial%20guide_final_6.pdf)

*This guidebook walks utilities through the annual budgeting process, the rate setting process, and creating a six-year financial plan.*

**Financing Alternatives Comparison Tool (FACT), U.S. EPA**

<http://www.epa.gov/owm/cwfinance/cwsrf/fact.htm>

*A financial analysis tool that calculates and compares the costs of various financing options for water quality projects.*

**Formulate Great Rates: The Guide to Conducting a Rate Study for a Water System**, Rural Community Assistance Partnership

[http://www.rcap.org/sites/default/files/resource\\_attachments/rcap\\_basics\\_of\\_financial\\_management\\_0.pdf](http://www.rcap.org/sites/default/files/resource_attachments/rcap_basics_of_financial_management_0.pdf)

*A guide to developing a fair and equitable rate structure in a small drinking or wastewater system.*

**Managing Money: State SRF Short-Term Investing**, Council of Infrastructure Financing Authorities

<http://www.cifanet.org/newsPDF/m12.pdf>

*This paper focuses on strategy development for SRF managers. It looks at shorter-term investment goals, where consideration of liquidity and accessibility are controlling factors.*

**The Basics of Financial Management for Small-community Utilities**, Rural Community Assistance Partnership

[http://www.rcap.org/sites/default/files/resource\\_attachments/rcap\\_basics\\_of\\_financial\\_management\\_0.pdf](http://www.rcap.org/sites/default/files/resource_attachments/rcap_basics_of_financial_management_0.pdf)

*This is a primer and how-to guide is ideal for a board member of a drinking water or wastewater utility who needs to understand the financial aspects of a small utility's operations.*

**Water & Wastewater Pricing – Introduction**, U.S. EPA

<http://water.epa.gov/infrastructure/sustain/Water-and-Wastewater-Pricing-Introduction.cfm>

*Website provides information on water and wastewater pricing, explains the related concepts of pricing and water conservation, and supplies tools, guides, and reports on pricing.*

**Utility Finance Knowledge Portal**, Water Research Foundation

<http://www.waterrf.org/knowledge/utility-finance/Pages/default.aspx>

*This website provides summary information and resources on the most important elements of water utility finance, including revenue, financial planning, communication with governance and customers, and cost control.*

## **Green Infrastructure and Development**

**Green Values Stormwater Management Calculator**, Centers for Neighborhood Technologies

<http://logan.cnt.org/calculator/calculator.php>

*Assesses hydrological impacts and cost-effectiveness of green infrastructure options.*

**Green Infrastructure**, U.S. EPA

<http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm>

*Provides background information and resources on green infrastructure strategies.*

**The Trend to Low-Impact Development and What it Means to Public Works**, American Public Works Association

<http://www2.apwa.net/bookstore/detail.asp?PC=PB.E711>

*This is a CD-ROM program available for purchase through APWA. The program features experts in implementing Low Impact Development (LID) in communities throughout North America.*

**Decentralized Stormwater Controls for Urban Retrofit and Combined Sewer Overflow (CSO) Reduction**, Water Environment Research Foundation

<http://www.werf.org/i/a/k/Search/ResearchProfile.aspx?ReportId=03-SW-3a>

*This research evaluates strategies for incorporating decentralized controls into an infrastructure management system. Case studies provide alternatives for adoption of decentralized controls.*

## Attachment D: Business Model Characterization - Water Sector Utilities

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### **Conventional Business Model**

- Focus on optimizing cost effective response to meet regulatory requirements
- Focus on reliably providing a single service:
  - o Safe drinking water
  - o Treated wastewater
- Manage along a linear value chain and within areas of direct utility control:
  - o Drinking water – source water intake to tap
  - o Wastewater – collection point to discharge
- Community engagement focused on managing direct impacts to communities (e.g., construction activity, rate increases, odor)

### **Emergent Business Model**

- Expanded view of services and role in water resource management:
  - o Resource recovery services;
  - o Total water cycle management.
- Full, systematic integration of triple bottom line (environment, economic, social) factors into all phases of planning, including alternatives analysis, and implementation.
- Extended time horizons for Return on Investment requirements.
- Leadership role in the community through ongoing community outreach and engagement
- Manage operations with a view toward total watershed impacts and enhancement opportunities.
- Implementation of operational strategies that have dependence on external parties:
  - o Green infrastructure;
  - o Water quality trading;
  - o Energy production and distribution.

## Attachment E: Practices Table

|  | Conventional  | Emergent  |
|--|---|---|
| <b>Technology &amp; Infrastructure Practice Area</b> | <p>Basic:</p> <ul style="list-style-type: none"> <li>- Basic treatment processes in place</li> <li>- Asset management – infrastructure inventoried &amp; mapped (GIS supported)</li> <li>- Vulnerability assessment &amp; basic security measures in place</li> <li>- Customer utilization information support systems in place</li> <li>- Consultant-driven technology decision making</li> </ul> <p>Intermediate:</p> <ul style="list-style-type: none"> <li>- Capacity to be a first adopter of new practices</li> <li>- Internal research</li> <li>- Secondary treatment &amp; filtration</li> <li>- Asset management – condition assessment, monitoring, and failure analysis</li> <li>- Explicit business case process used for major capital investments</li> <li>- Leak detection &amp; repair program</li> <li>- In-line visual condition assessment</li> <li>- Integration of GIS enterprise with computer maintenance management system</li> </ul> | <ul style="list-style-type: none"> <li>- Sewer geothermal to draw and use heat contained in waste streams</li> <li>- Integration and cost share of utility GIS enterprise layers across community service departments</li> <li>- GIS layers support full accessibility across community services</li> <li>- Establish internal set-aside funds for innovative technologies</li> <li>- Integrated data and automated systems in the context of shared operations (optimize existing infrastructure)</li> <li>- Standard data infrastructures across interdependent utility operations</li> <li>- Use of infrastructure &amp; technology cost- and risk-sharing mechanisms (e.g., public-private partnerships for biogas development)</li> <li>- Production &amp; supply of different qualities of water (local stormwater collection for toilet flushing),</li> <li>- Distributed supply and treatment</li> <li>- Alliance partnerships for infrastructure development (avoid low-bid constraints)</li> <li>- Implementation of resource recovery</li> </ul> |

| Conventional  | Emergent   |
|---|--|
| <ul style="list-style-type: none"> <li>- Electronic billing (text &amp; email)</li> </ul> <p>Advanced:</p> <ul style="list-style-type: none"> <li>- Internal resource recovery (e.g., utilization of biogas for space heating)</li> <li>- Asset management – risk analysis</li> <li>- Water main re-lining, rather than replacement</li> <li>- Microfiltration</li> <li>- Real-time information collection through electronic billing</li> <li>- High resilience of IT infrastructure</li> <li>- Smart metering</li> <li>- Real-time monitoring'</li> <li>- Continuity in equipment to increase maintenance efficiencies (i.e. standardize equipment manufacturers) and free up capital resources for other priorities</li> </ul> | <ul style="list-style-type: none"> <li>technologies</li> <li>- Implementation of green infrastructure for stormwater management source control</li> <li>- Use of pilot projects for testing promising technologies</li> <li>- Partnerships on biosolids and high-strength waste digestion</li> <li>- Use of multi-attribute analysis to support incorporation of community values (Triple Bottom Line) into business case and alternatives analysis</li> <li>- Climate change considered and factored into long-range investments</li> <li>- Robust connection to research and development affiliates (e.g., university partnerships)</li> <li>- Engaged in developing and marketing intellectual property</li> <li>- Focus on resource recovery for nitrogen, phosphorous, organic material, and possibly precious metals</li> <li>- Use of street sweeping to recover organics</li> <li>- Use of natural treatment systems to create “ecological bridges” to water bodies</li> <li>- Seeding and growing of native plants in watersheds. Utilize reused water to cultivate native or endangered plant species</li> </ul> |



| Conventional                                     |  | Emergent  |
|--|--|---|
| <b>Operations &amp; Management Practice Area</b> | Basic:   | -   |
|  | <ul style="list-style-type: none"> <li>- Reactive maintenance – repair &amp; replacement</li> <li>- Following industry standards &amp; reliably meeting compliance</li> <li>- Explicit standard operating procedures</li> <li>- Basic energy efficiency measures (e.g., low energy lighting)</li> <li>- Compliance with permits</li> <li>- Drinking water sampling &amp; monitoring (frequency of sampling)</li> <li>- Operator training &amp; education</li> <li>- Energy assessments</li> <li>- Standard reporting of basic metrics (e.g., fleet, inventory management)</li> </ul> | <ul style="list-style-type: none"> <li>- Parcel-based billing for stormwater</li> <li>- Friendly utility to utility competition in support of voluntary self-improvement programs</li> <li>- Preparation &amp; implementation of strategic plan, integrated with broader community strategic plans &amp; community sustainability objectives/values</li> <li>- Coordinating water reuse planning &amp; implementation between local drinking water &amp; wastewater utilities</li> <li>- Cluster asset management partnerships (implement identical asset management at multiple neighboring utilities, share staff to maintain and support program)</li> <li>- Integrate utility service partnerships (joint water and electricity meter reading)</li> <li>- Watershed monitoring network partnerships (e.g., progressive storm alert system)</li> <li>- Watershed protection initiatives (full multiple barrier approach)</li> <li>- Planning and operations are conducted with a “total water” view and overall watershed health maintenance and enhancement perspective</li> <li>- Performance metrics include externally-</li> </ul> |
|  | Intermediate:  |   |
|  | <ul style="list-style-type: none"> <li>- Standard operating procedures cover policy statements, work instructions, and performance expectations.</li> <li>- Adopting voluntary standards (e.g., Partnership for Safe Water)</li> <li>- Rate studies (linking rates with system needs)</li> <li>- Gradual, built in rate increases</li> <li>- Strong master bond resolutions such as</li> </ul>   |   |

| Conventional  | Emergent   |
|---|--|
| <ul style="list-style-type: none"> <li>covenants that prescribe coverage ratios</li> <li>- Explicit maintenance management system</li> <li>- Emergency response plan</li> <li>- Area wide optimization plan (enhance &amp; optimize performance)</li> <li>- Energy management plan ,with explicit goals, based on energy assessments and audits</li> <li>- Implementation of operational and business practice process improvement programs</li> <li>- Establishing business case comparisons and conducting alternatives analysis to give decision makers information on the options in a language that they can understand</li> </ul> | <ul style="list-style-type: none"> <li>oriented metrics (e.g., watershed health indicators)</li> <li>- Coordination among drinking water, wastewater, and stormwater utilities to coordinate/integrate management strategies</li> <li>- Utilization of Integrated Water Resources Planning</li> <li>- Convening watershed-wide forums on source protection and enhancement</li> <li>- Build upon conventional ISO 14001 EMS for continuous improvement by using other relevant management system standards such as ANSI Z-10 for safety and the ISO 50001 Energy Management Standard</li> <li>- Establishment and use of infrastructure project rating systems (e.g., Envision under the ISI )</li> <li>- Moving to a watershed-based permitting strategy to enable water quality trading and market credits (e.g., advanced wetland mitigation credits,), and water rights trading</li> <li>- Enabling the purchase of energy on the open market through indexing</li> <li>- Creation of regional utilities and joint regional ventures for environmental improvement</li> <li>- Utilization of the collection system as an extension of treatment</li> </ul> |
| <p>Advanced:</p> <ul style="list-style-type: none"> <li>- Proactive risk-based maintenance repair rehabilitation</li> <li>- Joint systems operations &amp; maintenance partnerships</li> <li>- Explicit continual improvement management system adopted (e.g., ISO 14001 certification)</li> <li>- Participating as a test bed for new voluntary standards</li> <li>- Implement emergency response plan</li> </ul>  |  |

|                                | Conventional  | Emergent  |
|--------------------------------|---|---|
|                                | <ul style="list-style-type: none"> <li>- Advanced optimization methods (e.g., Six Sigma)</li> <li>- Preparation &amp; implementation of strategic and long-range planning</li> <li>- Real-time system control</li> <li>- CSO forecasts</li> <li>- Full GIS hydraulic model, SCADA, and customer information system integration</li> <li>- Strong performance measurement system in place aligned with business plan (along with employee incentives and performance expectations)</li> <li>- Remaining nimble by avoiding over-investment in capital (providing flexibility to take advantage of new technologies as they emerge, as well as manage for uncertainty)</li> <li>- Conducting water supply and demand analysis and land use planning to prepare for growth</li> <li>- Uniformly outfitting trucks, making them interchangeable (operators will be more efficient when there is continuity in the equipment, and maintenance becomes standardized)</li> </ul> | <ul style="list-style-type: none"> <li>- Creation of energy partnerships with other industries</li> <li>- Partnering with equipment manufacturers</li> <li>- Controlling traffic of peak flows to manage the amount of water in the system (by shuttling flow between treatment plants)</li> <li>-</li> </ul> |
| <b>Workforce Practice Area</b> | Basic: <ul style="list-style-type: none"> <li>- Traditional job requirements &amp; job</li> </ul>   | <ul style="list-style-type: none"> <li>- Integrated workforce development curriculums (e.g., Florida's utility education</li> </ul>   |

| Conventional  | Emergent  |
|---|---|
| <p>descriptions</p> <ul style="list-style-type: none"> <li>- Solid support to maintain a full range of certifications and technical training opportunities</li> </ul> <p>Intermediate:</p> <ul style="list-style-type: none"> <li>- Reaching to hires outside of utility</li> <li>- Rotating staff to other utilities for mentoring</li> <li>- Formalized new hire trainings</li> <li>- Effective systems for knowledge transfer: videos, etc.</li> <li>- Explicit professional development program for staff &amp; management (e.g., career progression programs)</li> <li>- Cross training of staff across functions &amp; departments</li> <li>- Fostering a culture of continuous improvement &amp; utilizing tools that support continuous improvement</li> <li>- Conduct utility training for management across all aspects of utility operations</li> <li>- Participation in state-managed matching of certified professionals to utility jobs, if available</li> <li>- Tuition reimbursement in order to incentivize professional development</li> <li>- Participation in programs targeted to key</li> </ul> | <p>program)</p> <ul style="list-style-type: none"> <li>- Diversify recruiting systems</li> <li>- Training in alternative management skills (collaborative partnership development and management and financial analysis)</li> </ul> |

| Conventional   | Emergent |
|--|----------|
| <p>groups (e.g. “Vet Success” programs )</p> <ul style="list-style-type: none"> <li>- Identification of skill levels with link to pay stratification/raises</li> <li>- Explicit, systematic performance evaluation &amp; standards</li> </ul> <p>Advanced:</p> <ul style="list-style-type: none"> <li>- Intern program (e.g., volunteer-to-hire programs)</li> <li>- Operator exchange programs</li> <li>- Education &amp; recruiting partnerships (e.g., establishing ongoing relationships with high schools &amp; community colleges)</li> <li>- Broad-based leadership &amp; management skills training</li> <li>- Succession planning</li> <li>- Mission &amp; vision branding in support of recruiting &amp; retaining high quality talent</li> <li>- Implementing pay for performance systems</li> <li>- Creating collaborative processes with collective bargaining units</li> <li>- Requiring mandatory on-line learning for skill development and continual improvement</li> <li>- Broad-banding of worker compensation and classifications</li> <li>- Creating goal-share bonus programs for employees</li> </ul> |          |

|   | Conventional   | Emergent   |
|---|--|--|
| <b>Leadership &amp; Culture Practice Area</b> | <p>Basic:</p> <ul style="list-style-type: none"> <li>- Adopts fully characterized &amp; proven technologies and management systems</li> <li>- Operates in a classic organizational hierarchy</li> <li>- Maintaining transparency of operations for external decision makers</li> <li>- Employee information program in place</li> </ul> <p>Intermediate:</p> <ul style="list-style-type: none"> <li>- Enable employee suggestions process with responsiveness</li> <li>- Establish incentives for creative thinking &amp; continual improvement among employees (e.g., awards &amp; recognition programs)</li> <li>- EMS continuous improvement culture</li> </ul> <p>Advanced:</p> <ul style="list-style-type: none"> <li>- Promote membership in professional organizations</li> <li>- Create clear alignment among or between mission vision &amp; business plan for performance appraisal purposes</li> <li>- Create participatory culture (e.g., all employees participate in business planning process)</li> </ul> | <ul style="list-style-type: none"> <li>- Adoption of sustainability as a core business principle</li> <li>- Establishing internal sustainability committee</li> <li>- Internal cultural alignment on sustainability</li> <li>- Integrating watershed considerations into utility decision making and planning</li> <li>- Viewing customers and other stakeholders as utility partners</li> <li>- Employees are familiar with and can express core messages and aspects of utility's strategic plan</li> <li>- Inviting other professionals to participate in your training programs as a revenue source</li> <li>- Removing barriers to creative thinking by reducing fear of failure and developing systems for failure tolerance. Manage failure and have contingencies</li> </ul> |

| Conventional  |   | Emergent   |
|---|---|--|
| <ul style="list-style-type: none"> <li>- Executive management commits to focused time with the workforce</li> <li>- Executive director has external communication &amp; relationship building focus</li> <li>- Establish recognition of the role of the utility in the community among staff &amp; equip staff to project utility values in external contexts</li> <li>- Blending work tasks to maintain &amp; enhance motivation</li> <li>- Employees enabled to take independent action (empowered employees)</li> <li>- Bringing in leaders to convene discussions on current topics (e.g., climate changes) to foster a 'thought leader environment'</li> <li>- Building relationships with state regulators and talking to them about how funds should be used</li> <li>- Meeting regulators before there are problems, making it easier to collaborate on issues in the future</li> </ul> |   |  |
| <b>Customer &amp; Community Practice Area</b>   | Basic: <ul style="list-style-type: none"> <li>- Availability of customer utilization data</li> <li>- Customer complaint responsiveness expectations in place</li> </ul> | <ul style="list-style-type: none"> <li>- Risk management communication to the public in support of innovation (increase public tolerance for service failure &amp; increased costs)</li> </ul> |

| Conventional  | Emergent   |
|---|--|
| <ul style="list-style-type: none"> <li>- Customer complaint monitoring &amp; interpretation</li> <li>- Customer complaint management system</li> <li>- Conduct public information events (e.g., 'Drinking Water Week')</li> </ul>   | <ul style="list-style-type: none"> <li>- Engaging customers and community as utility operations contributors (e.g., conservation measures, source control measures)</li> <li>- Community-based social marketing</li> <li>- Expanded scope of community engagement to include a full range of watershed participants</li> <li>- Explicit incorporation of community values into strategic long-range and capital planning (using community engagement forums to understand critical values)</li> <li>- Engagement with new and different customer bases (e.g., high-strength waste producers, energy utilities)</li> <li>- Conservation rate structures</li> <li>- Participating in community vision planning</li> <li>- Coordination of capital planning &amp; investment activities with other community service departments</li> <li>- Using of mobile apps to identify service needs</li> <li>- Involving stakeholders and helping them organize their missions &amp; visions to create a unified strategy for the watershed. (Act as a catalyst or facilitator to bring NGOs together and leverage funds)</li> <li>- Conducting public surveys of rate payers to test their knowledge, and comparing results with target knowledge levels -</li> </ul> |
| <p>Intermediate:</p> <ul style="list-style-type: none"> <li>- Utility information booths at community events</li> <li>- Payment assistance programs</li> <li>- Customer feedback capabilities (focus groups, satisfaction surveys)</li> <li>- Community informational engagement activities (e.g., open houses, K-12 school outreach)</li> <li>- Good community citizen activities (e.g., community event sponsorship)</li> <li>- Product giveaways to customers (e.g., grease kits)</li> <li>- Share plans proactively and publicly through media &amp; events</li> <li>- Value of water &amp; water services information education (communicate internally and externally)</li> </ul> |  |
| <p>Advanced:</p> <ul style="list-style-type: none"> <li>- Marketing services to customers (e.g., guaranteed response times to service</li> </ul>  |  |



| Conventional  | Emergent  |
|---|---|
| <p>failures)</p> <ul style="list-style-type: none"> <li>- Staff participating on local commissions</li> <li>- Establish &amp; project a utility brand</li> <li>- Establish two-directional engagement with community (social media, advisory councils, engagement in priority setting)</li> <li>- Youth &amp; environment program</li> <li>- Multigenerational media approach</li> <li>- Integration forums with other community planning &amp; sustainability organizations</li> <li>- Comparative usage data in bills</li> <li>- Providing water-related curriculum for local science programs</li> <li>- Conducting focused outreach to the financial community, particularly in the context of bond ratings (focused outreach to bond raters about sustainability)</li> </ul> | <p>outreach/communication/education to fill the gaps, and follow-up to determine if the information was absorbed</p> <ul style="list-style-type: none"> <li>- Using common language with the community and examples that are easily communicable (e.g., 'we saved 10k barrels of oil this week through our energy conservation efforts,' rather than 'we saved 300kw hours')</li> <li>- Talking to the hearts rather than brains of stakeholders</li> <li>- Creating a feeling of connectedness to the water body by involving the community in the watershed that is being protected</li> <li>- Creating and investing in natural treatment systems</li> </ul> |