Emerging Standards for Sustainable Water Management in North America

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Executive Summary

This report assesses opportunities to advance consensus on a performance standards and certification regime for the North American water supply, wastewater and stormwater management sectors that would reinforce and reward sustainable water management (SWM) practices.

Standard setting is an important process for market development. Standards specify a level of performance that entities—water utilities, for instance—must meet to satisfy regulators, investors, customers, communities, or other stakeholders. A well-designed standard can drive transformations in the practices of many entities at the same time and, therefore, changes in market performance. But designing a standard and gaining traction in a market is complicated, due to a variety of factors and barriers. It can take decades for standards to take hold in a market.

The emergence of serious efforts to develop sustainable water management standards, for public water utilities, corporate water users, and other stakeholders in water systems, and at regional, national, and global scales, reflects an underlying belief that the water market must radically change its performance and that ways to accomplish this—new practices or upgrading of old facilities and operational methods—are available and could be adopted widely.

We closely examined eight standards for sustainable water management that are under development or were recently launched as products/services for the water sector.[1] The sponsors include environmental nonprofits, businesses, professional associations of water managers and engineers, water research and advocacy entities, and the mayors of cities in a North American region. Their standards aim variously at the behavior of public utilities for water supply, wastewater, stormwater, and corporate water users. The standards take many forms—guidance, scorecards, verifiable performance based on metrics—but all essentially seek to assess the performance of one or more types of water system.

Sponsor	Standard Name
Alliance for Water Stewardship	*The Standard*
American Water Works Association	*G480-13 Water Conservation*
California Water Foundation	*Sustainable Water Management Profile*
Center for Neighborhood Technology, American Rivers, Great Lakes & St Lawrence Cities	*Green Infrastructure Portfolio Standard*
Ceres	*Aqua Gauge*
Ceres	*Financial Disclosure*
Great Lakes & St Lawrence Cities Initiative (U.S. & Canada)	*Sustainable Municipal Water Management Framework & Scorecard*
Institute for Sustainable Infrastructure	*Envision*

Our research yielded a set of seven findings and a single overarching recommendation, the creation of a Sustainable Water Management Standards Innovation Network, for advancing the development of standards for sustainable water management.

[1] Appendix A briefly describes additional standard-setting efforts involving water systems that for various reasons were not closely examined.

Findings

While all of the eight standard-setting efforts pursue a common goal—to promote the adoption of sustainable water management practices—and share some common characteristics, they also differ in important ways. Our findings point out key patterns across the standard-setting efforts, rather than critiquing each effort individually

• Standard setting for sustainable water management is at an early stage of development, just seeking initial traction in the water market.
• The water market's structure—its high degree of geographic and institutional fragmentation and reliance of public monopolies—poses an inherent barrier to leveraging change through standard setting.
• The emerging standards reflect a wide variation in sponsorship, design, and strategies for engaging the water market—with nearly all relying on voluntary adoption of standards by users.
• The diverse standard-setting efforts promote a similar set of sustainable water management practices, but these practices tend to be general and management process oriented, rather than operationally precise and results oriented.
• Most of the standard-setting efforts intend to use a third-party to verify compliance with standards—an essential practice in standard setting—but their models for certification are not yet fully developed or tested.
• The emerging standards offer relatively modest initial benefits or incentives to users for voluntary meeting standards' requirements.
• Several significant factors offer opportunities for widespread standard setting: water stress, capital access, climate change, and corporate concerns.

The emergence of standard setting for Sustainable Water Management is a sign of the evolution of the water market. But, as noted, standard setting is at an early stage and faces significant barriers in the nature of the public water utility marketplace. Moreover, standard-setting itself is somewhat fragmented; numerous entities and alliances are developing standards and seeking traction, targeting different segments in the market, emphasizing different content, and using different market-entry strategies. These are best thought of as "first generation" products that, once tested by volunteers in the market, will evolve, if they don't simply fail to gain adoption. It may well be that as a result of these efforts, the water market will see the emergence of a set of "leading edge" water utilities that, whether driven by a vision for sustainable water management or necessities caused by water stress and other external drivers, form a standards-based community of practice to adopt, invent, share, and spread sustainable water management. Such a development could be a prelude to widespread adoption of performance-outcome standards, most likely through the imposition of SWM-based government regulations and other public policies and/or the insistence of private investment markets that public water utilities seeking capital meet SWM standards that assure long-term risks will be managed effectively.

Recommendation

At some point, water utilities will either want or be required to achieve measurable degrees of sustainability—as a way of ensuring their performance meets their communities', customers', and society's needs. In the short term, though, what we see is two trend lines that have not yet intersected: One is the slowly spreading and intensifying demand that water utilities radically improve their sustainable performance. The other is the slowly growing supply of solutions, of

SWM practices that work. Standards offer a hypothetical point of intersection for this demand and supply—but for now momentum toward standards is just beginning and when and how it will reach critical mass and become a fixture in the market remains to be seen.

On the basis of our research, we concluded that there are a number of ways that standard-setters and their allies could align to support both their individual efforts and advance the sustainable water management field of practice. Our recommendations do not favor one standard-setting effort over another. Nor do we advocate for a "shake out" process aimed at a consolidation of standards and, eventually, one standard dominating in the market. The fragmentation and diversity of standard setting reflects some of the water market's own fragmentation. At this early experimental stage of standards development for SWM, consolidation wouldn't be a feasible effort; most sponsors of standards are strongly wedded to their current efforts and will want to see if they can gain market traction and what impact that has on water-system practice.

Recommendation

Create a Sustainable Water Management Standards Innovation Network comprised of standards sponsors, funders, and other stakeholders in SWM to undertake collaborative research and development that addresses issues likely to arise in standard setting.

Instead, we suggest a way—creation of a Sustainable Water Management Standards Innovation Network—for standards sponsors, funders, and other stakeholders in sustainable water management to seek strategic alignment around an agenda that anticipates future needs in setting standards in the water market. This proposal foresees two possibilities, even as individual standards start to enter the market:

- It would be quite useful to organize and tap the potential *collective capacity* of standard setters—their vision for sustainable water, expertise in sustainability practice, measurement, and tool building, and their engagement with the water market. Some of the sponsors have connected with each other and studied each others' standards, but not in a way that amasses, coordinates, and focuses their capacity.

- It would be possible to anticipate some issues that will arise in standard setting, and addressing them could be accomplished effectively through *collaborative research and development* by standard setters and stakeholders, such as the U.S. Environmental Protection Agency, with funding support. (Given the importance of standard setting for development of Sustainable Water Management practices, an intentional, collective effort may make more sense than assuming that individual standard sponsors will eventually turn to those issues and somehow raise the funding and organize the capacity to address them.) From our research, we'd suggest that an initial R&D agenda could include these items:

    - Increase the standards' content focus on quantitative outcomes/results, not just processes and qualitative results.
    - Develop standards for public water utilities in North America that can be easily customized to focus on particular *regional* stresses, climate risks, and other factors that build demand for sustainable water management.
    - Examine the potential of the corporate sector's growing practice in water foot printing and supply-chain management, as well as participation in some standard-setting efforts, as a potential driver for adoption of more rigorous standards for water utilities.

- Provide water systems and other users of SWM standards with a guidebook to the various emerging standards and the different purposes for which each is designed.

The viability of creating a Standards Innovation Network for Sustainable Water Management could be tested by:

- Inviting some or all of the relevant parties to convene
- Thoroughly mapping the standards' content and market engagement strategies as background information.
- Developing an initial agenda for collaborative R&D.
- Developing a work plan for organizing the funding and capacity needed to perform the work.

Introduction

Water markets are on a trajectory that will eventually lead to the normal and widespread practice of sustainable water management (SWM) by North American water utilities and water users. It's not difficult to discern the momentum: On the supply side, some practitioners, researchers, advocates, and policy makers are articulating and to a growing extent implementing visions, principles, goals, practices, metrics, and tools for sustainable water management. On the demand side, some customers, stakeholders, investors, elected officials, and regulators increasingly insist that water-systems/users be accountable for environmental, economic, and social outcomes, better anticipate and prepare for climate risks, and substantially improve traditional performance—all of which press the need for new water management approaches. And somewhere in the middle stand senior managers of public water utilities and water-intensive corporations, with various disasters looming on their horizons.

The evolution of supply and demand for SWM is still at an early stage, but it has gotten far enough along to give rise to a new dynamic in the market: the emergence of efforts to create standards for sustainable water management—ways to assess the management of water systems. Standards specify a level of performance that entities—water utilities, for instance—must meet to satisfy regulators, investors, customers, communities, or other stakeholders. They include methods of monitoring performance to verify whether or not the standard has been met. They provide new tools that can enable the demand for sustainable water management and guide the decisions and actions of water managers. In just the past few years, more than a dozen standard-setting initiatives have been initiated, with many of them just entering the marketplace and now creating a steady flow of news:

Pressure Builds on Water Managers

In October 2013 managers of 18 water and wastewater agencies in North America met to discuss issues they had in common and how they might collaborate to increase their influence to achieve their goals. Their priority concerns included access to capital for investments in water infrastructure; a lack of public and political will to raise rates sufficiently for investment in water systems; regulatory requirements driving both cost increases and the need for innovation; and the need to prepare systems for natural disasters and extreme weather events due to climate change.

An April 2014 report by the Pacific Institute and VOX Global, "Bridging Concern with Action," found that 79% of managers at 50 major U.S.-based corporations surveyed said their companies face physical, reputational, regulatory, or legal water risks and 60% said company growth and profitability will be affected.

- In June 2014, three North American communities issued scorecards assessing their water systems, using a common framework and scoring mechanism developed by the Great Lakes and St Lawrence Cities Initiative. They were piloting a model for sustainable water management practices and reporting that more than 100 communities in the region had embraced. "Its purpose is to provide the municipality with a standardized measure of its progress on sustainable water management and to communicate this progress to citizens," explained Nicola Crawhall, deputy director of the initiative.

- In May 2014, a development team was analyzing the results of a field test for a new standard for water and wastewater systems, piloted by the International Water Association and the Inter-American Development Bank. A final version was scheduled for global release by the end of 2014.

- In April 2014 in Lima, Peru, the Alliance for Water Stewardship, initially formed by The Nature Conservancy, The Pacific Institute, and Water Stewardship Australia, launched a new standard that sets criteria and indicators worldwide for how water should be stewarded at site and catchment levels in ways that are environmentally, socially, and economically beneficial.

The emergence of serious efforts to develop sustainable water management standards, for public water utilities, corporate water users, and other stakeholders in water systems, and at regional, national, and global scales, reflects an underlying belief that the water market must radically change its performance *and* that ways to accomplish this—new practices or upgrading of old facilities and operational methods—are available and could be adopted widely.

Purpose

This report assesses opportunities to advance consensus on a performance standards and certification regime for the North American water supply, wastewater and stormwater management sectors that would reinforce and reward sustainable water management practices.

In 2013, with a grant from the Rockefeller Foundation, the Innovation Network for Communities (INC) developed a framework for philanthropic investments in sustainable water practices.[2] In the report we noted that sustainable water management was a field of practice in an early stage of development and that practitioners and philanthropic funders had opportunities to accelerate the field's evolution. The report identified the development of a common set of standards on sustainable water management for the water, wastewater and stormwater utility market as one opportunity to pursue. Specifically, it reported that:

> Here and there, various types of standards—some rudimentary, some precise—are in the making and seeping into use. Some water utilities, research institutions, and professional water associations are working on performance standards. Water intensive corporations are implementing water audits and footprint analysis.[3]

The report recommended that funders:

> *Support, enhance, and help to align/coordinate promising efforts to develop sustainable-water measurement and performance standards for water providers in the U.S.* Performance measurement and standards would guide water management and investment decisions, as well as water-user behaviors. These are "threshold practices"; if they are not in place it is difficult to develop best practices and fully understand what, if any, impacts they have. What's needed is a comprehensive collaboration among the many innovators of performance measurement and standards for various water provider segments; alignment around which innovations have been proven to work, and around a development agenda and strategies for reaching scale across water systems and markets.[4]

In the fall of 2013, the Walton Family Foundation funded this follow-on project to analyze existing and emerging standards frameworks; interview industry players to assess interest in a consensus standards process; and make recommendations on next step.

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[2] Innovation Network for Communities, "Accelerating the Development of Sustainable Water Markets in the U.S," January, 2013, http://water.in4c.net/files/Accelerating-Development-of-U.S.-Sustainable-Water-Markets-Report-1.1.13.pdf.
[3] "Accelerating the Development of Sustainable Water Markets in the U.S.," 20.
[4] Ibid., 6.

I. Benefits and Challenges of Standard Setting

A standard is a tool for market development. It specifies a level of performance that entities—water utilities, for instance—must meet to satisfy regulators, investors, customers, communities, or other stakeholders. And it includes ways of monitoring performance to verify whether or not the standard has been met. These and other elements of design involve making choices. A well-designed standard can drive transformations in the practices of many entities at the same time and, therefore, changes in market performance. But designing a standard and gaining traction in a market is complicated, due to a variety of factors and barriers. It can take decades for standards to take hold in a market.

Design Elements of Standards

Elements	Types of Choices	
Users. Who will be seeking to meet the standard?	Universal (any entity, anywhere)	Targeted – by type of user, geography, other factors
Content. What is the content of the standard?	Behaviors/practices	Outcomes/results
Indicators. How will meeting the standard be assessed?	Qualitative	Quantitative
Validation. Who will do the assessment?	Self-certified	Third-party certified
Disclosure. Who will have access to the indicator data?	Public Access	Limited Access

Although standard setting for sustainable water management is fairly new, there are many examples of standard-setting efforts to promote sustainability in other markets, including LEED for buildings and neighborhoods; sustainable management certification for forest products; corporate supply-chain management for sustainable food sourcing; Fair Trade Certification for agricultural products; Energy Star for energy-efficiency in appliances and other products; and Marine Stewardship Certification.

The emergence of serious efforts to develop sustainable water management standards, for public water utilities, corporate water users, and other stakeholders in water systems, and at regional, national, and global scales, reflects an underlying belief that the water market must radically change its performance and that ways to accomplish this—new practices or upgrading of old facilities and operational methods—are available and could be adopted widely. Standards can stimulate and support the process of adopting and scaling sustainable water management in a number of ways:

- *Awareness.* Increasing the water market's awareness of the need for change.
- *Knowledge.* Promoting a framework for sustainable water management and specific practices.
- *Assessment.* Allowing water utilities and users, such as corporations, as well as stakeholders and advocates, to measure, monitor, and assess water market performance.

Most crucial to any standard-setting approach is its user value proposition: what benefits accrue to users that achieve compliance with the standard? The compelling aggregation of these benefits for many users is what can drive change at the level of an overall market.

Potential Benefits for Users of Standards

Access to Customers	Customers often require compliance with a standard as a condition of doing business with them (e.g. companies that require ISO 9000 or other quality standards for their suppliers; or governments that impose requirements for vendors)
Regulatory Compliance	Standards can be built into regulatory requirements or used as a condition for obtaining a public benefit (e.g. embedding LEED or other requirements into local zoning ordinances; tax increment finance agreements with local governments for development projects)
Access to Financing	Standards can be set as a condition of access to private or public capital (e.g. privately financed "green bonds" or requirements of government loan funds)
Risk Management	A number of standards are used to minimize risk and can be used as a form of legal recourse (e.g. accounting standards organized around Generally Accepted Accounting Principles; standards that require disclosure or transparency of information provided to investors)
Performance Improvement	Some organizations use voluntary standards to drive efficiency and other performance improvements, and cost saving, in their enterprise, or advocate for industry-wide standards as a way of keeping their sectors vital and economically competitive.
Market Advantage	Players often adopt voluntary standards as a means of increasing their appeal (public reputation) to customers or maintaining their social license to operate (e.g. corporate sustainability standards).

Although our earlier report on sustainable water markets and the research for this report suggest that there are some signs of growing "readiness" in the water market to adopt sustainability goals and practices, these standard-setting efforts face difficult challenges in the water market that affect their potential to reach scale and impact.

II. Emerging Standards for Sustainable Water Management

We closely examined eight standards for sustainable water management that are under development or were recently launched as products/services for the water sector. The sponsors include an array environmental and business nonprofits, professional associations of water managers and engineers, and the mayors of cities in a North American region. Some address sustainability in a broad manner, while others focus on a particular aspect, such as efficiency.[5]

Standards Examined in Report

Sponsor	Standard Name	Launch Year	Geography
Alliance for Water Stewardship	*The Standard*	2014 (April)	International
American Water Works Association	*G480-13 Water Conservation*	2013	U.S.
California Water Foundation	*Sustainable Water Management Profile*	2014 (TBD)	California
Center for Neighborhood Technology, American Rivers, Great Lakes & St Lawrence Cities	*Green Infrastructure Portfolio Standard*	2012	U.S.
Ceres	*Aqua Gauge*	2013	International
Ceres	*Financial Disclosure*	2013	International
Great Lakes & St Lawrence Cities Initiative (U.S. & Canada)	*Sustainable Municipal Water Management Framework & Scorecard*	2012	Great Lakes/St Lawrence Region
Institute for Sustainable Infrastructure	*Envision*	2012	North America

For each standard-setting effort we developed a brief profile, starting on page 23, of key information:

- Sponsor
- Date Introduced
- Targeted Users
- Geographic Scope
- Transaction Volume
- Standards Content
- Standard Examples
- Verification Model
- User Benefits

[5] In Appendix A we identify additional standard-setting activities that were not the subject of our deeper research, because they appeared to be less relevant to North American sustainable water management. One standard, AquaRating, was still under development and details of its content were not publicly available.

The efforts come at standard setting from quite different angles, but each seeks essentially to assess, one way or another, the performance of a water utility or water user or both.

Ideally, standard setting for sustainable water management will result in the articulation of a set of performance/outcome goals with measurable indicators of a given water system's sustainability. The system will be able and expected to set targets for achieving those goals over time. It will regularly disclose its performance to stakeholders and the public, who will be able to compare the performance to the system's target, its historical performance, industry norms, and "best-in-class" performance, while noting how contextual variations may affect performance expectations. And it will strive to achieve better performance, by continuously improving its efforts and adopting innovations. Thus, standards become a basis for establishing a water system's sustainable management regime and for ongoing accountability. The emerging standards we've examined present some aspects of this ideal system.

III. Findings

While all of the eight standard-setting efforts pursue a common goal—to promote the adoption of sustainable water management practices—and share some common characteristics, they also differ in important ways. For instance, most target public water, stormwater, and/or wastewater utilities, but some aim at water users, especially larger corporations. Our findings point out key patterns across the standard-setting efforts, rather than critiquing each effort individually

• Standard setting for sustainable water management is at an early stage of development, just seeking initial traction in the water market.
• The water market's structure—its high degree of geographic and institutional fragmentation and reliance of public monopolies—poses an inherent barrier to leveraging change through standard setting.
• The emerging standards reflect a wide variation in sponsorship, design, and strategies for engaging the water market—with nearly all relying on voluntary adoption of standards by users.
• The diverse standard-setting efforts promote a similar set of sustainable water management practices, but these practices tend to be general and management process oriented, rather than operationally precise and results oriented.
• Most of the standard-setting efforts intend to use a third-party to verify compliance with standards—an essential practice in standard setting—but their models for certification are not yet fully developed or tested.
• The emerging standards offer relatively modest initial benefits or incentives to users for voluntary meeting standards' requirements.
• Several significant factors offer opportunities for widespread standard setting: water stress, capital access, climate change, and corporate concerns.

- ***Standard setting for sustainable water management is at an early stage of development, just seeking initial traction in the water market.***

All standards researched have been in the market no more than two years, many less than a year, and several still are in development. As a result, none has yet demonstrated an ability to achieve widespread adoption, and the standard-setters' strategies for engaging and influencing the water market remain mostly untested.

- ***The water utility market's structure—its high degree of geographic and institutional fragmentation and reliance on public monopolies—and differences in the legal, regulatory, natural, and built-system contexts of water systems pose inherent barriers to leveraging change through standard setting.***

Many of the incentives for user adoption of standards that work in more traditional markets are either weak or non-existent in the water utility market. Some examples include:

- *Access to customers.* In many markets with tiered supply chains, the firms at the top of the supply chain impose requirements on suppliers as a condition of doing business with them. However, the water utility industry is highly fragmented and relatively "flat" in its structure, so there are limited opportunities to impose standards through supply chain management. (A number of water-intense corporations have been initiating such standards.)

- *Market advantage and performance improvement.* Most water utilities are monopolies, so consumers do not have any choice about where they get their water, who processes their wastewater, or manages their stormwater. Therefore, standards compliance to get market advantage has less appeal to utilities; it doesn't give them any advantage with consumers in a market that they already dominate. "We have no outside pressure on this issue," acknowledged a top manager at a big-city water utility. "We do some benchmarking, but it does not translate into a sense of competition to perform against our peers."

- *Regulatory compliance.* Water utility regulation is also quite fragmented. In most states, there is weak oversight at the state level (especially, for instance, in comparison to electric utilities) and most oversight comes from local governance bodies. At the federal level, the EPA plays a role in imposing standards on water quality through the Clean Water Act and the Safe Drinking Water Act. However, these do not take the form of a comprehensive approach to sustainable water management.[6]

At the same time, substantial differences in water systems' natural, built, legal, regulatory, and market contexts create distinctions that can stand in the way of national-scale standards: western water law versus eastern water law; "wet" watersheds/regions versus "dry" watersheds/regions; states with or without water plans and regulatory authority; water systems with extensive, expensive built infrastructure versus those without; water systems with a mix of customers that includes a large portion of big users versus those without. "Having different standards that take into account regional differences makes standard-setting more complicated," noted Douglas Yoder, deputy director of the Miami-Dade Water and Sewer Department. "But how could you have a national standard that doesn't recognize actual differences in the ways utilities have to operate? The variability that exists among situations that utilities find themselves would, in terms of the application of a standard, have different impacts on their operations and costs."

- ***The emerging standards reflect a wide variation in sponsorship, design, and strategies for engaging the water market—with nearly all relying on voluntary adoption of standards by users.***

The emerging standards make quite different choices among the major factors involved in designing a standard:

Factors	Some Choices Standard Setters Have Made
Sponsors. Who sponsors the standard and is responsible for setting the standards content, model, and verification process?	• NGO or alliance of NGOs • Association of professional water managers • Water industry association • Alliance of corporations • Alliance of cities
Targeted Users. What type of operation do the standards apply to?	• Infrastructure projects • Enterprises (e.g., public water utility, corporate water user) • Group of stakeholders in a watershed or river basin
Geographic Scope. What is the	• International

[6] EPA has produced a wide variety for materials in support of sustainable water management, mostly in the form of best practice guidance manuals. See http://water.epa.gov/infrastructure/sustain/sustainable_systems.cfm.

geographic scope of the standard?	• National • Regional (state/province or multi-state/province) • Local
Content of the Standard. What behaviors and outcomes do the standards cover and at what level of detail?	• Processes and systems for water management • Specific practices • Outcomes of water management
Compliance Method. How is compliance to the standard determined?	• Self-certified • Third-party verification

The choices sponsors have made reflect their own missions and priorities. They also reflect different strategies for attracting users to their standards. All but one of the standards relies on voluntary adoption of the standards by the potential users they have targeted. The exception is the Ceres Financial Disclosure standard, which would be imposed on utilities by prospective financial investors through bond-rating processes.

- ***The diverse standard-setting efforts promote a similar set of sustainable water management practices, but these practices tend to be general and management-process oriented, rather than operationally precise and results oriented.***

A challenge for standard setting is the continuing ambiguity about the goals and measurability of sustainability of water systems. As we noted in our earlier report on accelerating the development of sustainable water markets, there are many definitions of sustainability, little consensus, and few outcome measures.[7] These are signs of a practice field, SWM, in an early stage of development. In a positive sign for the field's evolution, nearly all of the standards converge on a set of practice topics:

- Water conservation and efficiency
- Shared water stewardship and collaboration
- Ecosystem restoration and collaboration
- Pollution prevention
- Climate preparedness
- Energy use and generation
- Pricing
- Asset management (including natural resources as assets)

However, when an emerging field of practice turns to standard setting, it's not unusual for the initial content of the emerging standards, whatever their topic, to be "soft"—general and process-oriented—instead of "hard"—articulating measurable performance outcomes to be achieved. Typically, an early-stage field struggles to articulate measurable results and specific practices with reliable outcomes. And the sponsors of standards tend to want as many players as possible to use the standards, so they set a relatively "low hurdle" for users' initial success in meeting standards. These dynamics are at work in the sustainable water management field. As one standard sponsor told us: "Most of our initial steps and moderate progress [in complying with the standards] are about processes and practices, so many agencies would reach their score from practices rather than from results." It's best, then, to view the standard setting under review as experiments in how to

[7] See Appendix B for our own synthesis of goals for sustainable water systems.

accelerate the field's development, and to recognize that initial standards will need to evolve toward greater specificity and a results orientation.

Examples of Process-Oriented Standards

Standard and Source	Comments
Universal Metering. The utility shall move toward implementing universal metering of all service connections. (AWWA)	• Metering is a practice that can make a difference—an underlying capability for SWM. But it is not a measure of water system performance. • Establishes goal of 100% metering, but leaves up to
Establish a leadership commitment. You must have the senior-most manager at your site sign and publicly disclose commitment to . . . engage stakeholders in an open and transparent manner, comply with legal and regulatory requirements . . . continuously improve and adapt your water stewardship actions and plans . . . [and more]. [Alliance for Water Stewardship]	• Leadership commitment matters enormously, but even committed leadership may not result in improved water performance • Stakeholder engagement and continuous improvement could prove to be difficult to assess
Scenario Analysis Informing Supply Management. Utilities should disclose the scenario analysis behind revenue projections and supply planning. [Ceres-Financial Disclosure]	• Standard requires disclosure of the analytic process, but is silent on the quality or effect of the analysis used.

Examples of Performance-Outcome Standards

Standard and Source	Comments
Change in the Total Volume of Water Produced Annually. Compares total annual water withdrawals by a municipality, and shows change over time as a result of the water conservation strategy. (Great Lakes/St Lawrence Cities Initiative)	• As initiative acknowledges, "This indicator does not isolate variations in water consumption due to changes in economic activity or changing demographics." This is one of the big difficulties with trying to establish *measurable* performance standards.
Maintain or Improve Site Water Balance. You must meet your site water balance targets and not further contribute to water scarcity. Measurement-based evidence showing that targets have been met. [Alliance for Water Stewardship]	• Water balance is a critical performance-outcome standard, but the standard's "toughness" depends in this case on what targets are set.
Reduce Overall Potable Water Consumption and Encourage the Use of Greywater, Recycled Water, and Stormwater to Meet Water Needs. Scores an infrastructure project's water consumption based on how much consumption is below industry norms. (Envision)	• Highlights another difficulty of measurable performance: if the baseline (industry norm) is weak performance, then some improvement over that performance, while desirable, may not represent a level of sustainability.

- ***Most of the standard-setting efforts intend to use a third party to verify compliance with standards—an essential practice in standard setting—but their models for certification are not yet fully developed or tested.***

Third-party verification puts "teeth" into standards, providing assurances that claims of compliance are accurate. They also create more value for standard users than a self-certification process, because the external assessment of performance is credible. At least five of the eight standard sponsors don't intend to rely on self-certification by the standard users, and are setting up verification processes. However, a verification process requires capacity and expertise to perform verification and a sustainable business model that will cover the costs of verification. And requiring users of the standards to pay the cost of verification (a typical practice in standard setting) can create a financial barrier to and slow down voluntary adoption of a standard.

- ***The standards offer relatively modest initial benefits or incentives to users for voluntarily meeting the standards' requirements.***

The success of voluntary standards depends substantially on the attractiveness of the benefits they offer potential users. We noted earlier that the water market's structure diminishes the typical benefits that standards may offer users. It appears that the emerging standards, not including Ceres' financial disclosure standards, mostly offer two types of benefits for users: achieving some performance improvements and/or obtaining reputational enhancement, which is a form of market advantage. But the attractiveness of both of these benefits depends largely on the specific elements of specific standards. When it comes to achieving performance improvements, what matters is whether or not the content of a standard helps to lead users to specific performance results. If it doesn't, then users may or may not achieve performance improvements by meeting the standard. In the case of reputational enhancement, what matters is the credibility of the sponsor, the standard's content, and the verification process with audiences that the user cares about. If sponsor and verification are credible, then the user may gain reputational benefits.

Given the relative softness of the content of much of the emerging standards—more process oriented and general than calling for specific performance results—and the newness of the verification processes that are planned, it seems fair to conclude that for now the standards offer modest initial potential benefits at best. Of course, the voluntary standards may evolve as their sponsors receive feedback from the market in the form of adoption or rejection. But it remains to be seen if the potential benefits will attract sufficient "early adopters" to build momentum for one or more of the standards in the market.

As noted, the Ceres financial disclosure standard has taken a different route. The content of the standard is process oriented, but its sponsor seeks to have the standard imposed on public water utilities seeking to borrow capital. This route has the potential for widespread adoption at scale, if the private bonding sector agrees to use the standard and requires compliance. However, the sector will only consider adopting content that is material for assessing a borrower's capacity to repay a loan, which may constrain the standard's impact on users' practices and performance.

- ***Despite the market's barriers and the early-stage of development at which standards stand, several significant factors offer opportunities for long-term widespread adoption of standards.***

As standards meet the market, especially public water utilities, the prospect of achieving traction depends greatly on what the people running utilities perceive to be in their interest—how they define their problems and acceptable solutions. These factors include:

- *Water stress.* Severe stress in water systems at local, regional, or even national scales increases water managers' attention to aspects of sustainability and increases water customers' and policymakers' desire to know how well their water systems are performing.

- *Capital access.* The need of many water utilities to borrow long-term funding for much-needed infrastructure improvement and replacement projects increases the interest of private investors in carefully assessing the financial risks involved in financing water systems.

- *Climate change.* An increasing recognition of the need for climate adaptation planning calls into question water utility assumptions about water supply, demand, pollution control, and other key matters—with potential impact on decisions of private investors and policymakers.

- *Corporate concerns.* A growing desire of corporations to substantially boost their own water efficiency and reduce water vulnerability, for both reputational and operational/financial reasons, increases their concerns about the performance of water utilities on which they depend directly for services or indirectly as stakeholders in a watershed/river basin. It generates new attention on managing the risks in a corporation's water supply chain—"probably the biggest area we're seeing interest in," said Alexis Morgan, lead advisor for water stewardship & standards, World Wildlife Fund.

The emergence of standard setting for SWM is a sign of the evolution of the water market. But, as noted, standard setting is at an early stage and faces significant barriers due to the nature of the public water utility marketplace. Moreover, standard-setting itself is somewhat fragmented; many entities and alliances are developing standards and seeking traction, targeting different segments in the market, emphasizing somewhat different content, and using different market-entry strategies. These are best thought of as "first generation" products that, once tested by volunteers in the market, will evolve, if they don't simply fail to gain adoption. It may be that as a result of these efforts, the water market will see the emergence of a set of "leading edge" water utilities that, whether driven by a vision for sustainable water management or the necessities caused by water stress and other external drivers, form a standards-based community of practice to adopt, invent, share, and spread sustainable water management. Such a development could be a prelude to widespread adoption of performance-outcome standards, most likely through the imposition of SWM-based government regulations and other public policies and/or the insistence of private investment markets that public water utilities seeking capital meet SWM standards that assure long-term risks will be managed effectively.

At this stage in SWM standards development, the philanthropic community has some sway in how things will evolve. Some funders have been supporting particular standard-setting efforts. Others engage with public water utilities, either directly or through NGOs, to promote more sustainable practices. But, it's often noted, even by funders themselves, that philanthropy doesn't have a collective and coherent strategy for moving water markets in the U.S. toward sustainable management. Foreseeing the likely evolution of standard-setting efforts could provide one opportunity to use philanthropic resources to accelerate and leverage change in the water sector.

IV. Recommendations

> Create a Sustainable Water Management Standards Innovation Network comprised of standards sponsors, funders, and other stakeholders in SWM to undertake collaborative research and development that addresses issues likely to arise in standard setting.

At the beginning of our research, we hypothesized that the presence of numerous standard-setting efforts might divide up the water marketplace in ways that might not serve the shared desire to promote sustainable water management. Competing standards could cause confusion in the marketplace, slowing the adoption of goals and practices for sustainable water management and amplifying fragmentation in the sector. This would not be an unusual occurrence in standard setting; it can happen, for instance, when products based on different technologies are in direct competition for market share or when an industry group adopts a standard as an alternative to a more demanding standard supported by stakeholder and advocacy groups.

At some point, water utilities will either want or be required to achieve measurable degrees of sustainability—as a way of ensuring their performance meets their communities', customers', and society's needs. In the short term, though, what we see is two trend lines that have not yet intersected: One is the slowly spreading and intensifying demand that water utilities radically improve their sustainable performance. The other is the slowly growing supply of solutions, of SWM practices that work. Standards offer a hypothetical point of intersection for this demand and supply—but for now momentum toward standards is just beginning and when and how it will reach critical mass and become a fixture in the market remains to be seen.

On the basis of our research, we concluded that there are a number of ways that standard-setters and their allies could align to support both their individual efforts and advance the sustainable water management field of practice. Our recommendations do not favor one standard-setting effort over another. Nor do we advocate for a "shake out" process that could result in consolidation of standards and a single standard dominating in the market. At this early experimental stage of standards development for SWM, consolidation wouldn't be a feasible effort; most sponsors of standards are strongly wedded to their current efforts and will want to see if they can gain market traction and what impact that has on water-system practice.

Instead, we suggest a way for standards sponsors, funders, and other stakeholders in sustainable water management to seek strategic alignment around an agenda that anticipates future needs in setting standards in the water market:

- ***Create a Sustainable Water Management Standards Innovation Network comprised of standards sponsors, funders, and other stakeholders in SWM to undertake collaborative research and development that addresses issues likely to arise in standard setting.***

This proposal foresees two possibilities, even as individual standards start to enter the market:

  - It could be quite useful to organize and tap the potential *collective capacity* of standard setters—their vision for sustainable water, expertise in sustainability practice, measurement, and tool building, and their engagement with the water market. Some of the

sponsors have connected with each other and studied each others' standards, but not in a way that amasses, coordinates, and focuses their capacity.

- It could be possible to anticipate some issues that will arise in standard setting, and addressing them may be accomplished effectively through *collaborative research and development* by standard setters and stakeholders, such as the U.S. Environmental Protection Agency, with funding support. (Given the importance of standard setting for development for SWM, an intentional, collective effort may make more sense that assuming that individual standard sponsors will eventually turn to those issues and somehow raise the funding and organize the capacity to tackle them.) From our research, we'd suggest that an initial R&D agenda could include these items:

  - *Increase the standards' content focus on quantitative outcomes/results, not just processes and qualitative results.* Although some of the emerging standards move in this direction, performance measurement is an "edge of innovation" for sustainable water management—and crucial if standards are going to produce long-term impact. We recognize that standards can and will evolve, typically becoming more demanding after there has been substantial compliance with easier requirements. But the production of outcome standards with metrics should not be left to individual entrepreneurial efforts in standard setting; it requires a collective, long-term effort, a "pre-competitive" research and development initiative that all standard-setting efforts could contribute to and benefit from.

    A starting point could be to identify current work on this problem, some of which we described in our previous report on innovation in sustainable water market development,[8] and bring together performance-measurement practitioners with the standard-setting sponsors to work out a practical agenda for developing and using stronger performance measures.

  - *Development of standards for public water utilities in North America that can be easily customized to focus on particular regional stresses, climate risks, and other factors that build demand for sustainable water management.* The regional scale—whether it's defined by one or more large watersheds and/or river basins, or by state-level governance—appears to have strong potential traction for standards for water utilities. This is because at the regional level, multiple utilities tend to operate in similar hydrological, regulatory, and market contexts and face similar challenges, such as climate adaptation. Two of the eight standards we examined were designed for regional use: the California Water Foundation and Great Lakes & St. Lawrence Cities Initiative. The standards' sponsors are quite different (an operating foundation in California, an alliance of mayors in the Great Lakes) and they take somewhat different approaches to assessing sustainable water management, but some of the standards' content overlaps. It would not be surprising to see similar efforts emerge in other large-scale regions, such as the Colorado River Basin or the southeast United States, where water supply stress is growing. But there's no reason for each region to reinvent the wheel. As one standards sponsor said, it makes sense to "align regional efforts . . . independent regional standards is a nightmare scenario." Developing a common standards model

[8] Innovation Network for Communities, "Accelerating the Development of Sustainable Water Markets in the U.S," January 2013, see pp. 19-21, http://water.in4c.net/files/Accelerating-Development-of-U.S.-Sustainable-Water-Markets-Report-1.1.13.pdf.

that water stakeholders in a region could adapt to their particular concerns could accelerate the spread of awareness about sustainable water management and the use of standards as a tool. "What constitutes 'sustainability' will vary within watersheds and among regions," notes David Rankin, vice president and director of programs at the Great Lakes Protection Fund. "The narrative standard might be similar within watersheds and among regions, but the performance metrics will vary drastically. I don't see variation as a 'nightmare scenario,' but common sense. I see high level integration and consistency as good or nice to have, but not necessarily as the first thing one does."

A starting point could be to bring together existing regional efforts at standard setting, as well as sponsors of more universal standards that could have regional applications, to develop a process for creating a model that other regions could use. The Alliance for Water Stewardship has recognized this potential: "We're hoping to customize regional guidance and . . . align regional efforts," said Alexis Morgan. The efforts of the California Water Foundation and the Great Lakes and St Lawrence Cities Initiatives could serve as a baseline worth examining.

- *Examine the potential of the corporate sector's growing practice in water foot printing and supply-chain management, as well as participation in some standard-setting efforts, as a potential driver for adoption of more rigorous standards for water utilities.* The corporate sector, especially publicly traded companies, has been adopting new tools—technologies, planning, monitoring and measurement methods, and more—for closely managing its water use and risks. At the same time, some corporations have become more active in engaging water utilities and other stakeholders in broader initiatives for sustainability, and some have joined standard-setting efforts.[9] Perhaps this energy, and its focus on quantifiable measurement of performance results, can be harnessed to influence and accelerate standard setting for the water sector. Perhaps as businesses recognize increasingly that their "water destiny" is closely tied to the performance of water utilities, they can become forceful advocates for performance standards for sustainable water management.

  A starting point could be to identify which corporate-focused efforts have "crossover" potential into standard setting for water utilities, and to bring together corporate leaders in sustainable water management with "leading-edge" utilities and standards sponsors to identify potential collaborations to accelerate standards development and market engagement.

- *Provide water systems and other users of SWM standards with a guidebook to the various emerging standards and the different purposes for which each is designed.* From the perspective of the water sector as a whole, these emerging standards can be thought of as a "tool kit" with different standards serving different purposes. Even though each standard-setting effort is following its own path into the market, providing guidance to users on which tools/standards make sense in what situations, and seeking to align the standards' content so they are consistent with each other and capture the leading edge of best practice, would be useful to the sector. It could help with voluntary adoption of

[9] For instance, The World Business Council for Sustainable Development, a CEO-led, global coalition of some 200 companies advocating for progress on sustainable development, partnered in development of Aqua Gauge.

standards and also prove to be educational about the SWM approach that the standards mostly share.

A starting point could be to develop a map of the standards, in consultation with the sponsors, and distribute the map through professional and trade associations of water managers.

The feasibility of creating a Standards Innovation Network for SWM could be tested by:

- Inviting the relevant parties to convene to explore the potential value of collaborative R&D.
- Thoroughly mapping the standards' content and market engagement strategies as background information
- Developing an initial agenda for collaborative R&D.
- Developing a work plan for organizing the funding and capacity needed to perform the R&D work.

Profiles of Eight Standard-Setting Efforts

Alliance for Water Stewardship: ***The Standard***	
Sponsors	The Alliance for Water Stewardship (AWS) was formed in 2008 by three organizations—The Nature Conservancy, The Pacific Institute, and Water Stewardship Australia. Since then they have been joined by Carbon Disclosure Project, European Water Partnership, Water Environment Federation, Water Witness International, World Wildlife Federation, United Nations Global Compact's CEO Water Mandate, and the United Nations Environment Programme.
Date Introduced	April 2014
Targeted Users	The standard is targeted to all water users, anywhere in the world.
Geographic Scope	International
Transaction Volume	None
Standards Content	The standards are focused on good water governance, sustainable water balance, good water quality status, and healthy status of "important water related areas" (IWRAs). The standard is built on a framework of six steps (management processes) for continuous improvement. For each step there is a set of criteria to contribute to stewardship outcomes. Each criterion has corresponding indicators. (There is also guidance information for each step/criterion.) The six steps are: 1. Commit – ensure sufficient leadership and commitments to legal, regulatory compliance. 2. Gather and Process – gather data to understand water risks, impacts, and opportunities. 3. Plan – create a plan for improvement. 4. Implement – ensure the site is executing the plan. 5. Evaluate – review performance and learn from outcomes. 6. Communicate and Disclose – encourage transparency and accountability.
Standards Examples	• Establish a leadership commitment • Analyze data to understand impacts and risks • Plan for adaptation and resilience • Contribute to industry water-related benchmarking • Evaluate stakeholder performance • Contribute to recognized disclosure frameworks
Verification Model	• Third-party certification • Three levels of certification: Core, Gold, and Platinum
Information	www.allianceforwaterstewardship.org

American Water Works Association: *G480-13 Water Conservation Program Operation and Management Standard*	
Sponsors	The American Water Works Association, the largest nonprofit, scientific and educational association dedicated to managing and treating water, with approximately 50,000 members.
Date Introduced	2013
Targeted Users	Water supply utilities: AWWA utility standards are designed to serve water, wastewater and reuse utilities (and their customers, owners, service providers and regulators). This standard is intended to improve overall operations and service by formalizing utility operations and procedures that contribute to public safety, health, and the environment.
Geographic Scope	United States
Transaction Volume	Sold to members and non-member of AWWA; requires a staff member dedicated to conservation initiatives at the organization implementing the best practices.
Standards Content	Categories of content addressed by the standards: • Regulatory Requirements • Top Level Organizational Functions (dedicated staff, water conservation planning, water conservation in integrated resource planning, public information and education program, water waste ordinance) • Internal Utility Actions and Requirements • External Policy Requirements • Wholesale Agency Requirements
Standards Examples	From the categories, examples include: metering practices, rate structures, billing practices, landscape efficiency program, distribution system and pressure management, utility water audit, water loss control program, water efficiency in building codes and standards, promote water-efficient products and services.
Verification Model	Self-Assessment: documentation shall be made available by the organization and published for public consumption, including: • Job description for the staff dedicated to water conservation • Water conservation plan • Water resources plan • Water ordinance (no details on what this should contain) • Rate schedule • AWWA water audit (a worksheet completed annually by the utility) • Water loss and tracking (a plan for reducing leaks) • A building code or development standard (related to water efficiency) AWWA certifies after submission of the plans and documents listed above. There is no third-party verification.
Information	http://www.awwa.org/publications/standards.aspx

The California Water Foundation: *Sustainable Water Management Profile*	
Sponsors	The California Water Foundation (CWF), an operating and re-granting foundation, initiated as part of a broader strategy for sustainable water management in California. CWF advances solutions to meet water needs of cities, farms, and the environment, through statewide policy reforms, place-based regional demonstration projects, and coalition building.
Date Introduced	To be released in 2014.
Targeted Users	California water agencies/utilities; regional entities: water management coalitions, land-use agencies, regional water utilities; bond rating agencies, insurance companies, investors, businesses, managers of public/private funds; nonprofits, regulatory agencies, state water managers and policy makers, the public. Initial users will be public entities facing water supply vulnerability.
Geographic Scope	State of California; CWF hopes model can be adapted and adopted in other places.
Transaction Volume	None to date. Pilot underway.
Standards Content	The profile is divided into three themes and considers multiple stressors: 1. Water Balance: Assesses water supply and demand and other stressors—climate change in particular—that impact water supplies. 2. Environment: Assesses environmental and land-use factors that influence water quality/quantity. Includes stream and watershed health. 3. Financial Health: Assesses financial stressors that impact the ability to manage water resources, such as infrastructure investment and revenue risk. Themes are evaluated using a scoring system that considers stressors threatening a region's water supply; management responses currently underway and that could be taken; and contextual information, such as geographic features and population factors.
Standards Examples	• Water Supply could include seven indicators with multiple metrics: Groundwater Index, Surface Water Index, Contracted Water/Water Rights Index, Water Quality Index, Reliability Index, Reuse Index, Portfolio Diversity. • Climate Change could include these metrics: Portion of supply from snowpack and portion affected by sea level rise, Precipitation decreases or timing changes, Evapotranspiration increases, Delta imports, Energy.
Verification Model	• Third party verification, conducted by CWF, with four ranking tiers: 1. Initial Steps: developed policy, collected data and information, set targets. 2. Moderate Progress: analyzed data, adopted policy, developed plan with specific outcomes that would result in sustainable conditions, developed management tools for improved conditions 3. Advanced Progress: funded execution of plan, applied tools to achieve improved conditions 4. Leading Practice: Agency is engaging in regional action & stakeholder engagement, implementing and adaptively managing the plan with targets and check-in points
Information	www.californiawaterfoundation.org

Center for Neighborhood Technology, American Rivers, Great Lakes and St Lawrence Cities: *Green Infrastructure Portfolio Standard (GIPS)*	
Sponsors	The Center for Neighborhood Technology, American Rivers, and Great Lakes and St Lawrence Cities Initiative collaborated in development of the standard, with a grant from US Environmental Protection Agency, Region 5.
Date Introduced	2012
Targeted Users	Stormwater, sewer utilities
Geographic Scope	United States
Transaction Volume	Initial pilots undertaken: City of Grand Rapids, MI, the Milwaukee Metropolitan Sewage Agency, and water systems in Atlanta, and Toledo, OH.
Standards Content	GIPS is modeled after "renewable energy portfolio standards" that have been adopted by more than 30 states. Under GIPS, a utility would set long-term and annual targets for an increase in the volume of stormwater runoff and pollutants that would be retained onsite and a corresponding reduction in the amount flowing into the stormwater sewer system and surface waters. GIPS is a planning tool with a process for local standard setting: • Commit to Measurable Goals • Establish a Working Task Force • Select the GIPS Target Area • Quantify Baseline Runoff Volumes for Target Areas • Identify and Design Green Infrastructure Projects • Calculate the Projects' Runoff Retention Volume • Establish Annual GIPS Goals • Implement Green Infrastructure Projects • Monitor Annual Progress Against Established Goals
Standards Examples	• For a Long-Term Goal: Reduction in stormwater runoff volume by 20 percent over 15 or 20 years. • For a Working Task Force: All municipal functions with a stake in land and stormwater management should be represented in the GIPS task force and participate in decisions related to the type, timing and location of green infrastructure projects. These functions generally include: planning, engineering, public works, stormwater management, community development, private development permitting, streets and alleys, urban forestry, GIS capability, and finance.
Verification Model	• GIPS target achievement would be self certified, but actual performance of green infrastructure might be validated by state and federal government regulators of runoff, for instance, as part of an MS4 permit. • Annual GIPS goals would be for incremental improvements, the achievement of which would be measured and public. Some users might adopt more flexible goals, such as a five-year goal that does not specify annual targets.
Information	http://www.cnt.org/water/projects/green-infrastructure/gips/

Ceres: *Aqua Gauge*	
Sponsors	Ceres, a business-and-investor driven nonprofit, is the host of the tool and its website. It was developed through collaboration between Ceres, the World Business Council for Sustainable Development, Irbaris, and IRRC Institute, and reflects input / feedback from over 50 financial institutions, companies and NGOs, and is supported by investors managing over $2 trillion in assets.
Date Introduced	2013
Targeted Users	Private sector water users & their supply chains: investors, portfolio managers, governance specialists, financial and ESG data providers, and companies.
Geographic Scope	Global
Transaction Volume	Unclear due to free download, but many major companies use it.
Standards Content	This deals strictly with corporate-level views on water risk management, divided into four key areas: 1. Measurement 2. Management: sets accountabilities for water through board of directors and senior management 3. Public policy and lobbying positions, Policies & Standards 4. Stakeholder engagement
Standards Examples	• Stakeholder perceptions and concerns related to water issues • Effectiveness of suppliers' water management practices) • Risk Assessment (identifies and quantifies water-related risks) • Standards and goals on water withdrawals/consumption for direct operations • Data and analysis related to water in financial filings/reports
Verification Model	Self-assessment and third-party verification, with multiple levels of certification: • No Action: No evidence that the company has taken action in this area. • Initial Steps: Action has been taken but the company is only beginning to implement Advanced Progress: Action has been taken and good progress toward leading practice • Leading Practice: Action is consistent with what leading companies are aspiring to The Certification/Adoption Process: • Meant for use with information already in the public domain (investors can acquire additional information through direct engagement with companies and quarterly analyst calls). • Can be both self initiated or conducted by a third party; score cards can be completed by anyone. • Companies can internally self-assess, benchmark against competitors—to identify priorities and form a more comprehensive water management approach.
Information	www.ceres.org

Ceres: *Financial Disclosure*	
Sponsors	Ceres is the main force behind the disclosure framework, as part of its broader work to define principles for responsible investment in water. It brought into the process more than a dozen private investment and asset management companies with $40 billion in assets under management.
Date Introduced	2013
Targeted Users	Bond raters and underwriters: the direct target is municipal bond analysts and credit-rating agencies that provide opinions on potential bonds issued by water utilities. But changing disclosure standards would affect not only the information that water utilities have to provide with bond issues, but also the utilities' own analytic methods, and probably and eventually the utilities' actual management practices.
Geographic Scope	International
Transaction Volume	No formal adoption of the disclosure standards has yet occurred. However, Cascadia Water Alliance used the disclosure framework to provide information for a bond issue in 2013.
Standards Content	Financial disclosure is divided into six categories with sub-categories: 1. Supply Security 2. Demand Management 3. Asset Management 4. Water Quality 5. Energy Use and Generation 6. Rates
Standards Examples	From the six categories, some of the standards are: • Scenario analysis informing supply management • Assessment of climate change effects • Sensitivity of demand projections to price • Water loss rates • Asset condition assessment and replacement • Valuation and budgeting for natural infrastructure management (forested lands, wetlands, • Energy intensity for water treatment and delivery • Structure of stormwater and wastewater rates
Verification Model	In effect there would be third-party verification: Representation to Investors: The disclosure standards would come with both self-certification and third-party certification. Utilities issuing bonds would be representing to investors the veracity of the information they provide, and would be liable for the information. Credit analysts would be checking for compliance with the disclosure standards and this would be part of their rating of the bond issue.
Information	www.ceres.org

The Great Lakes and St. Lawrence Cities Initiative: *Sustainable Municipal Water Management Framework and Scorecard*	
Sponsors	The Great Lakes and St. Lawrence Cities Initiative is an alliance of more than 100 mayors in the Great Lakes/St. Lawrence basin.
Date Introduced	2012. During 2013 and 2014, six cities tested framework and issuing of public evaluation reports. First report was made public in late 2013 by Montreal. Other reports are expected to be public by Initiative's 2014 annual conference in June.
Targeted Users	Great Lakes/St Lawrence region municipalities.
Geographic Scope	Great Lakes and St. Lawrence basin, encompassing parts of Canada and U.S.
Transaction Volume	Voluntary adoption by Initiative members, starting with six piloting cities.
Standards Content	The framework has six basic categories, each with a set of milestonwith status indicators to show quantifiable trends or achievement): 1. Water Conservation and Efficiency 2. Shared Water Stewardship 3. Shorelines and Waterways Restoration 4. Water Pollution Prevention 5. Water Protection Planning 6. Water Preparedness for Climate Change.
Standards Examples	• Set the right price (Progress toward full cost accounting and recovery; total costs/total water rate revenues) • Protect and restore shorelines and riparian corridors and control erosion (Length of shoreline or riparian corridor that is protected or restored) • Reduce stormwater entering waterways (For separated system: reduction in quantity of stormwater entering receiving waters, or improvement in quality of stormwater effluent; for combined system: reduction in number and/or volume of non-treated sewage entering receiving waters) • Adopt green infrastructure (Objective or policy adopted by a municipality to encourage use of green infrastructures; percentage of permeable surfaces within serviced urban boundary)
Verification Model	• Self-certification of best practices, with some measurable indicators and public disclosure through an "evaluation report" (scorecard) • The report "does not aim to compare municipalities against each other. Rather the objective is to track over time an individual municipality's progress towards meeting the 20 milestones in the SMWM framework." Reporting "will serve to keep the public informed, and to encourage municipalities to go even further in their progress towards SWM."
Information	http://www.glslcities.org/

The Institute for Sustainable Infrastructure: *Envision*	
Sponsors	Envision is a joint project of the Institute for Sustainable Infrastructure (ISI) and the Zofnass Program for Sustainable Infrastructure at Harvard Graduate School of Design. ISI was founded by coalition of trade and professional associations, including American Public Works Association, American Society of Civil Engineering, and American Council of Engineering Companies.
Date Introduced	2012
Targeted Users	All infrastructure projects: Envision is designed to rate the sustainability of infrastructure projects in a broad range of sectors, including: Energy, Water, Waste, Transportation, Landscape, Communications and IT.
Geographic Scope	North America
Transaction Volume	Despite relatively recent release, a large number of people have been trained in the Envision rating system, and 1,500 have received the "Envision Sustainability Professionals" credential. To date, only two projects (with six more in the pipeline) have received third-party audited "awards" from ISI.
Standards Content	The rating system content is organized around four stages of project development and operations: 1 – Exploration and Testing. A set of yes/no questions to determine at early stage if the project is likely to address various aspects of sustainability. 2 – Assessment and Recognition. The core of the current Envision Best Practices. Within this stage, four phases that are assessed, which track the chronological lifecycle stages of a project: Phase 1: Planning and Design; Phase 2: Construction; Phase 3: Operations and Maintenance; Phase 4: Deconstruction and Decommissioning 3 – Operational Imperatives. The practices for this stage have not yet been developed. When completed, they will support the ability to do an in-depth audit of existing project sustainability (as opposed to new projects). 4 – Decision Support. This stage not yet developed. It will include the ability to link Envision rating system with existing industry assessment tools.
Standards Examples	Water Related: Protect fresh water availability, reduce potable water consumption, monitor water systems, protect wetlands and surface water, protect floodplain functions, manage storm water, maintain wetlands.
Verification Model	• Self-assessment and third-party certified, with multiple levels of performance awarded: Bronze, Silver, Gold and Platinum • Adoption Process: Verification starts with creation of a "project" in Envision on-line database. There are scoring sheets for five Sections of the system. Scorer uses Guidance Manual to do scoring. For third-party verification, project is reviewed by Envision "Verifier" before score is awarded.
Information	http://www.sustainableinfrastructure.org

Appendix A:
Additional Water Standard-Setting Initiatives

Our initial search for standard-setting efforts identified 16 potential candidates, from which we selected eight for close examination. The table below describes the eight initiatives we set aside. In one case, AquaRating, there was not enough publicly available information, since the standard is still under development. Other cases did not appear to offer a comprehensive approach to sustainable water management or were part of a broader sustainability effort with a relatively narrow focus on water, and therefore did not seem to make a potentially important contribution to the practice field of sustainable water management.

Initiative	Description	Targeted Users
AquaRating www.aquarating.org	Under development by the International Water Association and the Inter-American Development Bank. Global use; weighted standards; third-party certification.	Water and wastewater utilities
Carbon Disclosure Project (CDP) Water Reporting https://www.cdp.net/en-US/Respond/Pages/cdp-water-disclosure.aspx	Annual voluntary responses to a common questionnaire from large corporations worldwide that are members of CDP.	Corporate water users
Global Reporting Initiative https://www.globalreporting.org/Pages/default.aspx	The Global Reporting Initiative (GRI) is a leading organization in the sustainability field. GRI promotes the use of sustainability reporting as a way for organizations to become more sustainable and contribute to sustainable development.	Government, private, and not for profit facilities
International Organization for Standardization (ISO-9000, 14001, 50001, 24510) http://www.iso.org/iso/home/about.htm	ISO develops International Standards. Founded in 1947, has published more than 19,500 International Standards covering almost all aspects of technology and business.	Corporate water users
LEED Green Building Rating System http://www.usgbc.org/articles/new-ways-save-water-leed-v4	For facilities, includes a set of standards for reduced water use, such as use of alternative on-site sources of water, no potable water use for landscaping, and reduced generation of wastewater. Water efficiency credits promote smarter use of water, inside and out, to reduce potable water consumption. A LEED certified building averages 30% less water than a conventional building.	Government, private, and not for profit facilities can all apply, pay the certification fee, and be certified LEED, silver, gold, or platinum
Star Communities Index http://www.starcommunities.org	The STAR Community Rating System advances community priorities across the three pillars of sustainability: economy, environment, and society. By integrating strategies across multiple goals, greater benefits are delivered for the resources invested. In the water category, the stated purpose is to protect and restore the biological, chemical, and hydrological integrity of water in the natural	U.S. communities

	environment.	
Sustainability Accounting Standards Board http://www.sasb.org/standards/our-process/	SASB is a new organization that began in 2011. It is setting the sustainability standards for 88 industry sectors. It plans to begin working on the utility sector (Veolia-type companies but not municipal utilities) in late 2014. Sets standards around social, environmental and governance issues, with focus on publicly traded companies.	Investors of publicly traded companies.
US Environmental Protection Agency-Environmental Management System http://water.epa.gov/learn/training/wwoperatortraining/index2.cfm	An Environmental Management System (EMS) is a framework that helps a company achieve its environmental goals through consistent control of its operations. The assumption is that this increased control will improve the environmental performance of the company. The EMS itself does not dictate a level of environmental performance that must be achieved; each company's EMS is tailored to the company's business and goals. EPA provides training on developing an EMS.	Wastewater facility operators and managers

Appendix B:
Example of Scorecard for Sustainable Municipal Water Management

City of St. Catharines
2013 Report
Milestones and Indicators

Great Lakes & St. Lawrence Cities Initiative
Cities Transforming Toward Sustainability (CITTS)
Sustainable Municipal Water Management Framework (SMWM)

Principle	Milestone	Trends	Comments
WATER CONSERVATION AND EFFICIENCY	1.1: Promote Water Conservation		Total water consumption has decreased by 27% since 2003 (10-year period).
	1.2: Install Water Meters		St. Catharines is fully metered and has been since the 1960's.
	1.3a: Set the Right Price		The Water System Financial Plan's objective when setting the water rates is to be self-sustaining.
	1.4b: Minimize Water Loss		None-revenue water is 11% of total consumption (10-year period).
	1.5: Increase Water Reuse and Recycling		Not measured.
SHARED WATER STEWARDSHIP	2.1: Raise Public Awareness and Engage the Public		The City completed 60 interactive presentations at local schools and reached 2,048 students (2013).
	2.2: Public Reporting on Municipal Water Performance		In 2013 reports include the Annual Drinking Water Report, Annual Infrastructure Reports and Asset Management Report.
SHORELINE AND WATERWAYS RESTORATION SHORELINES, WATERWAYS	3.1: Protect and Restore Shorelines/Riparian Corridors and Control Erosion		Approximately 75% of the Lake Ontario shoreline is protected, this includes the urban and rural areas.
	3.2: Increase Public Access to Shorelines, Riverbanks and Waterfronts		Over 81% of the Lake Ontario shoreline has public access, this does not include the rural areas (urban only).
	3.3: Protect Habitats and Biodiversity		More than 275 hectares of Areas of Natural and Scientific Interest (ANSI) are protected in the Official Plan
WATER POLLUTION PREVENTION	4.1: Prevent Pollutants from Entering the Sewage Collection System		Not applicable. Wastewater treatment is performed by the Region of Niagara.
	4.2: Reduce Pollutants from Wastewater Treatment Plant Effluent		Not applicable. Wastewater treatment is performed by the Region of Niagara.
	4.3: Reduce Stormwater Entering Waterways		Recent improvements include the installation of oil/grit separators, a permeable pavement pilot site and better use of road salt.
	4.4: Monitor Waterways and Sources of Pollution		St. Catharines has an extensive monitoring program which includes a rain gauge network, sewer flow monitors and staff who collect samples from Lake Ontario, local watercourses and sewers. Through the Niagara Water Strategy St. Catharines also shares data and information with its partners including the Region of Niagara, Ministry of the Environment, University researchers and the Niagara Peninsula Conservation Authority.
	4.5: Improve Beach Quality		Not applicable. Beach monitoring is performed by the Region of Niagara
	4.6: Reduce Sodium Chloride Entering Waterways		A Road Salt Management Plan was approved by Council in 2008.
WATER PROTECTION PLANNING	5.1: Adopt Council-endorsed Commitment to Sustainable Water Management		The Integrated Community Strategic Plan (ICSP) identified Water Protection and Conservation as important objectives that must be met in order for St. Catharines to be sustainable. Also Council approved participating in the GLSLCI Green CITTS Program.
	5.2: Integrate Water Policies into Land Use Plan		The Garden City Plan (Official Plan) has a strong emphasis on protecting water resources.
	5.3: Collaborate on a Watershed-Scale		A watershed plan is in place already for the 12 Mile Creek Watershed (encompassing the majority of St. Catharines).
	5.4: Adopt Green Infrastructure		Several Pilot projects including a permeable pavement pilot site, green roof at the Museum and LEEDS designs at new City buildings. As well the Official Plan specifically requires Stormwater Management Plans to consider alternative approaches to traditional stormwater management such as Low Impact Development (i.e. Green Infrastructure) practices.
WATER PREPAREDNESS FOR CLIMATE CHANGE	6.1: Conduct a Vulnerability Assessment		The ICSP identified Climate Change as one of the major challenges the City will face in the future.
	6.2: Address Vulnerability		The Emergency Plan covers natural disasters and public health emergencies.
	6.3: Reduce Greenhouse Gas Emissions		St. Catharines has prepared an annual electricity and greenhouse gas emission report and is developing a five-year energy conservation and demand management plan. Some of the actions are not applicable (e.g. co-generation) as wastewater treatment is performed by the Region of Niagara.

Continuous Improvement Key Indicators	
Significant Progress	
Stability or Moderate Progress	
Decline	
Not Measured or Not applicable (Indicator is not within St. Catharines jurisdiction)	

Appendix C:
Synthesis of Goals for Sustainable Water Systems

In our 2013 report, "Accelerating the Development of Sustainable Water Markets in the U.S," we reviewed various efforts to define sustainable water management and offered this synthesis of five characteristics:[10]

Efficient	The market/system values water conservation and using the least amount of water possible for the desired use.
Resilient	The market/system can withstand variations in water availability and quality caused by aging of infrastructure, population growth, climate change, and other factors.
Regenerative	The market/system manages water use to maintain the natural system's "water budget" at its regenerative capacity.
Clean and Safe	The market/system delivers water that is safe for its intended use and meets government/scientific standards.
Equitable	The market/system provides all segments of the population with fair and equal access to water supply and services needed for health and life, while offering non-discriminatory opportunities to use water for economic gain.

These orienting generalizations, we continued, are the sort of vision and values upon which sustainable-water movements and advocacy are being built, but they fall far short of providing performance metrics that reveal how well water markets and systems achieve desired outcomes. Neither surprise nor criticism, the U.S. is in an early stage when it comes to the development of sustainable water markets/systems.

[10] See page 17, http://water.in4c.net/files/Accelerating-Development-of-U.S.-Sustainable-Water-Markets-Report-1.1.13.pdf.

Appendix D:
Project Interviews and Feedback Sources

We thank the following people for providing their time, information, and points of view.

- Gary Belan, Senior Director and Co-Lead, Clean Water Supply Program, American Rivers
- Scott Bernstein, President, Center for Neighborhood Technology
- Bill Bertera, President and CEO, Institute for Sustainable Infrastructure
- Drew Beckwith, Water Policy Manager, Western Resource Advocates
- Lynn Broaddus, Director, Environment Programs, The Johnson Foundation at Wingspread
- Nicola Crawhall, Deputy Director, Great Lakes and St Lawrence Cities Initiative
- Mary Ann Dickenson, President and CEO, Alliance for Water Efficiency
- Lisa Wojnarowski Downes, North America Regional Initiative Coordinator, The Nature Conservancy
- Paul Fleming, Manager, Climate Resiliency Group, Seattle Public Utilities
- Adam Freed, Director, Global Securing Water, The Nature Conservancy
- Bertha Goldenberg, Assistant Director, Miami-Dade Water and Sewer Department
- Jeremy Hayes, Chief Strategist for State and Local Initiatives, Green For All
- Rich Juricich, Principal Water Resources Engineer, California Department of Water Resources
- Laurna Kaatz, Climate Scientist, Denver Water
- Abdul Khan, Supervising Water Resources Engineer, California Department of Water Resources
- Jeffrey Lape, Deputy Director, Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency
- Sharlene Leurig, Director, Water Program, Ceres
- Barry Liner, Director, Water Science & Engineering Center, Water Environment Federation
- Jim McCabe, Senior Director, Standards Facilitation, American National Standards Institute
- Alexis Morgan, Lead Advisor, Water Stewardship & Standards, World Wildlife Fund
- Mike Myatt, Program Manager, California Water Foundation
- Jeffrey Odefey, Director, Clean Water Supply Programs, American Rivers
- David Rankin, Vice President and Director of Programs, Great Lakes Protection Fund
- Matt Reis, Chief Technical Officer, Water Environment Federation
- Alvaro Sanchez, Green Infrastructure Strategist and Urban Planner (previously with Green For All)
- Lester Snow, Executive Director, California Water Foundation
- Douglas Yoder, Deputy Director, Miami-Dade Water and Sewer Department

And the Urban Sustainability Directors Urban Water Learning Group, consisting of local government sustainability directors in Ann Arbor, Boston, Cincinnati, Denver, Dubuque, El Paso, Iowa City, Knoxville, Los Angeles, Miami, Milwaukee, Santa Monica, Tucson, and Washington D.C.