Chapter 1

Innovation Among Public Sector Water and Wastewater Systems

The Editors

There are some who believe that the spark of innovation requires the friction of competition to ignite. To the extent that this holds true, there is no question that water and wastewater utilities across North America rose to the competitive challenge of privatization in the 1990s and responded with a wave of creative and successful internal change.

In the mid- to late 1990s, privatization appeared to be ascendant among U.S. water and wastewater utilities. Major international corporations were investing heavily in contract operations within the industry, the federal government modified tax regulations in 1997 to eliminate provisions previously discouraging long-term contracts, and some privatization analysts that same year were forecasting continued growth in operations and management contracting of 20 to 30 percent annually for the next five years to come [1]. In the following year, the City of Atlanta entered into a 20-year agreement to manage its water system, the largest such U.S. contract yet.

Indeed, in many cases, for-profit water and wastewater utilities and contract operators have proven to be industry leaders. International, investor-owned utilities were among the early users of ozone for drinking water treatment, for example, while privatized utilities in the United Kingdom have led in developing improved approaches to reducing system

water loss. In North America, many private utilities have also demonstrated strong track records for positive customer relations and effective infrastructure maintenance.

Nonetheless, in the new millennium, the aggressive drive to privatize has abated. While many investor-owned water utilities have continued to grow, and many contract operators have been retained and renewed by satisfied customers, a variety of forces have been at work to slow the push toward the use of private firms. These factors include the following: a period of reduced municipal budget pressure in the late 1990s, increased concern about the risks of change, and public employee union opposition. Also significant, municipal utility managers and workers alike adopted new and innovative approaches to service delivery and cost containment that have narrowed competitive gaps.

As a result, the great majority of U.S. citizens continue to receive their water and wastewater services from municipal systems. As of 2004, few major cities, if any, are actively considering a shift from public to private operation for core utility operations—and Atlanta canceled its contract for private operation of its water system in early 2003, bringing service delivery back in-house.

This slowdown in privatizing systems, however, does not mean that water and wastewater utilities have simply stayed the same. Across the industry, leading professional associations have developed active programs across this period to improve the quality and efficiency of service delivery—such as the American Water Works Association (AWWA) QualServe and Partnership for Safe Water initiatives. Likewise, individual utilities have not only incorporated best practices drawn from private sector competitors (including the outsourcing of selected, noncore services), but have also developed and shared new ideas of their own. Many of these innovative ideas and approaches—both adapted and original—are highlighted throughout this volume.

Alongside competition as an explanation for innovation, another perspective is offered by the novelist John Updike: "Any activity becomes creative when the doer cares about doing it right, or doing it better." In the case of public water and wastewater systems, the industry's long and strong tradition of commitment to excellence is unquestionable. Achieving reduced drinking water turbidity or improved sludge solids content are activities not widely viewed to be glamorous by the general public. Nonetheless, these pursuits involve vital services—and do inspire real creativity and innovation among the industry professionals who care about them.

1.1 KEY DRIVERS OF CHANGE

At the same time, management innovation requires an ability to anticipate and respond to major external changes. Among water and wastewater utilities, a further series of specific and evolving external factors is stirring the wave of change, and effective utility managers are surfing this wave ahead.

- Environmental standards continue to increase. A new contaminant candidate list (CCL) is expected to be regulated in 2008 under the Safe Drinking Water Act and every five years thereafter. Among wastewater utilities, strategies to manage total maximum daily load (TMDL) limitations on pollution in the nation's waterways, as well as wet-weather pollution controls for combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs) are projected to require hundreds of billions of dollars of capital investment [2].
- In many communities, older generations of infrastructure are nearing the end of their life cycles, requiring thoughtful planning for replacement and renewal. At the same time, many regions are bumping up against the limitations of massive infrastructure alone in tackling the next generation of environmental improvement challenges. Increasingly, the greatest return for the next "environmental dollar" invested is found with non-point sources—in turn, requiring a new approach to watershed-based planning and problem solving that will often cross established service territory and political boundaries.
- Across all of society, the information age has largely supplanted the industrial age, bringing "disruptive technologies" that can radically restructure how work gets done and how services are delivered. Objects can now be "smart"—from automatic water meters to bar-coded inventory to supervisory control and data acquisition (SCADA) systems—transmitting information, and even taking action, by themselves. Asset management systems, geographic information systems (GIS), and system models all allow for dramatically improved planning. At the same time, human beings communicate in new and better ways—using the Internet, improved wireless communications, handheld digital assistants, enhanced call centers, and other forms of networks and connections well beyond those available to prior generations.

- Reflecting similar changes among the external organizations partnering with the water and wastewater sector, a broad new range of options has emerged across the marketplaces serving utilities. In the financial markets so important to infrastructure-intensive utilities, for example, new and more complex financing tools—such as interest rate swaps—have become increasingly widespread in their application. At the same time, the providers of necessary capital have become more sophisticated with regard to the level of information they expect to safeguard their investments. Likewise, across a broad range of non-core functions, as has occurred in many industries, there are now many more alternatives for utilities to subcontract. Ancillary functions such as billing and collections, facility maintenance, security, information technology management, and "back-office" human resources and financial support have all been outsourced by many organizations.
- Broad demographic changes are also affecting the nature of utility customer bases and workforces. Since the U.S. Environmental Protection Agency was created in 1970—launching a period when much current water and wastewater infrastructure was planned—according to 2000 U.S. Census data, the nation's population increased by 38.5 percent. Over these three decades, the combined West and South regions supplanted the combined Northeast and Midwest as home to the largest population share. For many utilities, these changes have brought growing demands to provide supply [3]. In places such as Charlotte (124.0 percent), Austin (160.7 percent), Colorado Springs (166.3 percent), and Las Vegas (280.4 percent), the rate of population growth has been even sharper, often generating tremendous pressure to develop new capacity.
- At the same time, cities in other regions saw population declines that left a smaller, and generally less affluent, customer base to support renewal and replacement of the increasingly aging infrastructure already in place. Examples include Philadelphia (22.1 percent population decline), Baltimore (28.1 percent), Cleveland (36.3 percent), and Detroit (37.1 percent). At the extremes of the demographic change spectrum, as of 1970, Mesa, Arizona, was a city of just 63,049, while St. Louis was nearly 10 times as large with 622,236 residents. By 2000, however, Mesa's new population of 396,375 had moved ahead of St. Louis, which had fallen to

348,189. Obviously enough, such demographic shifts (528.7 percent growth in Mesa, 44.0 percent decline in St. Louis) create very different types of challenges, but neither set of circumstances allows any room for maintaining a status quo approach.

- Over this same three-decade period, U.S. demographics have also changed in other ways. The nation, for example, has become better educated, with the percentage of high school graduates among persons 25 years old and over increasing from 52.3 percent in 1970 to 84.1 percent by 2000, and the percentage of college graduates more than doubling from 10.7 percent to 25.6 percent. Concurrently, the nation has also become increasingly diverse—with the census category of races other than black or white growing nearly tenfold from 1.4 percent in 1970 to 12.5 percent in 2000. For utilities, such changes imply a different type of communication with customers, who will generally hold higher expectations for better information well beyond the "silent service" standards of decades past. At the same time—in a growing number of cases—customers will rely on different media outlets and information networks, at times in a language other than English. Likewise, a utility workforce will generally bring new skills, capacity, and expectations that call for a changing management approach.
- In the aftermath of the September 11, 2001, terrorist attacks on the United States, utility leaders must also manage against newly recognized threats. Maintaining the security of drinking water supplies, key infrastructure, computer networks, and chemical stores has taken on true urgency. Public—and even employee—access to key facilities and information must be viewed differently. Likewise, contingency planning now involves a different type and level of preparation, and is subject to federal requirements to complete vulnerability assessments and emergency plans.

1.2 LESSONS FROM ACROSS THE INDUSTRY

A central message of this volume is the need for utility managers to step back from time to time in order to identify such ongoing trends that continue to require attention, as well as to scan for emerging trends that will require new solutions. The examples in this book provide ideas for meet-

ing such challenges, and can be used as a starting point for considering the unique issues facing—or soon to face—the reader's utility:

- Chapter 2 by James A. Parrott and Sharma L. Young provides a strong overview of how many of the challenges outlined previously are impacting one utility, the Butler County (Ohio) Department of Environmental Services, and how Parrott, Young, and their colleagues are responding with a range of innovative strategies.
- Chapters 3 and 4 look at standards for measuring success as utilities innovate and improve. In their review of performance measures within the industry, Nora F.C. Freeman and Gregory C. Heitzman of the Louisville Water Company detail the increasing use of standardized metrics as guideposts for change. Next, Dean Kaplan, a public sector financial consultant, assesses progress toward development of an accreditation system to promote progress toward excellence in both the United States and Canada, with a particular focus on the potential quantifiable benefits of such an initiative.
- Chapters 5 and 6 further evaluate financial concerns and innovations. Michael Nadol, financial consultant and former utility CFO, reviews the risks and potential returns of contemporary financing tools in the capital-intensive water and wastewater business. Then, Richard P. Larkin, an experienced Wall Street analyst, outlines credit-rating agency thinking about management practices that matter.
- With infrastructure needs driving so much of utility demands for capital, Chapters 7, 8, and 9 turn to innovations in planning for future investments. Brian G. Marengo and Christopher S. Crockett of Philadelphia's Office of Watersheds outline new regional partnership approaches toward achieving environmental improvement that transcend traditional service territories. Next, Cyrus Q. Toosi details the methodologies used by Metro Water Services of Nashville-Davidson for managing main rehabilitation and replacement planning thoughtfully and cost-effectively. In Chapter 9, Darla Inglis describes the pioneering efforts of the Seattle Public Utility to develop a natural drainage system design to mitigate the adverse impacts of stormwater on Seattle's aquatic environments through retrofit and redevelopment of the

streets in a manner that mimics predevelopment hydrologic function and improves water quality.

- Almost all of the chapters noted address the importance of customer communications within other, broader strategies, and Chapters 10, 11, and 12 explore current tools in this area in greater detail. Communications executive Linda J. McAleer outlines best practices in the use of customer surveys and focus groups among utilities. Next, Robert R. Williams of the Toledo Department of Public Utilities provides a frontline perspective on effective coordination with citizen advisory committees, while Adam J. Kramer contributes a parallel view from the Minneapolis Water Works regarding the importance of developing a combined technical and political approach of moving forward to adopt innovative membrane treatment technology.
- Chapters 13 and 14 then turn more directly to technology concerns. Information technology expert Susan P. Lior provides an overview of GIS and strategies for gaining the greatest return from investment in this tool. Next, James Bolno describes the experience of the Philadelphia Water Department five years after implementation of the industry's first large-scale automatic meter reading (AMR) initiative, highlighting lessons learned in a highly successful technology change featuring a significant outsourcing component.
- Chapters 15 and 16 by Chris Lippe, Charles Schoening, Daniel Baker, and David Harris, and Jos Bell and Ron Butcher, respectively, point to new developments in computer applications for water utility management. Lippe and his co-authors describe the Austin Water Utility's eCAPRIS CIP Management System. It is a comprehensive tool for planning, budgeting, procuring, and tracking capital projects that can be accessed through a Web browser and is integrated with the City's other information systems. Bell and Butcher explain how Central Arkansas Water formed by merging companies, converted their data systems into an innovative geodatabase system.
- Finally, Chapters 17, 18, and 19 focus on management strategies. At the government-wide level, Matthew D. Gallagher outlines Baltimore's acclaimed CitiStat management-by-measurement program, with a focus on its application to the City's water and

sewer utility. Then, back to the frontlines, Michele Hill and Cheryl Cronin detail how the Fort Wayne Water Pollution Control Plant applied a citywide "Six Sigma" methodology to improve operations. Finally, Randall A. Monteith of the City of Akron Public Utility Bureau details the successful effort to reorganize an organization that had a top-down command-and-control type of culture to one that is team-based.

1.3 NO ONE SIZE FITS ALL

As outlined previously, multiple and diverse approaches toward public sector management innovation are described within this volume. In each case, managers chose an approach that worked for them, and continued to refine it. Rarely is there a single "right" answer to any challenge facing water and wastewater utilities; what is important is to begin, to try, to apply, to evaluate, to learn, and (hopefully, more often than not) to improve—and then to begin again.

In his chapter on the development of a new treatment facility for the Minneapolis Water Works, Adam Kramer notes that "When the word 'innovative' is mentioned, it is generally associated with 'success.' Alternate methods that are not successful are thought not to be innovative." Yet, as Kramer implies, innovative also means going where no one has gone before. It is unlikely that new and different yet successful methods will be developed without a few wrong turns, if not spectacular failures.

Traditionally, however, water and wastewater utilities have been particularly risk-averse—and often for good reason, given extensive environmental regulation and the essential services being provided. As rating agency Moody's has written, "[b]oth the water and wastewater sectors are mature and are very slow to innovate, often relying on traditional designs that have been operationally risk-free and that more easily obtain regulatory approvals." [4] Changing times, however, demand continuous forward progress to become more efficient and effective. Prudence cannot justify paralysis.

The editors hold no illusions about the industry's ability to eliminate every failure as water and wastewater managers attempt to meet their goals for the future. In fact, we hope to encourage more trials despite such inevitable errors. By providing examples of success, our intent is to add the flow of information for those who, to paraphrase Updike, care

about delivering essential services both right and better—and, as a result, will continue to innovate.

ENDNOTES

[1] Reason Public Policy Institute, "Privatization 1997: Eleventh Annual Report on Privatization," 1997.
[2] Fitch Ratings, "Water and Sewer Revenue Bond Guidelines," April 13, 2004.
[3] Standard & Poor's, "U.S. Water-Sewer Utilities Awash in Supply Issues," January 22, 2003.
[4] Moody's Investors Service, "Analytical Framework for Water and Sewer System Ratings," August 1999.