Privatization of Water Services in the United States: An Assessment of Issues and Experience

Committee on Privatization of Water Services in the United States, National Research Council

ISBN: 0-309-51208-5, 164 pages, 6 x 9, (2002)

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Water Science and Technology Board

Division on Life and Earth Studies

National Research Council

NATIONAL ACADEMY PRESS
Washington, D.C.

NATIONAL ACADEMY PRESS 2101 Constitution Avenue, N.W. Washington, D.C. 20418

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Support for this project was provided by the American Water Works Company, Inc., California Water Service Company, Severn Trent Environmental Services, the U.S. Environmental Protection Agency under Contract No. X-82829401, and the University of California under Award No. SA6138.

Library of Congress Cataloging-in-Publication Data

Privatization of water services in the United States : an assessment of issues and experience / Committee on Privatization of Water Services in the United States Water Science and Technology Board Division on Life and Earth Studies.
p. cm.
ISBN 0-309-07444-4
1. Water utilities—United States. 2. Water-supply—Economic aspects—United States. 3. Sewage disposal—Economic aspects—United States. 4. Privatization—United States. I. National Research Council (U.S.). Committee on Privatization of Water Services in the United States.
HD4461 .P75 2002
363.6′1—dc21

2002008161

Privatization of Water Services in the United States: An Assessment of Issues and Experience is available from the National Academy Press, 2101 Constitution Avenue, NW, Box 285, Washington, DC 20055 (1-800-624-6242 or 202-334-3313 in the Washington metropolitan area; Internet: http//www.nap.edu).

Printed in the United States of America.

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WILLIAM N. STASIUK, New York City Department of Environmental Protection, Kingston, New York

Staff

JEFFREY W. JACOBS, Study Director
ELLEN A. DE GUZMAN, Research Associate

Preface

There has been widespread interest in "privatizing" various functions and activities in both the public and private sectors in the United States at least since the early 1980s. In the water services sector, privatization has taken many forms, from meter reading and accounting and billing, to operation and maintenance of core water supply and wastewater facilities, and in some instances the sale of system assets. Early water utilities in the United States were private companies, but urban growth eventually prompted many cities to develop publicly owned water systems. Since World War I, public ownership has been stimulated by various financial arrangements that reduce the cost of capital for public water systems.

Water utilities in the United States today often face a combination of financial, regulatory, and operational challenges. Much of the nation's water supply, treatment, and distribution infrastructure was built one hundred or more years ago. Much of this infrastructure is today in need of repair or replacement, and population growth in many areas requires water infrastructure expansion. Decisions about allocating resources for water infrastructure replacement and expansion are made in a context of limited or shrinking city budgets, competing demands, and increasingly stringent water quality regulations. Expenditures to adequately maintain our essential, but unglamorous, water infrastructure system are thus often inadequate. As a result, there is a large backlog of deferred maintenance on the nation's water infrastructure. Local officials are interested in options that promise to relieve these pressures.

Since the middle and late 1980s, new actors have entered the U.S. water utility scene in the form of large international firms that specialize in water utility management and ownership. These firms have been able to offer technical help to smaller systems, and lower costs and new capital supplies to larger systems. Proposals from these firms have often been politically attractive by virtue of promises to minimize price increases, expedite long-delayed maintenance, and provide capital for system expansion and meeting increasing water quality standards. An important consequence of this availability of private alternatives has been improved performance of many public water utilities.

This study springs from strategic planning sessions of the National Research Council's Water Science and Technology Board (WSTB). During the late 1990s, the WSTB noted a growing interest in the prospects for water services privatization in the United States. The WSTB noted that some studies of water services privatization had been conducted, but that a comprehensive review that characterizes many NRC studies would be timely and useful. In an effort to provide an overview of the key issues in privatization—including fiscal, policy, management, regulatory, water quality, and environmental issues—the WSTB drafted a study proposal and shared it with several prospective sponsors. Given the various public-private relations that characterize U.S. water utility operations, it was fitting that a mix of public and private organizations stepped forth to provide funding for the study. The committee and the WSTB thank the following sponsors for their foresight and courage in granting the committee license to provide an independent review of the key issues: American Water Works Company, Inc., California Water Service Company, Severn Trent Environmental Services, the U.S. Environmental Protection Agency, and the University of California. The committee itself was comprised of a range of water service industry experts, public and private managers, water industry consultants, officials of water industry associations, government officials, journalists, and academics.

This committee's report was nearing its conclusion when the tragedy of September 11, 2001 occurred. Those events may have changed the environment for decisions about privatization and appropriate public-private balance. Those events certainly raised security concerns about our water utilities, a topic not covered by the committee. Nonetheless, the report provides useful background information for both public and private officials in the water utility sector.

The report was reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise in accordance with the procedures approved by the NRC's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as pos-

sible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report: John Briscoe, The World Bank; Peter Gleick, Pacific Institute; Rebecca Parkin, George Washington University; Paul Seidenstat, Temple University; and Rhodes Trussell, Montgomery Watson, Inc.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. The review of this report was overseen by Patrick Adkins of the Alcoa Corporation. Appointed by the National Research Council, he was responsible for making certain that an independent examination of the report was carefully carried out in accordance with the institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

The committee wishes to thank the many experts who spoke to the committee during its early meetings and who provided logistic support, information, data, and insightful case studies. Finally but certainly not least, the committee thanks Dr. Jeffrey Jacobs of the Water Science and Technology Board staff for his tireless editing and unwavering insistence on clarity and balance throughout our extensive discussions and the writing process—all with good humor whatever the pressure from reviewers or the committee chair. Ms. Ellen De Guzman provided excellent arrangements for all our meetings and endless, highly competent assistance in formatting and editing the chapters and tables, figures and all. Ms. Rhonda Bitterli also provided excellent editorial advice.

Charles W. (Chuck) Howe
Chair

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Executive Summary

Although many U.S. water utilities are today publicly owned and operated, many U.S. water utilities were initially private ventures. But interest in the prospects for an increased role for private sector participation in water supply and wastewater services in the United States expanded during the 1990s as economic, fiscal, regulatory, and environmental factors led city officials across the United States to consider privatizing parts or all of their water supply and wastewater systems.

The term "privatization" covers a wide spectrum of water utility operations, management, and ownership arrangements. The four major classes of privatization options can be characterized as (1) private provision of various services and supplies such as laboratory work, meter reading, and supplying chemicals; (2) private contracting for water utility plant operation and maintenance (both 1 and 2 are often referred to as "outsourcing"); (3) negotiating a contract with a private firm for the design, construction, and operation of new facilities (this option is referred to as design, build, and operate, or DBO); and (4) outright sale of water utility assets to a private company. In the United States, the contracting of management and operations to a private provider (outsourcing) has been more common than the sale of utility assets to private companies. No major U.S. city has sold its utility assets in recent decades, although some smaller water utilities have done so.

Because of variations in political, demographic, economic, and physical circumstances, no single model of public or private water services (drinking water and wastewater treatment) delivery best fits all situa-

tions. Although there is no inherent reason why either the public or private sector should be the preferred sector for delivering water services, public and private sector operations often face different constraints and incentives. For example, on one hand, privately owned and operated water utilities may be less tied to local politics than publicly owned utilities and they may have greater flexibility to make staffing changes. On the other hand, public systems may be more responsive to public input and more amenable to conservation objectives. The issues are complicated and dynamic, and vary greatly across communities and regions.

Public and private water utility management organizations are guided by different sets of incentives. Some of these differ between the public and private sector, while some incentives are common in both. Whatever the mix, public and private utilities operate best with clear lines of authority and responsibility, with technical competence, and with the ability to make long-term investments. Given appropriate incentives, authorities, and responsibilities, water utility privatization will represent a viable option to public ownership or operations. But according to industry financial consultant George Raftelis, "Privatization is not an all-encompassing panacea for water and wastewater facility financing and construction. Rather, it is one of several approaches to solve the capital infrastructure problems facing local government utilities" (Raftelis, 1989).

This report reviews key issues and experience with water services privatization in the United States and examines privatization's economic, fiscal, regulatory, and other implications. It is intended to help the reader make informed judgments about which situations represent good candidates for privatization and which do not, and should therefore be of interest to water utility managers, urban government officials, and concerned citizen groups.

STRUCTURE OF THE WATER AND WASTEWATER INDUSTRY

Historically, water services were initially delivered by private providers in many cities in the United States, such as Boston, New York, and Philadelphia. As these and other larger U.S. cities grew, water services became a core function of local government. This trend accelerated largely because of a legislative change after World War I, when Congress exempted interest payments on municipal bonds from federal income tax. This assured that municipalities could issue bonds at lower interest rates than those for taxable bonds.

The U.S. water industry today is highly diversified. As of 1999, there were nearly 54,000 community water systems in the United States (the U.S. Environmental Protection Agency defines community water systems as systems serving more than 25 people, regardless of ownership). The

vast majority of these systems serve small populations. In fact, 85 percent of U.S. community water systems serve only 10 percent of the population served by community water systems.

Investor-owned water supply utilities (i.e., "private utilities") accounted for about 14 percent of total water revenues and for about 11 percent of total water system assets in the United States in 1995. Investor ownership of wastewater utilities is more limited than investor ownership of water supply utilities, in part because of extensive federal funding of wastewater treatment plants that began after World War II. Investor-owned water supply and wastewater utilities are subject to state economic regulation that oversees rates charged, evaluates infrastructure investments, and controls profits. In contrast, private contract arrangements under public ownership are not subject to this regulation. The private sector has favored public-private relationships that are not subject to state economic regulation. According to the National Association of Water Companies (NAWC), the proportion of water services in the United States provided by private water companies, whether measured by customers served or volume of water handled, has remained close to 15 percent since World War II (NAWC, 1999).

FACTORS DRIVING WATER SERVICES PRIVATIZATION

The magnitude of investments that will be required to continue to provide high-quality, reliable drinking water and wastewater treatment services to the nation is huge. A recent report from the American Water Works Association (AWWA) estimated the necessary investments in replacement of the nation's water infrastructure to be $250 billion over the next 30 years (AWWA, 2001a; this estimate is based on a water utility survey). Public officials with limited financial and technical resources are interested in alternatives that may help meet these needs.

Customers increasingly demand high-quality, reliable drinking water and wastewater treatment service. Surveys have indicated that customers are often willing to pay more for high quality water and reliable service. Water bonds usually pass at elections, another indication of the public's willingness to pay for high-quality services.

The Safe Drinking Water Act of 1974 has been a major factor in initiating changes in utility management and operations. With standards becoming increasingly stringent (illustrated by EPA's 2001 arsenic standard), it has become more difficult, especially for small and medium-sized utilities, to comply with standards at acceptable cost levels. Small to medium-sized water utilities (those generally serving fewer than 50,000 people) face the greatest difficulties in meeting the full range of technical, business, and infrastructure needs and compliance with in-

creasingly strict drinking water and wastewater effluent standards. Approximately 95 percent of the public water systems in the United States serve fewer than 10,000 people. Private utilities and larger public utilities typically have adequate resources and more advanced technical capabilities than smaller public utilities. Owing to economies of scale, private entities are often able to apply centralized scientific, technical, and business expertise to serve smaller, widely spaced systems. Likewise, some larger public water utilities, like the city of Cincinnati, increasingly assist in the provision of management services, procurement, and the provision of reliable, high-quality water supplies to smaller surrounding communities.

For smaller communities, "regionalization"—consolidation of water utility management and operations across several communities—can achieve scale economies and performance improvements. Regionalization includes the combination of utility organizations, wholesale service arrangements, cooperative agreements, and satellite management of multiple systems, and can be achieved through both private and public sector arrangements. The primary barriers to regionalization appear to be institutional and political, as policymaking institutions (including laws, regulations, and decision makers) may not favor water system consolidation in the interests of maintaining some degree of local control over personnel, management, and operations decisions.

A major impact of increasing competition from the private sector has been to stimulate public water agencies to engage in self-improvement programs such as establishing performance benchmarks, modifying work practices, implementing staff education and certification improvement, and accelerating investments in new technologies. Flexible workforce practices are particularly important; many systems that convert to privatized operations reduce costs by reducing the size of their workforces through changes in work practices and by broadening their employees' range of skills. These practices are also increasingly utilized by public utilities through pre-arranged attrition schedules that protect employee rights. "Benchmarking" performance against other public water utilities has become a common practice. In the long run, the resultant widespread improvements in public water utility performance may constitute the most significant result of the presence of a privatization alternative.

KEY CONSIDERATIONS IN WATER SERVICES PRIVATIZATION

Several factors are relevant to municipalities that are considering privatization options. These include loss of some degree of control over a vital public service, uncertain control during emergencies, loss of expertise (which would make reversal of operations difficult), requirements for

adequate contract supervision, and implications for water quality, environmental values, public health, and local job security. A frequently-voiced concern is the possible contradiction between short-term profit maximization and long-term needs to protect infrastructure and water source areas.

Goals of public agencies and private contractors are different. Contracts should therefore be carefully designed and implemented to protect public interests such as protection of the local workforce, customer service, civic responsibility, and environmental stewardship. To help ensure that goals are met, the contract should specify arrangements for monitoring and enforcement. Regardless of the terms of ownership and contractual arrangements for operation, the ultimate responsibility for providing safe drinking water and wastewater treatment, and for complying with standards, rests with a public agency.

Privatization is not equivalent to competition—long-term contracts between the private sector and utility monopoly may not be subjected to ongoing competition. In contrast to contracts for operation only, privately owned utilities are accountable to state economic regulators (public utility commissions) that apply a public interest standard to the evaluation of utility investments, expenditures, rate structures, and profits. And although regulation has weaknesses and is an imperfect substitute for competition, oversight and monitoring are important to help stabilize revenues, to ensure cost recovery, and to help guarantee a reasonable return on investment.

Although private operation and management of water services may provide savings in operating budgets and capital costs, because of the bias against private operations in the United States tax code, a private operator with the same real costs as a public operator would have to charge higher rates. Investor-owned utilities that both own and manage assets must allow for depreciation and profits, while public sector rates may not reflect actual costs because of subsidies and for political reasons. Inadequate municipal accounting practices frequently make it difficult to achieve cost-based pricing. For example, the opportunity cost of the raw water itself is rarely considered in water utility accounting practices, and to do so would change the national dynamic of water pricing. The prospect of higher private rates has been a deterrent to privatization through asset transfers.

Private contractors also have concerns about competing for utility operation and management, including the uncertain profitability of the venture and longer-term potential for extension of the contract. Preparation of bids is costly and competition among the qualifying bidders can be intense. In the past, the procurement process through which requests for proposals are publicized and responses are made has varied, with result-

ant uncertainties for both municipalities and contractors. This procurement process is increasingly being standardized. Private contractors are concerned about advantages possessed by municipalities because of their ability to issue tax-free bonds, the lack of access to alternative sources of public funding, and complex regulations concerning private management of publicly funded facilities.

Public wastewater facilities were funded through federal grants during the 1960s, 1970s, and 1980s. The grant program has been replaced by state revolving funds that were initially federally funded, but that are now available only to publicly owned water and wastewater utilities. A variety of financial assistance programs that would facilitate private sector participation have been proposed, including federal matching funds combined with state appropriations and low-interest loans, but funding to date has been limited to cases of extreme community hardship. The State of California has provided some low-interest assistance to investor-owned utilities but insists that customer rates be lowered to reflect these subsidies. Expanding such loan programs would increase opportunities for private sector participation. Only recently have longer-term (up to 20 years) private operating contracts of plants financed by tax-exempt bonds been permitted.

Although a water utility's success can be partly measured in immediate terms such as cost savings, its ultimate effectiveness should be evaluated over longer time horizons, and in the context of broader social and environmental considerations such as public health and environmental stewardship. Water services privatization arrangements ideally will enhance, not detract from, compliance with environmental and public health standards.

Environmental stewardship considerations include the watersheds that provide raw water supplies. Control of land use and possible development in watershed areas are growing concerns with privatization and with foreign ownership of private water companies. Preservation and appropriate use of watershed lands should be part of an integrated water resources management approach under either public or private ownership.

In many parts of the United States, water has usually been considered a free resource, with accountable costs reflecting only the capture, transmission, treatment, and delivery functions. Nationwide recognition of the importance of environmental protection, along with rapid population growth in many regions, has increased competition between traditional and newly emerging environmental uses of water. These developments have emphasized the importance of being able to transfer raw water supplies from older and lower-value uses (primarily agriculture) to new emerging uses. Water markets that facilitate short-term loans and perma-

nent transfers of water rights, while long existing in the western United States, are playing an increasing role in effecting these transfers.

Communities are also often concerned about the implications of privatization for employment and other community values, such as aesthetics and water's cultural values. The community and the water services provider will both be better served to the extent that such issues are openly discussed when considering appropriate roles for the private sector in water services provision.

KEY FINDINGS AND CONCLUSIONS

The Committee on Privatization of Water Services in the United States reviewed a range of issues associated with public and private ownership and operations of water utilities in the United States, and lists its key findings and conclusions below:

Water services privatization takes many forms, and no one form or structure fits all situations. Alternatives range from contracting for various services to the sale of system assets. Privatization arrangements will usually be most effective when they consider the context of local values.

Pressure from large national and global water companies has motivated improved performance by public water utilities. Performance standards have improved because of the existence of private alternatives. "Benchmarking" against the performance of similar water utilities is a widely used approach. Leadership training programs, offered by both private and public agencies, have expanded.

Privatization is not the same as competition. The municipality must retain the ability to monitor performance and assume operations in case private operations fail. In the case of private ownership of utility assets, states impose regulation by a commission, but the commissions frequently do not have the resources to adequately monitor and enforce regulations. Misuse of monopoly power is a possibility, but regulatory action should be able to minimize this threat.

Not all privatization efforts are successful. Well-run and poorly-run organizations exist in both the public and the private sectors. In several cases, operating contracts have not been renewed; in some instances, longer-term contracts have been repossessed by the city before the expiration date. Some cases have resulted in litigation, while others have been resolved through negotiation.

Small to medium-sized utilities face the greatest challenges and problems and are prime candidates for availing themselves of services from either private or public organizations. These smaller utilities often lack the resources and expertise to meet today's drinking water and waste-

water treatment standards. Regionalization and consolidation of small to medium-sized utilities hold great promise for improved performance. Both are being provided by the public and the private sectors.

Customers appear to value potable water reliability and quality quite highly, and surveys have shown their willingness to pay for better services. This finding must be tempered with the observation that expressed willingness to pay may not always motivate officials to propose higher utility rates or propose the need for borrowing. Public officials are often unwilling to charge appropriate prices because of a history of underpricing and a fear of criticism.

The water services industry faces a great need for maintenance and replacement. Most of this need can be attributed to the low priority assigned to water systems in past municipal budgets. Some of these needs are also because of U.S. demographics, as increasing urban populations in some areas require additional water infrastructure.

The design-build-operate contractual arrangement and its variants have been successful in some large water service systems in the United States. An example is provided by the recent expansion of Seattle's water utility. Such arrangements encourage creative applications of advanced technology and project efficiencies.

Liberalization of federal tax laws has helped encourage private participation in the operation of publicly owned plants that were funded by public bonds or grants. Urban utilities can now enter into contracts of up to 20 years for the operation of such systems. These advantages do not extend to privately owned systems.

The Safe Drinking Water Act of 1974 has been a major factor in causing change in utility management and operations. In particular, this has pressured small to medium-sized utilities to improve their operations and/or seek private assistance.

Development on watershed lands and the protection of environmental quality around reservoirs could be relevant issues in water services privatization. Especially in the case of asset sales, there is concern about land that may be subject to development. Preservation of watershed lands that do not generate revenue may be a loss to shareholders but are often a boon to local residents and customers.

Workforce issues are important considerations in water services privatization, both as a possible source of cost savings and a focal point for public concern. Labor costs are a major component of utility costs, but there are always local concerns about maintaining traditional patterns of employment.

Continued public ownership and operation is the most likely future for the majority of water utilities. Many public water utilities are

likely to respond to the pressures of possible privatization by improving their performance, rather than privatizing part or all of their operations and ownership. Organizations are often reluctant to proactively initiate substantive changes, particularly if there is no overriding water services issue of great local concern.

1

Key Issues in Water Services Privatization

Interest in an increased role for private sector participation in the U.S. water supply and wastewater industries expanded greatly during the 1990s. Although many U.S. water utilities were initially private undertakings, they have a long history of public ownership and operation. But despite this history of strong public sector involvement, views about the role of the private sector shifted during the 1990s because of a variety of economic, fiscal, regulatory, and environmental factors. City and water utility officials were increasingly subjected to pressures of limited financial and technical resources, stringent regulatory requirements, and inadequate infrastructure. In addition, private water companies saw profitable opportunities in the ownership and operation of water utilities and began to promote their services. These conditions led city officials across the United States to consider the pros and cons of privatizing some or all components of their water supply and wastewater utility systems.

The decision as to whether to transfer ownership or operations of a public water utility to a private firm is complex. Immediate economic questions such as "Will privatization reduce customers' monthly water bills?" are accompanied by larger and longer-term questions relating to public health, employment, political control, environmental issues, and relations to other city services.

Given this broad and growing interest in the privatization potential of U.S. water services, the Water Science and Technology Board (WSTB) of the National Research Council discussed the prospects of conducting a study on the topic. The level of interest in the proposed study was high

and in 1999 the WSTB appointed a committee of experts to examine the issue of water services privatization in the United States. The committee's study was conducted with support from the following sponsors: American Water Works Company, Inc.; the University of California; the California Water Service Company; Severn-Trent Environmental Services; and the U.S. Environmental Protection Agency. The charge to the committee was as follows:

> This study will assess issues associated with various forms of ownership and operation of drinking water supply and wastewater systems in the United States, including strengths and weaknesses. Ownership and operation of water services ranges from fully public to fully private, with several possible public-private partnerships in between.
>
> This study will assess public, private, and public-private drinking water supply and wastewater systems in the United States in light of the following water management concerns: long-term water supply; stewardship of water resources; the ability to manage water from a regional or watershed perspective; the ability to implement conservation strategies; water quality (both at the tap and in the environment); reliability of services; economies of scale; efficiency of operation and management; political and financial incentives and disincentives for improving management and service; and fiscal and policy implications.

FORMS OF WATER SERVICES PRIVATIZATION

Four types of privatization considered representative of the range of privatization arrangements available in the United States are considered in this report. In order of private responsibility and risk assumption, they are (1) "outsourcing" of the performance of specific public utility support services to private companies; (2) full-service contract operation and management by private companies of publicly owned treatment works; (3) coupling design and construction services with comprehensive operating agreements for new, expanded, or upgraded facilities under design-build-operate (DBO) contracts; and (4) the sale of government-owned water/wastewater assets to private water companies.

Only the fourth option fully transfers risks and responsibilities of asset ownership, operation, maintenance, and replacement to the private sector. Private companies that operate as tax-paying corporate entities currently collect about 14 percent of the revenues and own about 11 percent of the assets providing drinking water in the United States (EPA, 1997). They typically operate under long-term franchises granted by local municipalities. State commissions regulate their rates and charges.

The first three forms of privatization involve variously detailed contracts for private participation in publicly owned facilities where financ-

ing is usually provided by government agencies and ownership risks are retained by the government. These performance-based contracts for a fixed fee are the most common form of privatization in the U.S. water and wastewater industry. All three forms share similar goals in terms of assigning specific tasks and operating risks to financially sound and technically competent private companies or consortia under multiyear contracts. These agreements are frequently secured by insurance companies and by bank guarantees. Prices are fixed and schedules are set in these agreements, which usually seek to reward private operator-managers only for meeting efficiency and cost performance targets.

Private companies working for government-run utilities under short-term contracts often provide design and construction services, technical consulting, biosolids disposal, laboratory analysis, and other special tasks. Some of the simpler privatization forms may evolve into longer-term, more complex agreements involving major operation and management responsibilities.

A benefit of public ownership of water assets in the United States is the ability of governments to fund capital improvements with 100 percent debt financing. Investors in the large and highly liquid U.S. municipal bond market are exempt from federal and state income taxes on interest earnings, which substantially lowers the interest rate governments pay for borrowed capital as long as they retain full ownership control of the asset being financed.

The advantage conferred on municipal governments in the form of lower borrowing costs greatly affects consideration of whether water/wastewater capital assets should be publicly or privately owned. Water services are the most capital-intensive of all utilities, including electric power and natural gas (see Table 5-1 in Chapter 5), largely because of the high cost of building and repairing sewers and water pipelines. Capital expenditure needs for both types of conveyance systems are forecast to more than triple during the period from 2000 to 2030 (AWWA, 2001a). As capital needs grow, the borrowing cost advantage from lower interest rates on municipal debt will become even more important in discussions of asset ownership.

Another barrier to change is the diversity in ownership, size, management characteristics, and capabilities within the U.S. water industry. As of 1999, nearly 54,000 community drinking water systems were in operation (the U.S. Environmental Protection Agency (EPA) defines a community water system as one serving more than 25 people, regardless of ownership; see Box 1-1). The vast majority of these systems serve small populations—85 percent of the water systems serve only 10 percent of the population served by community water systems (Table 1-1). In the wastewater sector, the EPA noted there were 16,024 publicly owned wastewater treat-

BOX 1-1
Forces of Change Affecting Water Utilities

McGuire Environmental Consultants (2000) describes the forces affecting water utilities as follows: The majority of water utilities in the United States are owned by local municipal governments. The degree to which local governments embrace and/or react to change may well govern the pace at which the industry transforms. Broad societal, business and utility trends will shape the water utility future. These trends include the development of new technology, increasing stringency of water quality standards, aging infrastructure, globalization of the water business, population increases, demographic shifts, and the increasing litigiousness in the United States.

Some of the trends affecting provision of water/wastewater services are not so obvious. For example, the free exchange of technological knowledge so common in the current collegial world of water may well become constrained if competitive pressures cause water utility managers to view such knowledge as a competitive advantage. Other, more discrete effects include the simplicity of advocacy group organization and mobilization in an era when electronic communication is in the hands of every water utility customer and the utility itself. The availability of water quality data on a real-time basis via the internet also could fundamentally change the manner in which consumers are made aware of water system issues.

SOURCE: McGuire Environmental Consultants, Inc. (2000).

TABLE 1-1 Community Water Systems (Public and Private) in the United States and Population Served, 1999

Population Served	No. of Systems	Percentage of Water Systems	Population Served	Percentage of Population Served
25–500	31,904	59.2	5.2 million	2.0
501–3,300	14,040	26.0	19.8 million	7.8
3,301–10,000	4,356	8.1	25.4 million	10.0
10,001–100,000	3,276	6.1	91.0 million	35.9
>100,000	347	0.6	112.4 million	44.3
Total	53,923	100.0	253.8 million	100.0

NOTE: Total systems based on U.S. Environmental Protection Agency, EPA Drinking Water Information System Factoids: FY1999 Inventory Data. Ownership percentages based on U.S. Environmental Protection Agency, 1995 Community Water System Survey, and applied to factoid data.

SOURCES: EPA (1997, 1999a).

ment works (POTWs) serving 190 million persons, or about 73 percent of the U.S. population (Michael Cook, EPA Office of Wastewater Management, personal communication, 2000). Small communities in which fewer than 10,000 persons are served accounted for 71 percent of the total publicly owned wastewater treatment works.

There is also diversity within ownership arrangements of U.S. water utilities. At one extreme is full private ownership and operation by investor-owned water companies, whose charges and rates are typically set by state public service commissions. More common are publicly owned systems that fund and manage their assets without economic regulation (except for accountability to local government) and that perform most of their operations with municipal employees. Nearly all medium- to large-sized cities in the United States follow this approach.

Private ownership nonetheless plays an important role in the water industry. Table 1-2 shows that 14.3 percent of total revenues and 10.7 percent of assets are attributable to privately owned utilities. There are about 4,000 investor-owned water utilities in the United States, some of which serve large populations (e.g., Indianapolis Water Company). Other examples of U.S. cities and suburban areas served by investor-owned water systems include San Jose, California; Lexington, Kentucky; Baton Rouge, Louisiana; Chattanooga, Tennessee; Bridgeport, Connecticut; Hackensack, New Jersey; Charleston, West Virginia; St. Louis County, Missouri; and Peoria, Illinois.

Table 1-3 shows there is private ownership in all of the size categories, but that it is more common in smaller systems. Public ownership is the rule for larger community water systems, but this has not always been the case in the United States. The early days of the U.S. water industry saw public and private operations growing side by side, and not until the twentieth century did municipal ownership become predominant (Baker, 1948).

TABLE 1-2 Market Share of Publicly and Privately Owned Water Systems, 1995

	1995 Revenues		Assets	
Ownership	Amount ($ bil.)	Percentage	Amount ($ bil.)	Percentage
Public	22.2	85.7	117.8	89.3
Private	3.7	14.3	14.1	10.7
Total	25.9	100.0	131.9	100.0

TABLE 1-3 Community Water Systems in the United States by System Size and Ownership (estimated for 1999)

Ownership	System Size (in Terms of Number of Households Served) <100	101- 500	501-3,300	3,300-10,000	>10,000	Total Number of Systems	Percentage of Total
Public	7.7	34.8	68.6	78.1	87.7	23,187	43
Private	39.5	34.6	26.6	21.4	12.2	17,795	33
Ancillary[a]	52.8	30.6	4.8	0.5	0.1	12,942	24
Total systems		31,904	14,040	4,356	3,276	53,924	100

NOTE: Data are from EPA's Drinking Water Information System Factoids: FY1999 Inventory Data. Ownership percentages are based on EPA's 1995 Community Water System Survey.

[a]Ancillary systems deliver drinking water as an adjunct to their primary business (e.g., mobile home parks, retirement homes).

SOURCES: Adapted from EPA (1997; 1999a).

A March 2001 survey (PWF, 2001) reported results from the 17 largest firms seeking water/wastewater privatization contracts in the United States (Table 1-4). Collectively, these companies reported they were paid $917 million in calendar year 2000 for operating 2,273 publicly owned facilities (most often treatment plants but also solids handling, pump stations, and other components) with an aggregate design flow of about 7 billion gallons per day. These fees for contract services were paid by 1,882 different municipal, state, and federal government clients (PWF, 2001).

Table 1-5 lists the values of a variety of investor-owned water companies, ranging from regional operators to multinational conglomerates. Any listing of water companies should be considered somewhat fluid, as the number of private water companies has changed significantly over the past five years through mergers and acquisitions (Table 1-6).

TRENDS IN AND TYPES OF WATER PRIVATIZATION

Deregulation and privatization trends in the airline, telecommunications, and energy industries have significantly influenced the water supply and wastewater treatment industry. However, based on data from the National Association of Water Companies (NAWC), the actual proportion of water services provided by private water companies, whether measured by customers served or by volume of water handled, has remained relatively steady in the United States since World War II, and currently stands at roughly 14 percent (EPA, 1997).

TABLE 1-4 Ownership of Major Contract Water Services Operations and Maintenance Firms

Operating Company	Parent Company	Ultimate Ownership/Affiliation	Acquisitions in 2000
Alliance Water Resources	Privately held	Privately held	None
American Water Services	American Water Works Company	Publicly traded NYSE	None
Americas' Water Services	Allete Water Services	Allete Corp.,[a] publicly traded NYSE	None
CWS Utility Services	California Water Service Group	Publicly traded NYSE	Dominguez Water (CA)[b]
Earth Tech Total Water Management	Earth Tech Inc.	Tyco Int'l Ltd., publicly traded NYSE	NA
ECO Resources	Southwest Water Company	Publicly traded NASDAQ	Master Tek Inc. (CO)
Thames Water North America	Thames Water Plc	RWE	E'town Corp. (NJ)
Environmental Management Corporation	Privately held	Privately held	None
Covanta Water	Covanta Energy Corp.[c]	Publicly traded NYSE	None
Operations Management International	CH_2M Hill Cos. Ltd.	Employee-owned	None
OPTECH	Operations Technologies Inc.	Privately held	None
Azurix North America	Azurix Corp.	Enron Corp., publicly traded NYSE	Prism Res. Mgmt. (Ont.) H2O Utility Services. (FL) E. Craver Pumping Services (FL) Baker Hughes Indus. Services (TX)
Severn Trent Environmental Services Group	Severn Trent Services	Severn Trent, PLC, publicly traded London exchange	None
United Water	ONDEO Services	Suez Lyonnaise des Eaux	None
U.S. Filter Services	U.S. Filter Corp./Vivendi Water North America	Vivendi Environment, publicly traded Paris Bourse	None
U.S. Water LLC	UIC/United Utilities	Bechtel/United Utilities	None
Woodard & Curran	Privately held	Privately held	None

[a]Formerly Minnesota Power Inc.
[b]Acquisition included nine small industrial service contracts.
[c]Formerly Ogden Energy.

SOURCE: PWF (2001).

TABLE 1-5 Value of Investor-Owned Water Companies (in millions of currency units)

Company	Ticker Symbol	Market Capitalization
U.S. Companies		
American Water Works Company, Inc.	AWK	$4,324
Philadelphia Suburban Corporation	PSC	$1,531
California Water Service Group	CWT	$359
American States Water Company	AWR	$367
Connecticut Water Services, Inc.	CTWS	$216
Southwest Water Company	SWWC	$133
International Water Utilities		
Suez (ONDEO)	SZE	£33,502
RWE AG (Thames)	RWE	£22,992
Vivendi Environment	VIE	£13,227
United Utilities	UU	£3,300
Severn Trent	SVT	£2,517
Anglian Water Group	AWG	£1,502
Kelda	KEL	£1,391

NOTE: Bridge market data, January 23, 2002; 1.00 US$ = 1.16 Euros; 1.00 US$ = 0.71 British pounds (£) as of January 29, 2002.

SOURCE: Schwab Capital Markets LP (2002).

TABLE 1-6 Large U.S. Utility Acquisitions by Major Water Companies (EBIT and EBITDA figures in millions)

Major Company-Company Acquired	Date Announced	Equity Value (million $)	Trailing 12 Mos. P/E	Book Value Premium	$/Customer
NiSource (NI)–Indianapolis Water Company	12/19/96	288	25.7	240	$1,719
Philadelphia Suburban (PSC)–Consumers Water	6/29/98	270	21.9	252	$2,045
Kelda Group PLC–Aquarion	6/1/99	444	25.5	281	$4,096
Suez Lyonnaise (SLEDF)–United Water (UWR)	8/23/99	1,360	30.3	292	$4,154
American Water Works (AWK)–Citizen's water assets[a]	10/17/99	NA	27.5	265	$2,738
Thames Water PLC–E'town (ETW)	11/22/99	607	26.7	256	$4,732
Median Multiples			26.7	265	$2,738

[a]Asset purchase, multiples as adjusted to reflect capitalization structure similar to other publicly traded water utilities.

SOURCE: EPA (1997).

Responsibility for safe, reliable, and reasonably priced service ultimately rests with state and local agencies. Local and regional water supply and sanitation services may be provided by government agencies or private companies, either as asset owners or managers. Operating risks may be contractually assumed by private companies. But failures in services that affect health, fire safety, and other public goods will be attributed to political leaders. In most cases, privatization is driven by the desire of elected officials for greater accountability and improved service at lower cost. Ultimately, an important political goal is to reduce or avoid the blame for large increases in user fees that would eventually stem from the capital improvements needed to replace aging and failing infrastruc-

BOX 1-2
Upgrading and Replacing the Water Services Infrastructure

There is widespread agreement that current levels of investment must be increased substantially to replace old pipes and obsolete treatment systems, upgrade technology to comply with stricter quality standards, and meet the demands of a rapidly growing U.S. population. For example, a 2001 study on drinking water infrastructure in the United States found that spending on pipe replacement alone must triple over the next 30 years in order for the nation to maintain a reliable, high-quality drinking water infrastructure (AWWA, 2001a). This represents an additional $250 billion in capital spending over the next 30 years. Other estimates are of a similar magnitude. For example, in a needs survey conducted in 1996, the U.S. Environmental Protection Agency (EPA) estimated infrastructure investment requirements at $140 billion over 20 years (EPA, 1997). Other groups have provided similar estimates, nearly all of which reflect an aging water infrastructure. No matter which set of figures is chosen, substantial expenditures will be required to maintain and upgrade the nation's water delivery and sewerage infrastructure in the ensuing decades.

The AWWA study was conducted in 20 utilities nationwide and was the first comprehensive assessment of drinking water infrastructure needs ever performed, according to the AWWA. "The utilities in this study represent the best in the business;" said AWWA Executive Director Jack Hoffbuhr, who also stated, "They were chosen in part because they are so well-managed. By studying these best-case scenarios, we come to understand what we must do to maintain a reliable drinking water infrastructure for all of us" (AWWA, 2001b).

The U.S. drinking water infrastructure network is primarily publicly owned and operated. It spans more than 700,000 miles, more than four times the length of the national highway system. Most utilities across the country will have to confront a convergence of replacement needs over the next few decades, as many of the pipes laid a century ago and many of the pipes laid in the post-World War II era will need to be replaced.

ture (Box 1-2) and to meet the mandates of the federal Clean Water Act and Safe Drinking Water Act.

Other drivers are also at play. Even without a need for capital improvements, the economies achievable through private plant operations may allow long-term rate stabilization. Philosophically, some political leaders believe that subjecting public management monopolies to vigorous private competition is beneficial. Advances in treatment technology to meet increasingly stringent regulatory standards are also motivating some local governments to consider outsourcing the management of individual treatment plants, conveyance systems, and other services to private firms.

How municipal governments fund these capital expenditures will play an important part in the scope and pace of private involvement in the water industry. The private investor-owned water industry and private operators of pubic utility systems generally oppose a major program of federal grants to fund municipal utility infrastructure. Their position was stated at a water investors conference in April 2001 by Peter Cook, executive director of the National Association of Water Companies: "The larger the federal role the more counter-productive it will be." As replacement costs continue to rise, investor-owned utilities are forced to create operating efficiencies to help keep local rate increases within the realm of political acceptability.

Costs of Needed Capital Improvements to Drinking Water Infrastructure for the Top 10 States by System Size[a,b]

State	Large Systems	State	Medium Systems	State	Small Systems
California	12,310.8	Texas	3,691.7	Texas	2,655.1
New York	9.305.0	Massachusetts	2,998.8	California	2,204.4
Texas	6,684.2	California	2,896.7	New York	1,739.0
Michigan	3,647.1	Illinois	2,738.6	Pennsylvania	1,375.0
Massachusetts	2,628.4	Ohio	2,096.7	Illinois	1,306.2
Florida	2,163.1	New York	2,015.4	Washington	1,256.5
Illinois	2,020.8	Pennsylvania	1,946.5	Ohio	957.5
Pennsylvania	1,722.1	Michigan	1,919.3	Florida	910.2
New Jersey	1,721.7	Iowa	1,800.3	North Carolina	908.5
Ohio	1,689.9	Minnesota	1,498.5	Missouri	881.4

[a]Large systems: >50,000 customers; medium systems: 3,301-50,000 customers; small systems: <3,300 customers.

[b]Costs reported in millions of dollars on January 1999 dollars.

SOURCE: EPA (2001).

Private construction and management of new and replacement facilities thus are sometimes sought by governments seeking to transfer capital needs, the onus of rate increases, and operating risks to private design-build-operate (DBO) consortia. Outsourcing of operations and maintenance alone is often driven by a desire for cost savings through economies of scale and service efficiencies that may be possible through private enterprises.

Few local governments want to sell their entire water system to a private water company and lose control of the community water supply and responsibilities like rate setting. Most municipal wastewater assets are encumbered by federal grants that must be paid back in any asset privatization. Further, any premium on the price paid by a private company for the purchase of the municipal water or wastewater utility will be recovered in the rates charged to the community by the private company, thus minimizing efforts to reduce rates to the residents and businesses. Finally, municipal utility valuations are difficult to establish because of variations in local governments' bookkeeping and maintenance records.

Of the major private U.S. water companies, Philadelphia Suburban Company (PSC) has been the most successful in expanding its rate base through acquisition of small public and private systems. Since 1992, it has purchased more than 40 public and private water utilities, including what PSC claims is the largest ever municipal water system asset sale in the United States, in Bensalem, Pennsylvania, in 1999. Most of PSC's municipal acquisitions have been acquisitions of systems that are contiguous to its densely populated service area north of Philadelphia. The country's largest publicly traded water company, American Water Works Company, Inc., bought municipal systems in Howell Township, New Jersey, in 1998, and Coatesville, Pennsylvania, in 2000.

The type of privatization that involves the design, construction, and operation of new, upgraded, or expanded treatment plants, pipes, pumps, and storage facilities has become an accepted option for municipal owners during the past 10 years. Under these DBO contracts, municipalities set design criteria and their guidelines for long-term agreements. Private firms compete on the quality of their technical submissions and their prices for managing the detailed design/engineering/procurement/construction services and for operation and maintenance (in some cases with fixed prices for major maintenance and repairs).

Municipal governments and their financial advisors usually arrange project financing for DBO projects. The cities of Atlanta, Seattle, Phoenix, Houston, and Tampa have completed or are building large new treatment plants or biosolids processing facilities procured as DBO projects. A substantial number of long-term management contracts for the private opera-

tion of existing municipal utility plants also include a capital upgrade or expansion component that is treated as a DBO project.

The design-build-own-operate-transfer arrangement (DBOOT) is infrequently used but involves the private, taxable debt and equity financing of new or expanded water/wastewater systems for municipal governments. In DBOOT-transfer operations, private developers organize the project, obtain permits, arrange financing, and manage the capital and operational risks of new facilities under long-term contracts. In the past 15 years, only Cranston, Rhode Island, Franklin, Ohio, and Tampa, Florida, have awarded DBOOT contracts for new water/wastewater treatment plants.

The cities of Chicago and Atlanta used a private DBOOT approach in 2001 for building and operating large wastewater biosolids treatment and disposal projects. Tampa Bay Water is a state-created regional water wholesaler that supplies water to municipally operated utilities in the Tampa Bay metropolitan area. In 1999, Tampa Bay Water signed a 30-year water supply contract under which Poseidon Resources is obligated to deliver 25 million gallons per day of drinking water from a large desalination plant set for operation by December 31, 2002.

Although much attention has been given to new forms of contracting for facility construction, the most significant recent increase in private sector water activity has been in the operation and maintenance of both public and private water and wastewater facilities. This market, which now exceeds $2.5 billion per year, is projected to increase to $5.5 billion per year by the year 2004 (PWF, 2001). Table 1-7 summarizes recent activities. For example, the cities of Milwaukee and Indianapolis delegated management of their wastewater systems in 1999 and 1994, respectively, while Atlanta transferred its entire water system to private management in 1999. The largest number of privatization contracts is short-term service agreements of five years or less, signed with small and medium-sized municipalities.

Water utilities, whether public, private, or some combination, have several goals. First and foremost is assuring public health and safety through the reliable provision of high-quality water supply and treatment facilities, and the provision of water for fighting fires. Water utilities seek to provide these services at reasonable prices. Water utilities also often aim to meet several related concerns, including environmental stewardship and providing jobs in the communities they serve. The challenges of meeting new regulations, especially drinking water quality standards and wastewater effluent standards, have put many water utilities, especially small- and medium-sized ones, under great pressure to continue to meet these goals. Many lack the expertise to upgrade or operate their

TABLE 1-7 Communities with Long-Term Water Contracts

Municipality	Description (System Type)	Capacity[a]	Contract Term (Years)
Atlanta, Ga.	Water	201.4 mgd	20
Augusta, Ga.	Wastewater	46 mgd	10
Bessemer, Ala.	DBO water	24 mgd	20
Boston, Mass.	Wastewater sludge	125 dtpd	15
Brockton, Mass.	Water/wastewater	24 mgd	20
Chicago, Ill.	Wastewater sludge	150 dtpd	20
Cranston, R.I.	DBO wastewater	23 mgd	25
Edmonton, Alb.	Wastewater	24 mgd	8
Evansville, Ind.	Water	60 mgd	10
Farmington, N.M.	Water/wastewater	20 mgd	8
Franklin, Ohio	BOT wastewater	4.5 mgd	20
Franklin, Ohio	BOT water	5 mgd	20
Fulton Co., Ga.	Wastewater	24 mgd	10
Hamilton, Ont.	Water/wastewater	300/5 mgd	10
Indianapolis, Ind.	Wastewater	250 mgd	14
Milwaukee, Wis.	Wastewater	550 mgd	10
Moncton, N.B.	DBO water	25 mgd	20
New Haven, Conn.	Wastewater	45 mgd	15
Newport, R.I.	Wastewater	10 mgd	20
Norwalk, Conn.	Wastewater	20 mgd	20
Oak Ridge, Tenn.	Utilities	—	10+10
Plymouth, Mass.	DBO wastewater	3 mgd	20
Rahway, N.J.	Water	6 mgd	20
Seattle, Wash.	DBO water	120 mgd	25
Springfield, Mass.	Wastewater	67 mgd	20
Stonington, Conn.	Wastewater	3 mgd	20
Tampa, Fla.	DBO water	66 mgd	15+5
Tampa, Fla.	BOT desalination	25 mgd	30
Taunton, Mass.	Wastewater	8.3 mgd	20
Wash. Boro, N.J.	DBO wastewater	1.2 mgd	15+5
West Haven, Conn.	Wastewater	12.5 mgd	15
Wilmington, Del.	Wastewater	105 mgd	20
Woonsocket, R.I.	DBO wastewater	16 mgd	20

[a]mgd = million gallons per day; dtpd = dry tons per day.

SOURCE: PWF (2001).

plants to meet often stringent regulations, as well as the capital to finance related investments. Private contractors may offer the expertise and the capital, plus they may assume the risks of complying with regulations.

New management and communications technologies have made it possible for one company (private or public) to manage and operate several utilities from a central office. Provision of water services is based on access to information such as data on consumer demand, on quality levels

and water flows, effluent quality, as well as on financial flows. The ability to collect data and respond to changing conditions rapidly and appropriately is an important determinant of the scope and scale of water service systems. Technological advances in communications, monitoring, computing, and control systems have thus affected the water industry structure at the margins of change. Modern systems will accelerate the drive to larger units. Whether this technological shift will favor privatization or will be quickly adopted by efficient public systems remains to be seen.

CONCERNS ABOUT PRIVATIZATION

Unsuccessful Ventures

In the preface of the Masons Water Yearbook 2000-2001, a British water publication, Owen (2001) stated the following about water utility privatization:

> Privatization, or private sector participation, has already enhanced economic growth worldwide, but in contrast with telecoms, power and transport, for example, its impact on the water sector has been much less marked, (because of its very different risk profile) despite demonstrable need. Only about six percent of the world's population is currently served by private sector operators, and since more than one billion worldwide have inadequate water supplies, and some two billion no adequate sanitation, the potential market is truly very large-quite beyond the capacity, moreover, of the existing major players to service it.
>
> However, because water is a highly political issue, and existing infrastructure is often highly fragmented, market evolution has proved slower than earlier over-optimistic predictions suggested. Future development will be governed by creative solutions involving true partnerships of all the stakeholders in the sector, taking account of local political and social sensibilities.

Several major cities around the world have availed themselves of private management under various arrangements, including all of the United Kingdom, Berlin, Buenos Aires, Johannesburg, Manila, and Mexico City. Many U.S. cities also have arrangements with private firms to provide water services, and these firms often reliably deliver high-quality water services at competitive prices, with high levels of consumer satisfaction. As noted earlier, private firms have held roughly a 15 percent share of the U.S. water market for the past 50 years.

Contentious situations can stem from unrealistic contract conditions and strong competition in the process of bidding on water services contracts. And although improved system performance and cost savings have resulted from privatization in some instances, in some cases expected

benefits have not been fully realized. A recent case has been in Indianapolis, which repossessed its water utility from a private contractor (see Box 1-3). For one group's evaluation of the problems with water services privatization, the reader is referred to a 2001 report from the Public Citizen group (Public Citizen, 2001).

Inadequacies in performance can be resolved through negotiation between the contractor and the city. In Ohio, Clermont County's water treatment plant suffered problems of discolored tap water shortly after the country awarded an operating contract to a prominent private firm. Although harmless, the brown water focused criticism on both the county and the company. It turned out that the problem would have occurred independently of who was managing the plant. Corrections were made, with the cost being shared by the operator and the county, while overall cost savings have resulted in a 5 percent rate reduction.

The creation and failure of Azurix Corporation is an example of a market miscalculation in the water utility field (Box 1-4). Rapidly-evolving markets may exhibit instability and they raise questions of the reliability of member firms.

BOX 1-3
Private Delivery of Water Services in Indianapolis

The case of private sector water services in Indianapolis involves shifting the form of privatization from the ownership model to the contract operations model. The system was originally incorporated in 1869 and sold to the founders of the Indianapolis Water Company (IWC) in 1881. Indianapolis has long stood out as the largest U.S. city served by an investor-owned water company, although St. Louis County Water and San Jose Water are other important examples. The IWC also serves some nearby communities.

In 1997, the local gas company purchased the water company, but was required under securities law to put the assets up for sale when it purchased another energy company in 2000. The city chose to purchase the system in order to try to maintain lower rates, take advantage of lower capital costs available to municipalities, and avoid a purchase by foreign interests. An eminent domain process was begun, despite some local dissention. However, although the purchase has not been consummated, the city has issued an RFP (request for proposal) for its operations. The city's wastewater system is currently operated by a private consortium in which United Water Resources, owned by French Suez, plays a central role. The deal struck a blow to the U.S. investor-owned water industry, and water industry analysts will follow the case closely to see whether the shift affects performance.

BOX 1-4
Growth and Decline of Azurix

The Azurix business plan presented to investors in 1999 was based on the expectation of fast revenue growth from radical change in the market structure of water supply and service delivery in the United States and abroad. The company was formed and then spun off (at $19 per share) in a public offering of stock by the energy marketing company, the Enron Corporation, in June 1999. Azurix lost over $1 billion in market value before it was deemed a failure by Enron and was reorganized late in 2000. Azurix eventually discovered it could not compete with the larger, well-established British and French firms and was unable to make a market by trading water. In 2001, Enron filed for bankruptcy in one of the spectacular crashes of a prominent U.S. corporation.

Community Concerns

Communities considering water services privatization options often have many concerns regarding new operations or ownership arrangements. They are concerned about privatization's effects on their monthly water and sewerage bill: what does privatization imply for their short- and long-term bills? They are concerned about water quality: will they continue to receive consistently good-quality water in the long run? Citizens may also have concerns regarding new channels of communication and the airing of grievances: if they have questions regarding their water services under new privatization arrangements, do they voice their concerns with city officials or with a private firm? Communities may also have concerns regarding long-term protection of watersheds that convey raw water supplies, participation in and transparency of policy decisions, and competition after service contracts are awarded.

Communities are nearly always concerned about the possible loss of control over a vital public service. The public and their elected representatives exhibit a natural caution when faced with surrendering control and/or assets of essential municipal services. The reality of water services privatization is that the public official can never fully transfer accountability to a private operator for reliable delivery of water services, a function that communities believe is a vital public service. If the private operator fails to meet the public's expectations, the public is more likely to protest to the public official than to the private operator. Privatization of water services will only be a net political gain for incumbent politicians if cost reductions and improved service deliveries more than compensate for the loss of control. This political calculus likely means that political control will be transferred only for those services that pose problems in

meeting minimum financial, regulatory, or management standards. That is, systems most likely to be offered for privatization are likely to have structural or managerial difficulties.

A second concern is the recognition by administrators and citizen groups that privatization is not the same as competition. There is a tendency to equate the two, as the private economy is thought to work well because of the pressures of competition that force firms to operate efficiently and to produce what the public wants. However, by definition, when a contract is signed for the management, operation, design, etc., of a water system, only the monitoring and enforcement of the contract terms can guarantee the expected level of performance. Competition in urban water utilities is limited to the period when competitive bids are being accepted, and it is geographically limited to the system's expanding margins. Bidding for the operation of complex organizations such as water and wastewater utilities is ripe for accusations of political favoritism. A review of the media coverage in competitive bid processes such as those in Birmingham, Atlanta, and New Orleans reveals charges that political favors were granted in connection with these bids.

A third concern is the recourse that will be available if privatization does not work as intended. Terms of remediation must be carefully spelled out in legal and financial terms. Urban authorities must be sure that essential skills and equipment can be regained quickly if the terms of the contract are not fulfilled.

A fourth concern is the possible loss of openness and transparency of utility policies and practices. Deliberations of public bodies are subject to numerous "sunshine" provisions that require open meetings and records. Once a private firm assumes operations, it is no longer clear that business practices and accounts will be open to the public. To ensure transparency, such agreements must be specified in the contract.

A fifth concern is for the long-term protection of the water/wastewater infrastructure and the basic water supply itself. There are questions regarding whether private operators may take "shortcuts" by failing to maintain the system or allowing the degradation of watersheds and groundwater aquifers. Certainly, experience has not shown this to be a problem, but because relatively few long-term operations and maintenance contracts have run their course, little data regarding this concern are readily available.

City administrations may be concerned with the possible loss of revenues to the general treasury and with loss of service functions to other departments. In many cities, the funds of utilities are comingled with general funds. Some cities have enjoyed profits from utilities that are used to support general government functions (although most cities impose a "no profit-no loss" constraint on their utilities). Free water and wastewa-

ter services to city parks and hospitals may have to be foregone, as well as disaster response services that have been rendered by the water utility.

Concern for the welfare of the utility workforce and for the possible loss of local jobs is pervasive. Some fear that workers will be unfairly exploited or that jobs will be lost to nonresident personnel. Most privatization contracts have guaranteed no loss of jobs except through natural attrition. A frequent result has been the upgrading of skills, resulting in increased wages and increased promotion possibilities. Finally, experience has shown that the preparation of adequate contracts is expensive and time-consuming. Outside legal and engineering expertise is usually needed. The review of multiple bids can also be costly.

Concerns of Private Contractors

Preparation of detailed cost and technical proposals for contract operation of a major utility system is a costly exercise. If private financing is involved, lines of credit must be arranged. Some requests for proposals (RFPs) require parent companies to stand as guarantors of performance. Private contractors thus must consider the probability that the awarding process will be fair to all parties, that a contract will be signed, and that they will be permitted to earn a profit.

Because of the high cost of preparing a proposal and to encourage well-qualified firms to bid on a request for proposals, some municipalities have offered to partially reimburse bid-related expenses for the short-listed firms. Although some public utilities, such as Seattle Public Utilities, have provided compensation to bidders, the amounts have been small compared to the total expense incurred by the bidders responding to the requests. In some instances, it is suspected that municipal requests for proposals have been issued with no intent of entering a contract, but rather as a means of gauging public managers' performance or for winning concessions from unions on staffing. Another concern of private operators is gaining timely access to accurate condition assessments and maintenance records during their preparation of technical and cost proposals.

Some private operators believe they operate on an "uneven playing field" because publicly owned utilities can issue tax-free bonds, thus raising capital at lower interest rates than the taxable debt available to a private company. A study done in 1999 for the city of Phoenix ruled out private financing for a new water treatment plant largely because city-issued tax-exempt water lease bonds could be issued at a 5.2 percent cost of capital, versus 8.2 percent for private financing using taxable debt and equity (PWF, 1999).

Congress granted an interest-rate subsidy to municipal government

bonds soon after World War I. By exempting investors from having to pay income taxes on bond interest earnings, the federal government gave local borrowers a 250-300 basis points (a basis point is 1/100 of 1 percent; 100 basis points equals 1 percent) cost advantage over private issuers. The difference in borrowing costs accelerated the shift from private to public ownership of water and wastewater utilities during the infrastructure expansion period after World War I.

To obtain and keep their federal interest subsidy, municipal borrowers must maintain public ownership and management control of the debt-financed asset until the bonds are retired. In an attempt to expand the market for privately managed capital projects, in June 2001 federal tax legislation that would exempt water and wastewater bonds from volume caps was proposed. This bill (H.R. 2207) was referred to the House Ways and Means Committee, where it is expected to be considered as part of a larger review of the federal tax code.

Federal grants provided up to 85 percent of the capital cost of publicly owned wastewater treatment plants built during the 1970s and 1980s. In 1988, Congress voted to phase out these construction grants, but since 1989, Congress has provided seed funding for states to set up revolving loan funds for municipal wastewater projects. These revolving funds can be used only for municipally owned facilities.

CONCLUDING OBSERVATIONS

This report's executive summary lists the study's key findings. A few of those observations are nonetheless worth emphasizing in this introductory chapter. It is clear that no single model of water services privatization fits all situations. Indeed, continued public ownership and operation is the most likely outcome for the majority of water utilities. A major effect of the availability of private alternatives has been to increase the resolve of the publicly owned and operated water utilities to sharpen their operations, reduce costs, and upgrade the quality of services. Large municipal water utilities typically have the expertise and resources to address emerging challenges. Small to medium-sized water utilities generally have more difficulty in meeting higher quality and health standards and in responding to pressures of population growth. Small municipalities may thus be the most fertile ground for private participation in water utility operation and management.

2

History of U.S. Water and Wastewater Systems

This chapter provides a historical framework for consideration of today's debates over privatization. Changes in policies and practices are never free of the inertia of history. Some of the key pressures for change today have resulted from past action (or inaction), and today's practices have evolved from specific problem-solving histories.

Efforts to provide safe drinking water and wastewater disposal facilities date back to the origins of civilization (Rosen, 1993; Winslow, 1952). Ancient societies in Egypt, Mesopotamia, India, Pakistan, Crete, and Greece all sought to provide safe drinking water and safe means of human waste disposal. Water supply and wastewater collection reached a high point in the Roman Empire. The Dark Ages, however, witnessed a decline in the development and application of these practices.

As world population neared one billion during the Industrial Revolution in the late nineteenth century, cities and villages became more crowded. Public health concerns dictated that new ways had to be found to provide safe water supplies as well as provide means for safe disposal of sanitary wastes. Growth in the numbers and in the size of cities and increasing use of water in residential, commercial, and industrial enterprises led to increasing provision of public systems for water supply and wastewater systems. Although some research suggests that private water companies emerged during the Renaissance (Walker, 1968), private entrepreneurs initiated the provision of water supply services on a large scale during the nineteenth century in both Europe and the United States. By contrast, provision of sewers, along with streets and drainage facilities,

generally fell to local government. To this day, private provision of water supplies is common in many parts of the world, whereas wastewater treatment is seldom a responsibility of private enterprise. An exception is when private developers provide the service in connection with the construction of buildings and streets.

PUBLIC WATER SYSTEMS IN THE UNITED STATES

In 1755, Hans Christopher Christiansen instituted services for the first public water works in America at Bethlehem, Pennsylvania. In 1772, the state of Rhode Island chartered two private water delivery companies in Providence (Hudson Institute, 1999). New York City initially used private wells as its main water source. As the city grew, however, these wells became fouled. In 1799, New York State Assemblyman Aaron Burr (later U.S. vice-president) proposed legislation creating the Manhattan Company. Although this legislation was intended to provide a new source of water supply for the city, it also allowed for any unspent money to be used to create a bank. Burr's main purpose was the creation of the Manhattan Bank, the forerunner of the Chase Manhattan Bank. The company pursued its banking interests, but it neglected its water-related responsibilities. It was only in 1842 that New York City officials, after considerable study, brought an ample supply of water to the city from the Croton River. This was one of the early large municipal water supply projects in the United States (Blake, 1956). Boxes 2-1 and 2-2 describe the development of water supply and treatment facilities for the cities of Baltimore and Boston, respectively.

During the mid-1880s, there was a growing recognition in Britain, Europe, and the United States that water was a vehicle for the spread of disease, particularly typhoid, as well as cholera. There was also a need to provide water for fighting fires, which ravaged many cities during the period. Local government investments in public water supply service therefore grew in size and number. By 1850, the number of public water supplies in the United States had increased to 83, of which 50 were privately owned (Carlisle, 1982). After the Civil War, U.S. population continued to increase, and the need to reduce diseases and to provide fire protection escalated. By 1866, there were 136 public water supplies in the United States (Hail and Dietrich, 2000). At the beginning of the twentieth century, the number of water systems in the United States had increased to over 3,000, with approximately equal numbers of public and private owners (Figure 2-1).

In the late 1800s, new water treatment methods, such as slow sand filtration and rapid filtration with chemical coagulation, had been developed and were being used in public water supplies (AWWA, 1951, 1981a,

BOX 2-1
The Baltimore Water Company

The Baltimore Water Company was formed in 1805 at the invitation of the municipal authorities after the city of 30,000 had failed in attempts to build its own water works. By 1830 Baltimore's population had grown substantially, but only a small fraction of the population was being served by the water company. With the city's help, the company obtained springs in the city. But as was the case in many other cities, the wells and springs had become contaminated and the extension of the piping system had been restricted to the center of the city. A city council committee had not blamed the water company; it had been interested in profits.

The water company responded that it was prepared to sell its assets to the city. To forestall such action, the company acquired additional, higher-quality sources above the city and, because of a cholera outbreak, water from fire hydrants for flushing street gutters was made available at no cost to the city. But after another cholera outbreak, it was apparent that Baltimore would be obliged to be responsible for its water supply. The issue then became whether the assets of the Baltimore Water Company would be purchased or whether an entirely new, larger system would be built because the performance of the company system, particularly in making water available for fire fighting, had been unsatisfactory.

In 1836, a consultant recommended the construction of two dams on streams at some distance from the city, along with an aqueduct and a reservoir near the city. Thus began another conflict, with such a costly project being opposed by the conservative elements in the city leadership. An economic panic in 1837 drove out any thoughts of the proposed project. This gave the company another lease on life and it began a 15-year program of system additions. From 15 miles of pipe in 1835, by 1852 some 47 miles of pipe were in operation.

Despite these improvements and company prosperity, dissatisfaction with the company surfaced, primarily because of its decision to only serve districts of the city that promised to be profitable. Only about 30 percent of the people were being served. Also, while water for fire fighting was free to the city, the public was perturbed by large charges for all other public uses. The principal problem was the inability of the company to keep up with the city's rapid population growth.

An 1853 report of the Baltimore Water Commissioners made the following assessment:

> The Baltimore Water Company has done what a private citizen would have done for himself under similar circumstances, managed its business with an eye single to the interest of the stockholders. It had doubtless dealt as fairly as any corporation in existence, yet public sentiment is not satisfied, nor should it be with its operations. If Baltimore was a "finished city," and was only to survive until its present tenements and warehouses shall have decayed and fallen, the present system of supplying it with water might be tolerated. But her destiny is one of greatness and strength, and those charged with her legislative authority should, before it is too late, confer upon her that benefit which is of inestimable value (Blake, 1956).
>
> Finally, in 1854 the city purchased the holdings of the Baltimore Water Company and initiated plans for the creation of a management infrastructure and pursuit of a water supply adequate for the future. The inability of a private company with limited financial resources to keep up with growing demand for water again obliged a city government—even one happy to be served by a private company—to take responsibility for an important public service.

NOTE: This box draws from Blake (1956).

BOX 2-2
Water Supplies for the City of Boston

On April 7, 1825, a fire that destroyed homes and stores in central Boston led to a debate that lasted for more than 20 years before a decision to finally bring a supply of water to the city adequate in quantity and quality was reached. The issue was not whether the provision of water for the rapidly growing city was desirable; every candidate for mayor over the two decades promised to bring water to the city. The issue that delayed the decision was whether the water should be supplied by the city government or by one or more private companies.

Although water for fire protection triggered the debate, Boston's leaders recognized the necessity of an adequate supply of good-quality water. The water from the wells serving individual homes, as well as from those made available by private entrepreneurs who provided keys to the locks on the pumps for a price, was contaminated by infiltration of wastes from nearby privies. Even uncontaminated wells were providing "salt" water for poor taste and appearance. On the other hand, so-called "soft" water of good quality, available in ponds above the city, could be obtained by gravity.

Sewers became accessible for the receipt of household wastes during the middle and late nineteenth century. The storm sewers discharged to local drainage ditches, which extended contamination of the groundwater. The situation was further aggravated when small companies set themselves up to distribute water from private wells to some homes and businesses. The convenience of piped water in homes and businesses, and most particularly the availability of flush toilets, resulted in an explosive expansion of small piped systems serving the city's more prosperous enclaves.

The city's business leaders recognized the promise of profits that a large water company might bring, and several companies were created. The Aqueduct Corporation brought water from a small pond within the city. The Boston Hydraulic Company, through the Massachusetts legislature, took water from ponds north of the Charles River and within 12 miles of the city. However, the Boston City Council rejected the requirement that it be obliged to subscribe to stock in the Boston Hydraulic Company. In 1836, it brought the issue to a public referendum, and the public, despite opposition of the two companies, overwhelmingly endorsed the proposition that the city should build and operate the waterworks. Although this decision took more than 10 years of discussion and debate, it was only the beginning.

b). In 1893, Congress passed legislation to develop regulations to prevent the introduction, transmission, or spread of communicable disease from foreign countries or from state to state. However, it was not until 1912 that the first water regulations were promulgated under this legislation (AWWA, 1999). These early federal regulations prohibited the use of common water cups on interstate common carriers. The U.S. Public Health

The issue became a choice between water sources and private water companies and public ownership. The private companies, by then also including Boston Aqueduct Corporation and the Spot Pond Aqueduct Company, owned the small nearby ponds. The proponents of public ownership preferred Long Pond (later known as Lake Cochituate), which was larger and further from the city. The water companies preferred investing in water supply at a lower immediate cost, rather than committing to a larger source they did not own that was more costly and for which the companies did not have the financial resources. A second referendum again supported public ownership, but this time by a smaller margin. Meanwhile, the city was growing. The Boston Aqueduct Company had so extended its distribution system that the customers complained of low pressures and being without water much of the time. The city had done nothing, and the controversy continued.

In 1844, the city finally decided to enter into the provision of water from Long Pond. But the water companies were not done—they had the ear of the state legislature. The legislature agreed that the city should go ahead with its scheme but only if supported by another referendum. This time, the Long Pond option with public ownership was narrowly defeated. Machinations of the Spot Pond Aqueduct Company, however, delayed the commitment to the private option, and the decision to privatize was aborted.

Finally, consultants employed by the city reported that Spot Pond would provide only 1.5 million gallons per day, while the city needed 7.5 million gallons per day, and soon would need 10 million gallons per day. In April 1846 it was put to a vote, and the citizens again overwhelmingly supported the Long Pond project and public ownership. In the final analysis, financial resources available to the private companies could not compete with those of the municipality, which had the financial support of its state legislature. At the time, long-term investments were more readily made by public bodies than by private companies.

Since then, water and sewerage and wastewater treatment systems in the Boston metropolitan area have largely been regionalized and are now the responsibility of the Massachusetts Regional Water Authority (MWRA). Some cities in the region, such as Cambridge and Worcester, have their own water systems, and most of the cities own and operate their own sewerage and water distribution systems. The state controls the MWRA watersheds. The MWRA makes liberal use of private consultants, private laboratories, and other private establishments for capital and operational purposes.

NOTE: This box draws from Blake (1956).

Service Drinking Water Standards were first adopted in 1914, with bacterial limits to protect the traveling public. Water supplies in cities that provided water for interstate carriers needed to be approved by the U.S. Public Health Service. Many states adopted these or similar standards for their communities. The use of chlorine as a disinfectant in water treatment became common in the United States around 1915. By the 1940s,

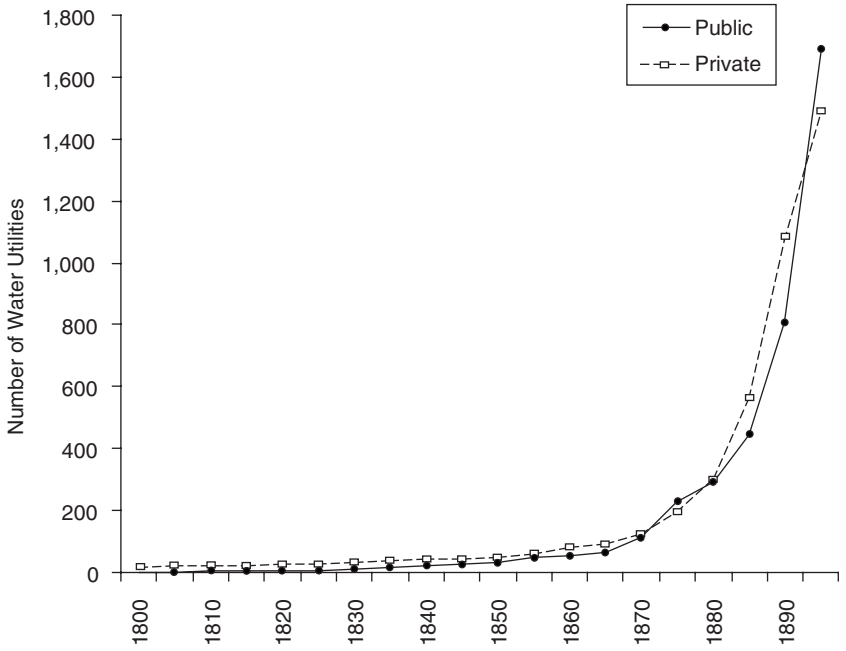


FIGURE 2-1 Historical pattern of ownership in the U.S. water industry (1800 to 1896). In the nineteenth century, the number of water supplies grew exponentially from a total of about 600 in 1880 to about 3,000 in 1895. Ownership was evenly divided between public and private ownership. Beginning about 1900, the number of publicly owned systems began to exceed the number of private systems. SOURCE: Baker (1948).

water-borne diseases in the largest U.S. cities were reduced nearly 100-fold from 1910 levels (AWWA, 1951).

The years following World War II saw the development of new approaches to ensure safe water supplies. Organic chemicals that were used heavily during the war found a place in a range of civilian applications. Many of these chemicals eventually made their way into surface and groundwater systems. In her 1962 book, *Silent Spring*, Rachel Carson expressed concerns regarding environmental quality, including the quality of drinking water, caused by synthetic chemicals (Carson, 1962).

These new chemicals were dissolved in minute quantities in water and could not be detected by the analytical techniques of the day (Dougherty et al., 1966). New analytical tools were developed, and they fostered even greater concerns over water pollution. There was public clamor for federal standards to be applied to all water supplies. As early

as 1942, the American Water Works Association (AWWA) had been calling for standards (Public Health Reports, 1946), but it was not until environmental groups forced Congress to act that the Safe Drinking Water Act (SDWA) was passed in 1974. This act requires that all public water supplies abide by national "maximum contaminant levels." The U.S. Environmental Protection Agency is responsible for establishing drinking water standards under the Safe Drinking Water Act.

PUBLICLY OWNED WASTEWATER TREATMENT WORKS

The original approach to disposing of wastewater from urban homes in the United States was via cesspools or septic tanks with underground tile drains for wastewater disposal through percolation into the ground. But this often polluted the groundwater that was being used for water supply. Sewerage systems were thus introduced to remove wastewater from homes and other buildings for discharge to the nearest waterbodies. Local governments constructed sewerage lines, as well as streets, drainage systems, and infrastructure for other utilities. These sewerage systems, while sanitizing homes, also often created nuisances and health hazards in the receiving waters, as these were also being used for water supply. Comprehensive sewerage systems were being built throughout Europe and the United States in the mid-1880s. Because receiving waters often played multiple roles as sources of food, places of recreation, and sources of drinking water, treatment of wastewater before discharge was initiated in the latter years of the century. Initial treatment consisted of diverting wastewater to farms for application to the land, where wastewater helped restore nutrients to the soil. In fact, these facilities were called "sewage farms" well into the twentieth century.

With urban growth and the attendant larger volumes of water that needed to be processed, sedimentation alone was no longer sufficient, and various improvements in treatment were introduced. Chemical precipitation was introduced to enhance sedimentation, but that created problems with sludges. A major step was the introduction of biological treatment with trickling filters following sedimentation (Box 2-3 describes development of St. Louis' water supply and use of chemical treatment).

Many other types of secondary biological treatment processes are now available, with the aim of increasing their efficiency and reducing their space and cost requirements. Activated sludge and other modern biological processes can provide up to 95 to 98 percent removal of organic matter and suspended solids and bacteria.

Passage of the Clean Water Act in 1972 made secondary treatment a requirement for all wastewater treatment plants in the United States. A federal construction grant program, which provided additional funds as

BOX 2-3
Developing St. Louis' Water Supply

At the beginning of the nineteenth century, St. Louis was under French control. But French leader Napoleon Bonaparte was having problems in Europe and needed money. In 1803 Secretary of State James Monroe and President Thomas Jefferson negotiated the Louisiana Purchase. President Jefferson subsequently authorized Meriwether Lewis and William Clark to lead an expedition to the Pacific Coast (1804-1806). Following Lewis and Clark's expedition, St. Louis served as a launching point into the western United States for settlers, trappers, and miners and became known as the "Gateway to the West."

By 1830, the population of St. Louis had reached about 6,000, and its water supply was primarily from springs and cisterns (Schworm, 1968). The city of St. Louis signed a contract with a Mr. Wilson and a Mr. Fox to "build and conduct water works supplying clarified water" to private citizens at $20 per year for a residence and at $100 per year for hotels and factories. In addition, after 25 years the "works" were to belong to the city of St. Louis. Unfortunately, Wilson and Fox were unable to borrow the necessary capital to perform the contract, and in 1831 the city took over the project and built its own water system, which became operational in 1835.

In 1832, a cholera epidemic broke out and killed 4 percent of St. Louis' population. In 1849 and 1866, St. Louis again had cholera epidemics that killed a greater number of victims than the epidemic in 1832 (Primm, 1981). It was not until 1904 that clean water was available to St Louis, which by then was the fourth-largest city in the United States with a population of 575,000. That the availability of clean water coincided with the St. Louis World's Fair was not coincidental, as the mayor had promised there would be clean water for the fair (AWWA, 1981a). John Wixford, a chemist with the city water division, had found that by using ferrous sulfate and then adding lime to the river water, he could achieve consistent coagulation. Wixford's process allowed St. Louis to have clean water for the fair and is still used for treating water from the Mississippi and Missouri rivers.

an incentive for innovative practices, and state grants up to a total of up to 90 percent, were major stimuli for the construction of wastewater treatment plants. In many instances, even secondary treatment was found to be inadequate for maintaining receiving waters as "swimmable and fishable" (as required by the Clean Water Act) and greater removal of specific components such as nutrients (nitrogen or phosphorus) was thus necessary. This is characterized as "advanced treatment." Although the federal government has no regulations for nonpotable reuse, many states do, and one of the requirements generally applicable is provision of "tertiary treatment," which adds a sand filtration process (similar to that used in drinking water plants) following secondary treatment. In its *Guidelines for Water Reuse* (EPA, 1992), the U.S. Environmental Protection Agency

recommends tertiary treatment followed by chlorine disinfection for unrestricted nonpotable reuse.

Requirements under the Safe Drinking Water Act and the Clean Water Act are sure to become more restrictive over time, given the continual emergence of contaminants that pose yet unknown public health risks and given that there will be new contaminants that have not yet been invented. Prevention and detection of pollution and the treatment of water at all stages of the hydrologic cycle will become more complex and more costly.

PRIVATE WATER SYSTEMS

Regulation of U.S. water utilities can be traced back to the nineteenth century and the westward expansion of United States. As the privately owned U.S. railroad system developed and expanded westward during the nineteenth century, rail operations needed to be regulated in order to ensure reasonably priced services. A new type of state regulatory organization was created to control these natural monopolies. With the invention of electricity and the telephone, similar types of regulation were also required. Gas and water services were eventually added to the list of regulated natural monopolies. Regulatory commissions began in the 1870s and, by the early twentieth century, had established rules and regulations to help control the various service industries. Regulatory commissions were initially interested in ensuring the provision of better services. However, given the monopoly status of the water supply systems, the commissions imposed financial constraints on the private water companies, as was customary for other privately owned monopolies such as electricity, telephone, gas, and transportation. Experience with these utilities has generally shown them to be reliable, with fair rates. All U.S. states have enacted legislation for the creation of regulatory commissions.

A private water system is one for which assets are held by an individual, by a private corporation, or by a holding company (although there are only a few of these in the United States) and for which there is a general expectation that the owner(s) will be compensated by receiving some return on their investment. The terms "private" and "investor-owned" are used interchangeably. The majority of private systems are owned by individuals or families, by real estate development firms, or by mobile home park operators. Only a handful of private water utilities are "public" companies (those that issue stock that is publicly traded by investors). Of course, private ownership does not negate the public responsibilities of private water systems, including compliance with all applicable standards that apply to publicly owned systems. Indeed, most private water companies are held to additional responsibility in the form

of economic regulation. Unlike water utilities, companies that provide contractual services are generally private companies that also may or may not be publicly traded.

Most water systems in the United States are publicly owned by municipalities, as well as by counties, authorities, and governmental districts. In addition to the public-private distinction, many water utilities operate on a nonprofit or not-for-profit basis. These include cooperatives and many homeowners associations. State policies vary with regard to water system types and associated regulatory jurisdiction. As of 1995, state regulatory commissions regulated approximately 8,750 water supplies in 46 states (Beecher, 1995), of which approximately 4,100 were investor-owned. The remainder are under some form of public ownership, generally municipal, but often in local regional authorities. Regulatory commissions are directly concerned not with water-quality issues, but with water rates, rates of return, and quality of service (water quality is regulated by state agencies according to federal government standards).

State regulatory commissions also regulated approximately 2,150 wastewater utilities as of 1995, approximately 1,230 of which were investor-owned, with the remainder being under government ownership (Beecher, 1995). Many private systems are relatively small, built by developers and owned by private entities, often homeowners associations. As a result of federal and state construction grant programs available only to municipalities and sewerage authorities, private companies were seldom able to compete, and many of them were sold to municipal or other governmental operations. Public water supplies presently have limited state and federal grant programs. However, there have been recent pressures to request federal assistance to help replace needed infrastructure. Because of the magnitude of these costs and the tendency for reductions in federal assistance, it does not seem likely that massive federal grants will be available for the drinking water industry.

WATER UTILITY PRIVATIZATION AROUND THE WORLD

This report on U.S. water privatization touches occasionally (see Appendix A) on international water privatization efforts. The more prominent privatization efforts have been in France, where water services privatization started in the mid-nineteenth century, and the United Kingdom, where national water utilities were privatized during the 1980s. The end of the Cold War saw the extension of private contract services in central and eastern European countries. Some European cities, including Berlin, Barcelona, and Budapest, have recently contracted for water and wastewater service. Private water services have also been provided in

BOX 2-4
Water Privatization in Cochabamba, Bolivia

One of the better-known Third World privatization attempts occurred in Cochabamba, Bolivia, during 1999-2000. The Cochabamba experience made international news after riots erupted following privatization of the water utility and resultant rate increases. One person was killed and several people were reported injured in the riots.

Although details of the events that precipitated these riots are not universally accepted and have not been independently reviewed, the key issues revolved around an attempt to improve Cochabamba's aged and decrepit water infrastructure through contracts with an international consortium of private companies (see Global Water Report, 2000; Minneapolis Star Tribune, 2000; PSI, 2000). The city's water services had been operated by Semapa, a municipal water company. The Semapa system clearly needed improvement. It leaked badly and served only roughly half of the city's residents. The poor were not being served well, and the company had a declining rate structure (the more water used, the lower the per-unit price). Water delivered to businesses was thus cheaper than water to homes, and those homes that were served tended to be those of the wealthy. The poor often purchased their water from unregulated truckers who charged more for water than Semapa did.

A consortium led by International Water Ltd., a London-based company that is half owned by San Francisco-based Bechtel Corporation, was awarded the contract to operate and expand the city's water supply system. Two main options had been considered for addressing Cochabamba's water problems: the Misicuni Project and the Corani project. The former project was costlier and technically more difficult. Against advice from the World Bank, the Bolivian government apparently required that the more expensive Misicuni project be implemented. International Water sought to have construction of an expensive dam in the Misicuni scheme delayed, which would have reduced the need for immediate rate increases. International Water had no authority to impose a rate structure that was established by contract. The Misicuni project also required some 20 kilometers of tunnels, four kilometers of which had been drilled, and it is alleged that the Bolivian government insisted that the cost of the incomplete tunnels be included, along with the costs of all the assets of the subsidized Semapa agency. More than 50 percent of the rate increases were said to have resulted from including these costs.

Critics of the privatization scheme allege that the rate increases were between 35 percent to 200 percent or even 300 percent, representing the exploitation of the poor at the benefit of multinational corporations. Typical rates for water and sewerage services rose 35 percent. Low-income residents were to pay 10 percent more, and the largest hikes (106 percent) were reserved for the highest-volume users, the most affluent. Critics also complained about the lack of public participation in decision making, the lack of justification for and discussion about rate changes, and the lack of appropriate government oversight. Following extended rioting and negotiations, the state government rescinded the contract. This case study illustrates the emotional environment within which water matters are often addressed and the high risks faced by private companies when dealing with local politics. It also illustrates the difficulties in changing rate structures after a history of subsidized water services has been established.

countries such as Australia, Macao, and the Philippines, but there have been no comprehensive evaluations of the net benefits of these decisions.

Independent evaluations of the successes, failures, benefits, and problems of these global efforts would be useful. Because companies with global investments are increasing their market share in North America, it would be of interest to U.S. utilities to have a continuing understanding of the performance of these companies in international markets. Failures or controversies occasionally develop (Box 2-4), some of which receive great international attention. Unfortunately, there are few credible, independent evaluations of water utility performance in many recent privatizations.

3

Forces of Change in the Water Service Industry

Water and wastewater utilities in the United States provide safe, reliable, and economical service as measured by any comparative standard of performance. The nation's water infrastructure has benefited greatly from long-term investments in water systems and the adoption of new wastewater standards with accompanying financial assistance. U.S. water service systems are based on historically conservative approaches to design and construction that, when combined with the current political aversion to long-term investments in infrastructure, have created some resistance to change. Nevertheless, major changes are under way.

Water service providers face new challenges on a range of fronts that include rising consumer expectations, increasingly stringent government standards, technical complexities, decaying infrastructure, and a political imperative to control costs and to limit rate increases. These pressures have created a market opportunity for private firms seeking to expand their role in the water services sector. These include investor-owned water utilities, which have seen limited expansion through acquisitions, and private domestic and foreign firms that offer services on a contractual basis to publicly owned water and wastewater systems. These companies can bring additional technical and managerial competency to the water sector, while also accepting a degree of competitive risk.

Water consumers and public and special interest groups are becoming more vocal and better educated about water quality and utility management issues. This is because of a variety of factors, including growing

media coverage of contamination and pollution events, stressed water supplies in some regions, new statutory hurdles for project construction, and competition between environmental and human uses of water. Legislators at the local, state, and federal levels are creating laws that tighten standards (and increase the costs) for water and wastewater services.

During the first half of the twentieth century, wastewater services consisted primarily of collection and disposal, while water supply services consisted of treatment processes and larger investments in reservoirs and pipelines. After World War II, the water sector experienced significant changes driven by accelerating environmental pressures in the 1960s and 1970s. New federal efforts at improving wastewater systems resulted in significant assistance to local communities for constructing wastewater treatment works; however, local utilities were left with obligations for operation, maintenance, and replacement. More recently, public health threats, long-deferred infrastructure maintenance, increases in capacity needs driven by population growth, and reallocation of supplies for environmental purposes have created significant new costs to drinking water utilities (Westerhoff et al., 1998). Increases in wastewater charges necessary to pay for the operation of new plants built throughout the United States in the 1980s generally made it harder to raise rates for water service improvements in the 1990s. Higher operating costs in the 1980s reflected higher standards for compliance and included new requirements for the disposal or recycling of sludge, control of combined sewer overflows, and upgrades. Furthermore, a new effort by the U.S. EPA to better manage nonpoint source pollution is likely to result in additional costs for source control and drainage services. The cost of water has been low in comparison to charges for energy, telephone, television, and waste recycling costs. But customers who envision a future of cheap, plentiful water may be in for some surprises when all water-related services are factored into their monthly bills. Investment deferrals and historic underpricing by many cities exacerbate this situation. Many publicly owned systems continue to be reluctant to charge customers for the true cost of water and wastewater services, although this is not the case for special purpose public agencies or investor-owned utilities. Underpricing of water services may satisfy political goals, but it also undermines economic efficiency and results in higher long-term costs to users.

WHAT DO CUSTOMERS EXPECT?

Water utility customers want adequate environmental protection and public health protection at the lowest reasonable cost. An indication of this was revealed in an American Water Works Association Research Foundation (AWWARF) study (1998), which was initiated in 1993 and

BOX 3-1
Water Utility Customer Attitudes:
A Study by the American Water Works Association Research Foundation

1993 Customer Attitudes

- Most customers are willing to pay the cost to meet federal standards, and most customers were willing to pay up to $10 per month more for water that exceeded federal standards.
- Customers rank clean, safe and healthy, and good-quality water three to five times more important than reasonably priced water, and only 6 percent of the customers list reasonable price as their top priority.

1998 Customer Attitudes

- Getting water that is safe, aesthetically pleasing, and reliable was 10 times more important than reasonably priced water.
- Overall perceptions remained about the same as the 1993 results. About 60 percent of respondents believed that they were getting good to excellent value, and 75 percent ranked utility performance as good or excellent.
- The customers' first priority was in having an uninterrupted supply; significantly lower in priority was affordability.
- The lowest priority was in "public input in making utility decisions."

SOURCE: AWWARF (1998).

updated in 1997 and again in 1998 (Box 3-1) (AWWARF, 1998). The AWWARF survey was followed by a Customer Attitude and Community Utility Communications Survey in 2001. These studies also included the opinions of utility managers who felt that public willingness to pay more was limited or nonexistent. It is clear that the industry initially responded slowly (with some notable exceptions) to customer desires to improve water quality and to their willingness to pay for it.

Because of EPA's requirement for consumer confidence reports, the number of utilities providing detailed water-quality reports with prescribed content has increased. In addition, there is an increased interest in how utility operations affect the environment and water quality, and the public today is generally better informed on scientific and technical issues. A heightened awareness of national security issues since the terrorist attacks on September 11, 2001, is sure to sharpen the public's interest in the security of the nation's water utility systems. Numerous proposals for state and federal legislation to make significant investments in enhancing security, including structural improvements to water and wastewater systems, are currently under consideration.

PUBLIC OFFICIALS AND PRIVATIZATION

Both elected and appointed local officials have been significant forces for change in the water industry. In the late 1990s, mayors and executives from Atlanta; Indianapolis; Lynn, Massachusetts; Milwaukee; and Seattle contracted for water service operations to save money and improve performance. Largely because of the need to repay grants when assets are privatized and the lower cost of borrowing available to municipalities, none of these efforts involved asset transfer or buyout similar to the water privatization effort in the United Kingdom during the 1980s. The lower borrowing costs are due to the state and federal tax exemption for municipal debt. Recent Internal Revenue Service (IRS) rule changes have allowed cities to enter long-term operations contracts, thus reducing the incentive for asset acquisition.

In the 1990s, the cities of Charlotte, North Carolina, and San Diego, California, conducted managed competition between public utility staff and private companies that had invested large sums in the preparation of proposals. However, these were unsuccessful because of union opposition or legal actions. The city of Indianapolis, on the other hand, allowed wastewater utility staff to compete with outside offers to operate and maintain the plant. That contract went to the private firm United Water. The result has been a tightening of utility operations by existing employees and organizations. A major new national program sponsored by American Water Works Association and the Water Environment Federation (WEF)—a program called "Qualserve"—provides a formal employee-based and peer-review procedure to determine appropriate changes in the functions of water utilities. Factors driving local officials toward these changes include long-term cost reduction, obtaining a risk-sharing partner for regulatory compliance, difficulty of attracting new employees with adequate technical capability, and the need to focus civic energies and resources on more immediate social problems.

New laws in Arizona, California, Georgia, New Jersey, and Washington allow utilities to enter into contracts that combine either design and construction, or design, construction, and operations, within a single contract. These contracts can be negotiated rather than awarded to the lowest-cost bidder. States allow cost to be a major factor, but it is only one of the criteria used to obtain the facility and/or the service. The state role tends to be limited to statutory procurement requirements for localities. Only the state of New Jersey has authorized economic regulators (the Board of Public Utilities) to review privatization contracts in order to ensure that cities and ratepayers are adequately protected.

Changes in federal policy also have stimulated privatization activity in the water sector. At the federal level, IRS Revenue Procedure No. 97-13

(passed in 1997) allows, with some exceptions, operating contracts of up to 20 years without sacrificing the tax-free status of these facilities (which were largely financed through federal construction grants). Prior to the change in IRS regulations, federal grant projects risked losing the federal grant if the commitment to private sector operations was greater than five years. This new procedure has had fewer effects on drinking water systems because few drinking water facilities were built with federal construction grants. A potential downside of the movement toward long-term contracting is the possibility of monopoly power. In the absence of competition or regulation, the long-term monopolist may not maintain efficiency or produce anticipated savings.

Changes in tax law have opened the way for the use of design, build, and operate (DBO) contracting. The design and build (DB) approach was originally proposed in the 1970s for wastewater facilities being funded under the Clean Water Act of 1972. However, opposition developed within the consulting engineering community, which felt there would be a conflict of interest if design and construction were not separate responsibilities. Today, many engineering firms recognize that synergies may be created by combining the design, build, and operation components into a single business responsibility and that costs can be saved and a better product produced. In the past, the primary driving forces affecting water utilities were the need to keep costs low, to use the utilities to generate funds for municipal services (primarily in big cities), to relegate utilities to last priority in budgeting, and to delegate utility operations under the "out of sight, out of mind" principle. But contemporary health and environmental priorities have elevated water supply and wastewater management in the public consciousness and have added significant future cost concerns.

CHANGING LEADERSHIP: MANAGERS, ENGINEERS, AND WATER UTILITY PROFESSIONALS

Significant changes in the internal operations and dynamics of water utility organizations are also taking place. The traditional utility manager typically had several years of technical education (and possibly a degree in civil or environmental engineering), was experienced in operations, maintenance, design, or customer relations, or had participated in the construction of major water infrastructure systems. Succession was achieved, usually without formal planning, by progressively promoting new leaders whose tenure in executive jobs frequently exceeded ten years. This leadership was characterized by top-down, clearly recognized lines of authority. These traditional features, however, are changing in a new era of cooperative decision making, public participation, customer rela-

tions, and greater media coverage of utility activities. There has also been a change in educational priorities, with civil engineering candidates studying subjects that emphasize more general concepts or that advance the science of a particular process, as opposed to studying basic public works technologies. At the same time, aspiring young professionals have more interest in sciences, computer technologies, and policy studies. These factors have resulted in water utility staffs with less traditional technical training. More water utility managers today have backgrounds in economics, public administration, and law. These new leaders tend to be more open to change and to be more proactive in urging their peers and support staffs to consider how changes can improve the utility's performance.

CHANGE AND GROWTH IN THE PRIVATE SECTOR

Until recently, the private water sector could be characterized by four separate areas of activity: (1) privately owned and operated regulated utilities that grew gradually through acquisitions, (2) engineering companies that planned and designed new facilities, (3) construction companies that specialized in building water-related facilities, and (4) manufacturers and suppliers of materials and services. There were a limited number of operations contracts, but they were mainly for small wastewater plants.

Investor-owned utilities are facing big changes. For example, water industry consolidations in 1999 occurred at a rapid rate (PWF, 2000a). Foreign firms such as Ondeo (Suez Lyonnaise des Eaux, France), Vivendi (France), some United Kingdom companies, and U.S.-based American Water Works Company, Inc. have made major national and international acquisitions. With regard to standards compliance and reliability, these firms and public agencies face similar challenges. Their growing capabilities are illustrated by the California Water Service Company (San Jose), which operates central services for a group of widely dispersed local systems. By providing laboratory, engineering, and major business assistance, California Water Service Company's services are of interest to small and medium-sized U.S. public utilities faced with increasing demands.

Larger private water companies in the United States usually are regional in nature, extending beyond local geopolitical boundaries and often operating multiple water systems. Private companies could bring professional management, technological expertise, and economies of scale to small and medium-sized water systems. As water rates have often been regulated to meet only the costs of short-term needs, private companies have looked to governments to make the needed long-term investments. There appears to be new regulatory flexibility in some states. For example, Pennsylvania has adopted more flexible processes for approving

regular rate increases, and California routinely approves all increases needed to meet requirements of health authorities.

Although many U.S. engineering companies conduct their business in the traditional mode (i.e., the traditional bidding process), others are forming partnerships for design-build-operate and design-build projects. Some decline to participate in these projects, preferring to play the traditional role as independent adviser to a municipality that is considering some form of privatization. Others incorporate an increasingly wide range of services in their corporate or core responsibilities.

In a world of changing alliances, real and potential conflicts of interest abound (Busch, 1998), and engineering companies must adopt multiple project strategies to succeed in the municipal sector. Construction companies find it relatively easy to move from competitive bidding on a single design to a cooperative bid on a design that they influence. Builders share in the performance risk of the facility that they will construct and are partners—not potential adversaries. The level of risk they are willing to tolerate depends upon their business arrangement. Because this new project approach has only a small share of the market, the bulk of construction company work is still in the traditional bidding mode.

REGULATIONS AND STANDARDS THAT AFFECT SERVICE

Significant and continuous change is a fact of life for water service providers. New laws, regulations, standards, and policies are being developed that will determine performance requirements for protecting public health and the environment. In addition, the range of regulatory requirements faced by today's operators is extraordinary. The following discussion summarizes some of the significant factors that may cause reconsideration of the appropriate balance between public and private roles.

Public health requirements led to the establishment of maximum contaminant levels (MCLs) by EPA, and some states have standards that are more stringent. These requirements are reflected in recent proposals by EPA to lower the arsenic standard from 50 to 10 micrograms per liter and to prevent *Cryptosporidium* organisms from entering water systems. Control of arsenic depends on improvements to several thousand small (serving a population of less than 10,000) systems and to larger utilities (requiring relatively smaller investments). Constructing the necessary facilities is both costly and administratively difficult for small systems. The Safe Drinking Water Act provides for state revolving funds that can be of some assistance, and although overall funding remains at low levels, it is available to both public and private utilities (Appendix B provides an overview of the Safe Drinking Water Act). Most small systems could

benefit by contracting or cooperating with neighbors to implement improvements such as arsenic control. The comparative benefits of using public or private operations to achieve reliable compliance with regulatory standards are being evaluated in Canada. New regulations are likely to continue to create conditions favorable to consolidation and/or regional service contracting.

Environmental requirements of the Clean Water Act are under regular review and have been strengthened as far as nonpoint sources are concerned. Total maximum daily loads are being established for stream systems. Performance requirements for wastewater plants are becoming more stringent. Little financial assistance for compliance is available, and to a large extent, systems funded by previous EPA grants now require rehabilitation. The Clean Water Act and the Endangered Species Act complicate the provision of water services. Compliance with both acts has made more explicit the full costs (including social and environmental costs) of new construction, making new facilities less economically and politically attractive. The effect is to require more effective operations of existing facilities, which in turn requires investment in efficient controls and in highly qualified individuals, who may be more readily available in the private sector.

TECHNOLOGY

The second half of the twentieth century saw substantial improvements in the delivery of water supplies and in wastewater treatment. Improvements in treatment technology, pumps, valves, chemical feeders, and instrumentation and control greatly enhanced performance. The reuse of treatment residuals (sludges) and energy recovery are being more widely practiced. Wastewater reclamation and reuse for nonpotable water supply purposes in urban areas have been adopted widely, particularly where water resources are limited. This integrated approach offers the prospect of more efficient and economical water supply and wastewater management. However, increasing operating costs for wastewater facilities that were constructed largely with federal and state grants is resulting in dramatic increases in operating budgets. Where water and wastewater are billed together, high costs for one have caused resistance to investment in the other service.

Treatment processes, including ozonation, membrane filtration, and use of ultraviolet light disinfection, are rapidly improving. In areas of limited water supply and high demand, demineralization is being seriously considered. Although new technologies have yet to produce economical results, newer, more efficient membranes may become a rela-

tively low-cost option, particularly where brackish waters are available. Investments in these processes and in computerized technology offer great opportunities for better and lower-cost service. Consolidation and centralization of services can make these benefits more widely available. New technologies can be used and the benefits of regionalization achieved by either public or private entities. However, there may be political resistance to cooperation and regionalization (Chapter 5 further examines U.S. water utility regionalization). Private sector incentives may be used to overcome political barriers to the application of efficient technological solutions.

Computerized automation is increasingly used by sewerage and water utilities, primarily to ensure reliability. A common cause of treatment failure is human error, as recent *Cryptosporidiosis* outbreaks in the United States and Canada demonstrate. The opportunity to reduce costs and improve reliability will be increasingly available to technically sophisticated utilities. For instance, unattended operation of treatment plants during periods of low flow, with suitable redundant alarm systems, can improve reliability and reduce costs.

RISK SHARING

Several factors increase the risks associated with operating water and wastewater systems. These risks include the challenges associated with meeting increasingly stringent water quality standards, potential litigation actions by the public, increasing amounts of damage awards, and a low public tolerance for service outages, even during natural disasters. There may be social benefits in reallocating some of these risks, such as a small community water utility partnering with a larger utility (public or private) to share some of the risks associated with water services delivery—provided the risks and responsibilities are clearly defined. The city of Seattle has developed an approach to risk allocation that has been successfully used on several projects (see Appendix C). Seattle and other cities have also demonstrated the value of detailed treatment performance requirements that include transferring risk of regulatory compliance, providing monetary incentives and penalties. However, this requirement may have limited the number of potential contractors willing to accept the risk.

Although it is probably unreasonable to attempt to fully transfer such risks as major natural disasters, the risk of regulatory compliance offers a new opportunity. One way to identify useful approaches is for a public agency to enter into a bidding/negotiation dialogue with private companies regarding the service in question. Public entities have used private

sector contractors for a range of services, but the amount of risk transfer has traditionally been limited. This trend is changing, and public utilities are exhibiting an increasing willingness to consider risk transfers.

REGIONALIZATION AND THE SMALL UTILITY

In general, smaller water utilities have more difficulties in responding to the challenges listed in this chapter. State and federal regulatory agencies have long recognized these difficulties, while some point to the ability of smaller utilities to keep pace with investment needs and increasingly stringent water quality requirements as perhaps the nation's most pressing water and wastewater problem area (EPA, 1999c, 2000). The significance of this problem increases each year and occurs in three main areas: (1) to make efficient capital investment for treatment or rehabilitation, small systems have severe financial limitations; (2) to use modern technology, experts are increasingly needed for design and operation; and (3) sources of supply, treatment, and effluent limitations frequently require regional or basin approaches that are beyond the jurisdiction or political will of local public or, for that matter, private agencies.

In the future, changed practices in the water and wastewater industry, initiated by competition and technology, may offer significant advantages to owners of small municipal systems. Rather than relinquishing ownership, they may be more willing to contract some (or perhaps all) of the responsibility for operating their utilities. Industry changes may provide opportunities for small systems through rate regulation assistance by state agencies, new industry performance standards, and benchmarking information and other services offered by regional private (and perhaps public) service providers. Regionalization is not just a private/public issue. It frequently involves concerns of loss of control over growth and development, or reluctance to give up a local function that has a proud history of accomplishment. Water industry changes now taking place may offer opportunities to preserve these values through carefully managed service contracts.

With few exceptions, publicly owned water and wastewater facilities in the United States have been maintained as independent units even when economic analysis has demonstrated the benefits of consolidation. In 1972, the wastewater grant incentives of Public Law 92-500 and the increasingly stringent discharge standards have occasionally caused consolidations. However, independence was frequently advocated to assure local control even at higher cost. On the national level, larger private owners continue to acquire small private utilities (PWF, 2001). This trend accelerated near the end of the twentieth century, but it has been coun-

tered by municipal systems in which independence has sometimes been valued more than efficiency and steadily increasing regulatory risk.

CAPITAL INVESTMENT

Public agencies are at times reluctant to incur debt. Political arguments at the national and local levels pit advocates of pay-as-you-go financing against supporters of long-term borrowing. Local situations reflect varying factors that affect debt justification such as connection charges, developer contributions in areas of high population growth, economies of scale for treatment plants and pipelines, and the ratepayers' ability to pay today and in the future. The national subsidy in the form of tax exemptions for municipal bonds makes public financing the lowest-cost form of borrowing. If citizens individually or collectively incur debt for long-lived assets, public financing will prove to be least expensive. The history of public finance shows that few agencies are unable to market bonds. Some may pay a higher interest rate but rarely, if ever, is the rate as high as private market rates because of the tax-exempt status of municipal debt, which creates roughly a 20 to 40 percent interest cost gap. This gap is demonstrated in the hypothetical analysis shown in Table 3-1. This comparison is solely for the purpose of showing the advantage of the municipal tax exemption and is not intended to represent a utility's typical budget.

Table 3-1 compares revenues and expenses for the two utilities. The first line contains the end result: the revenue requirement for the government-owned utility ($757,500) is only 75 percent of the revenue collected by the investor-owned utility. Depending on how the tariff is designed, this could translate into water prices a full 25 percent below those charged by the private sector utility. But in order to understand this result, it is necessary to examine the causes for such a large discrepancy and to assess the factors that may mitigate the differences.

Despite this disadvantage, private water companies and some politicians continue to advocate various methods for accessing private capital markets to finance municipal water and wastewater system projects. In addition, the sale of water utility systems to provide a one-time windfall of cash to local communities, at the expense of future water ratepayers, may also be advocated. Except for short-term cash flow purposes, or the rare circumstances of low public credit, municipal debt will remain the most practical and least expensive form of financing.

The availability of financial assistance to small utilities is growing. Federal appropriations since 1997 in the Safe Drinking Water Act State Revolving Funds have been about $800 million per year. Total expendi-

TABLE 3-1 Revenue and Cost Comparisons for Alternative Types of Ownership

Item	Actual Investor-Owned Utility ($)	Hypothetical Government-Owned Utility ($)
Operation Revenue (from user charges)	1,004,000	757,500
Expenses		
Variable operating expense	74,300	74,300
Fixed operating expense	288,900	288,900
Maintenance expense	144,700	144,700
Depreciation expense	88,600	88,600
Total expenses	596,500	596,500
Other Expenses		
Rate case expense (amortized)	7,700	0
Income taxes	89,100	0
Taxes other than income	59,400	0
Total other expenses	156,200	0
Net Utility Operating Income[a]	251,300	161,000
Cost of Capital		
Interest expense	115,200	161,000
Net cash flow to owner	136,100	0
Total cost of capital	251,300	161,000
Balance	0	0

NOTE: The difference in calculated revenue requirements is $246,500. The largest part of this is due to exemption from taxes. Income and other taxes not paid by the government operator total $148,500. This does not represent an efficiency gain for government ownership; it is simply a transfer not made. In more pragmatic terms, if the local government were to acquire the privately owned utility described here, all levels of government would lose $148,500 in tax income. This would be ultimately recovered by either increasing tax rates or other taxes, or reducing government services, or both. On balance, the customers of this utility may be better off under public ownership, but society as a whole may not be.

[a]Net Utility Operating Income = revenue – expenses – other.

SOURCE: Boland (2000).

tures since the program's inception have been about $3 billion, about a third of which has been received by small systems (AWWA, 2001a). States have the discretion to make loans available to investor-owned utilities. However, the state of California has required that the benefits of any such loans accrue to customers of the utility. As a practical matter, the private sector has not participated in these programs.

Allowing the use of tax-free bonds for privately operated water projects serving the public is mandated by Executive Order 12803 (Infra-

structure Privatization, April 30, 1992). The 1997 IRS modifications to Private Activity Bond Regulations provided local governments with some additional flexibility. However, there are still limitations on the use of tax-exempt financing for public-private partnerships. The following actions would allow greater access to tax-exempt financing:

- Eliminate the state volume cap restrictions for water and/or wastewater systems serving the public.
- Assure that revolving funds are available to privately owned/privately operated water and wastewater systems serving the public.
- Accelerate depreciation for private investment in municipal water and wastewater infrastructure.
- Provide flexibility to allow some private equity capital investments in facilities that are also partially funded through tax-exempt financing for water and wastewater infrastructure.
- Modify state law limitations to allow competition through incentive and/or performance-based fee structures for private operation and management of water and wastewater systems.

The Water Infrastructure Network (WIN), a group representing most associations concerned with investment in water infrastructure, issued a 2001 report advocating new federal funding to capitalize state-administered grant and loan programs in the amount of $57 billion through a new generation of state funding organizations called "Water and Wastewater Infrastructure Financing Authorities." The report recommended changes in financial assistance to meet needs that have exceeded recommended grants and loans to municipalities. The suggestions listed above also indicate a growing consensus for further lowering the barriers between public and private financing of water and wastewater facilities. Consideration is also being given to providing incentives and assistance to states to help smaller utilities deal with system upgrades and to facilitate regionalization (see Box 3-2).

SUMMARY

A broad range of forces within the U.S water services sector are providing opportunities for private water firms to extend their services offered to a wider range of customers. The U.S. water infrastructure system faces a large backlog of deferred maintenance. A large portion of the nation's water storage, treatment, and delivery infrastructure was constructed in the late nineteenth century, and much of it is in need of maintenance or replacement. These needs, combined with municipalities that may be unable or reluctant to make substantial investments in water

BOX 3-2
Water Infrastructure Network

Water Infrastructure Network (WIN), which was formed in 1999, is a coalition of local elected officials, drinking water and wastewater service providers, state environmental and health administrators, engineers, and environmentalists involved in drinking water and wastewater infrastructure operations. The Network was formed after the Association of Metropolitan Sewerage Agencies released the report *The Cost of Clean Water* (1999), which recognized the investment shortfall for water and wastewater treatment. WIN recognizes that other financial assistance mechanisms, including public-private partnerships, may address a portion of the issue helping smaller utilities deal with system upgrades and facilitate regionalization. The WIN also recommends that Congress authorize Water and Wastewater Infrastructure Financing Authorities (WWIFAs) to use federal capitalization grants to:

- purchase or refinance outstanding debt obligations of water or wastewater service providers,
- guarantee or purchase insurance for an obligation of a water or wastewater system,
- secure the payment or directly repay principal or interest on general obligation bonds issued by the state if proceeds of the bonds will be deposited into the State Revolving Loan Fund, and
- deposit into a capital reserve for a debt instrument of a water or wastewater system.

As part of the federal funding package design to lower the cost of capital for WWIFAs that choose to leverage their federal capitalization grants for individual issuers seeking to borrow in the public capital markets, Congress should exempt from state private activity bond volume caps state and local private activity bonds for water and wastewater infrastructure, where such bonds (1) are used to finance core water or wastewater infrastructure, and (2) produce public health or environmental protection benefits that are generally available to the public.

This will reduce the cost of financing water and wastewater infrastructure. As important, it will allow communities increased flexibility to more efficiently structure public-private partnerships that bring together the strengths of both the public sector and the private sector.

SOURCE: EPA (1991).

infrastructure, have provided an opportunity for private sector water firms. Customer expectations of high-quality water, along with minimal risks to public health and high levels of environmental protection, provide a water delivery challenge to both the public and private sectors. Some surveys have shown, however, a high willingness to pay for these amenities. In some U.S. cities, such as Atlanta, Indianapolis, and Seattle,

municipal officials have delegated substantial responsibility to private firms for the operation and drinking water or wastewater treatment facilities.

Private companies in the United States and abroad are growing in size and competence, creating new capabilities and a greater willingness to share risks of performance of water treatment facilities. At the same time, water utility officials bring a broader set of educational backgrounds to utility management, and some water utility staff—especially in larger cities with more resources—are receiving training in many aspects of water utility operations. Joint efforts of public and private sector experts have resulted in new and better models for contractual arrangements. At the same time, worldwide tightening of standards for protection of the aquatic environment and public health has fostered new technologies that, with automation, can provide better and more economical treatment and delivery systems.

The pace of change in the water utility industry is accelerating. New standards for performance, continuing concerns about cost and efficiency, and new management cultures and attitudes are creating a pace of change not previously experienced in the industry. Increased use of the private water utility sector will require careful consideration of unique characteristics of each local utility service area.

4

Models of Water Service Provision

This chapter describes various public-private arrangements for water service delivery and some of the experiences gained with shifts in ownership arrangements. Many core issues in debates regarding water services privatization relate to appropriate organizational structures for delivering those services. For instance, are government agencies that operate in an open public forum the most appropriate body to deliver water services? Are water services more appropriately provided by private organizations that are subjected to full market forces? How can efficient and equitable organizations for water service delivery be created? How can a public agency ensure under either public or private operations that the water utility will not cut corners on long-term investments to enhance short-term profits, ignore important conservation programs in favor of increased revenue, or tolerate lower water quality in favor of improving the financial bottom line?

As noted in Chapter 1, water services privatization takes many forms and there are many permutations involving ownership and operation. Most choices regarding privatization do not represent a simple dichotomy between public and private ownership. The decision to privatize various sections of the water utility is complex. Nonetheless, governments are more frequently considering this option and weighing its advantages and disadvantages.

Political considerations represent a hurdle to water utility privatization in the United States. Local politicians fear losing control of a public

utility and the possible losses of their constituents' jobs. Long-standing relationships between local officials and water service suppliers are important, as is job security and the role of labor unions in the operations of the nation's water systems. But public officials must remain responsible for oversight and contract monitoring; for setting, monitoring, and enforcing water-quality standards; for protecting ecosystems; and for bringing the public into the process in an open and transparent fashion. Whether a public or private operation provides water services, failure of the organization to fulfill a community's expectations will result in public protests to the local government. This issue is at the heart of the quandary for the public official: if a municipality decides to privatize, how can public officials ensure that, in case of failure, they can gain sufficient control of the operation to restore service? On the other hand, if a municipality decides to operate the facilities itself, how can the public official ensure that the public's money is being well spent? Private organizations do not necessarily operate efficiently, nor are they inherently more efficient than public organizations. By the same token, public organizations do not always deliver on their promises. The point is that neither public nor private organizations automatically entail "effectiveness." Well-run and poorly run organizations exist in both sectors.

When an organization provides a public good or service such as water and wastewater services, there are often other, more subtle factors integral to the organization's purpose. For example, is the organization to deliver services to all members of the public, regardless of their ability to pay? Or is it to deliver those services strictly based upon customers' ability to pay? Does the community expect the organization to deliver the best service possible, regardless of cost? Or is the lowest acceptable level of service to be provided at the lowest possible cost? Is the operation expected to assist in other public purposes in times of emergencies (e.g., snow removal; recovery from tornado, hurricane, or earthquake damage)? Is the organization expected to help meet other social goals such as giving preference for supply contracts to local businesses, to disadvantaged segments of the population, or to environmentally friendly firms?

Public service delivery is often an important factor in decisions about where people choose to live. If a public utility also provides disaster response teams, grounds maintenance, and snow removal services, important social objectives may be compromised with the restructuring of the public service. Ancillary services such as transport services or snow removal add to the price paid for the service, and if they are not perceived as adding value, consumers may not be willing to pay the additional price. Consumers tend to hold public services provided by governments to different standards than they do most privately provided services.

Public services tend to be monopolistic and are delivered at the same level to all public consumers, and the public collectively expects them to be of a reasonable quality and reliability. The challenge for public officials is that the public determines the measure of "reasonable quality and reliability" while the public may not widely agree on important measures of quality and reliability.

FOUR STRATEGIES

Public officials often select from four broad options for improving the delivery of public services: (1) improve current public operations, (2) contract the provision of all services to a private operation that will provide services largely in the same manner as the current public operations, (3) provide improved service through a public operation with a mixture of public and private services, and (4) divest public assets and transfer ownership to a private firm.

Strategy 1—Improving Current Public Operations

Professional water utility organizations like the American Water Works Association have long recognized the need for public utilities to address organizational and management issues. Public utilities have accordingly taken measures to improve performance through strategies directed at improving worker productivity, upgrading capital facilities, and streamlining procurement of goods and services. Each utility is unique in terms of the condition of its facilities, its organizational structure, and its management. Nevertheless, several initiatives can be utilized to enhance performance and reduce costs.

Several progressive public water utilities have instituted management initiatives directed at improving organizational efficiency. These initiatives focus on performance, procurement of goods and services, labor productivity, and organizational culture. Public organizations are often bound by rules and regulations that can make them unresponsive. Coupled with labor agreements, these barriers sometimes make it difficult to realize improved efficiency. Local governments that want to eliminate the costs of such bureaucratic processes and procedures have two main options: (1) make the municipal bureaucracy more responsive to consumer needs and (2) organize the utility into a stand-alone entity such as an authority, in which case the entity's board of directors would establish personnel, fiscal, and other policy.

An innovative example of a stand-alone entity is the Louisville Water Company in Kentucky, which serves the city of Louisville and surround-

ing communities. Authorized by special legislation of the Kentucky state legislature over 70 years ago, the utility's organizational structure is modeled after a typical private corporation, with a board of directors appointed by the shareholders. The difference is that the sole shareholders are the city of Louisville and Jefferson County, which surrounds Louisville. In this arrangement, the utility operates at arm's length from the governments, freeing it from the usual bureaucratic hurdles, yet a board of directors selected by the governments protects the public's interests and public policy.

Benchmarking and Performance Measurement

Benchmarking refers to the process of comparing the performance of a utility or one or more of its processes or functions with the performance of similar utilities, processes, or functions. The technique ranges from informal comparisons of data to sophisticated econometric analyses, usually statistically linking unit costs of water delivery to characteristics of the environment in which the utility is operating. The procedure has been experimented with extensively in the United Kingdom, where privatized utilities are under the regulatory control of the Office of Water Services (OFWAT). This office uses these comparisons in setting "price caps" for individual utilities, while allowing utilities that exhibit below-average unit costs larger price increases in relation to the rate of inflation (chapters 6 and 10 in Armstrong et al., 1994; ICR Byatt, 1997). There are several challenges in data collection and interpretation, such as difficulties in measuring output, in determining the components of unit cost, and in the use of book values of assets in computing long-run marginal cost. In this regard, the ability to collect cost and output data from similar utilities may be easier with public utilities because of disclosure requirements. In the private sector, much benchmarking information may be considered trade secrets, while public utilities usually openly share information and research efforts.

Benchmarking efforts help public utilities share knowledge and benefit from the latest self-improvement techniques. They can provide an overall assessment of individual utility performance and, more powerfully, they can be utilized to evaluate the performance of components of the business, such as quality of service, quality of product, metering, operation and maintenance, worker productivity, and capital investment. Indeed, seeing how a utility or a utility's business process compares with other utilities creates a powerful incentive to improve performance.

BOX 4-1
Improving Water Utility Operations and Management in the Western United States: Experiences of the San Francisco Bay Area and Phoenix

The East Bay Municipal Utility District (EBMUD) serves 1.2 million customers in Oakland, California, and recently utilized a "reengineering" program to help improve its water system maintenance practices. EBMUD auditors identified the need for a review of business practices in several areas: materials handling, purchasing, work management and scheduling, maintenance needs and setting priorities for repair, information systems, and preventive maintenance. The district decided to initially focus on all processes related to maintenance and issued a request for proposals for a business process review and suggestions for improving those processes. After selecting a proposal and evaluating the suggestions, EBMUD estimated that it could save at least $6.7 million per year (with an initial outlay of $1.2 million) in system technology improvements, and it could improve its organizational climate.

The Phoenix Water Services Department (PWSD) faces several challenges in meeting customer demands. Water service providers across the nation share many of Phoenix's challenges: customer demands for high-quality/low-cost water, limited ability to affect future rate increases, regulatory concerns, aging infrastructure, rapid population growth, and prospects of both regionalization and privatization. The city was especially concerned about the prospects of privatization and recognized that private sector firms held potential advantages over the public sector in many areas.

To help meet these demands and to help improve its performance, in 1995 the Phoenix Water Services Department began an internal review to see how it com-

Organizational Improvement

Organizational improvement, often referred to as "reengineering" or as "capacity building"[1] in the water utility field, represents a set of methods to change business processes and organizational climate. Business process reengineering has been defined as the fundamental rethinking and radical redesign of existing business processes in order to achieve improvements in performance measures such as cost, quality, service, and speed. Reengineering in the water utility sector generally begins with goal setting and an assessment process that includes evaluation of a range

[1]The term "reengineering" (or "capacity building") is used to describe changes in water utility organizational performance. These changes borrow from concepts and methods from fields such as public administration and evaluation. Outside the water utility sector, efforts aimed at improving organizational performance are known by other terms such as "organizational strengthening."

pared with well-run public utilities. The utility was especially interested in union-management relations, and it established a Participating Association of Labor and Management (PALM) group to identify and focus on the key issues. PWSD then initiated a comprehensive reengineering plan that constituted the most ambitious internal change process in the utility's history.

The program focused on several areas, including improved union-management relations, dispute resolution, and employee empowerment. The city enlisted industry consultant assistance and worked with several of its sister agencies within the city and with local unions. The city identified several clear goals in the process: develop empowered, self-directed teams; ensure that no employee would involuntarily lose a job within the city; maintain or improve levels of customer service, product quality standards, and environmental protection; and become a "best in class" water utility, with cost-effective operations. The PALM group sought to move from a reactive maintenance mode to a planned maintenance strategy, to merge formerly separate operations and maintenance (O&M) staff into a combined O&M program, and to emphasize on-the-job training and cross-training (e.g., encouraging staff to develop multiple skills across the utility).

Initial results have been impressive: $3.1 million saved in the first phase of reengineering, with additional savings of nearly $2 million. In 1999, PWSD estimated savings of more than $10 million by the year 2000. PWSD also estimated that improvements in operations efficiencies allowed them to avoid hiring 72 additional staff.

How does reengineering within a public organization compare with the prospects of privatization? According to PWSD director Michael Gritzuk, "Privatization doesn't even begin to address the scope of what a reengineering project can address" (AWWA, 1999).

of business processes that include: work practices, information management and technology, procurement of goods and services, management systems, and organizational structure. Box 4-1 describes examples of reengineering in the San Francisco Bay area and in Phoenix, Arizona. These examples also highlight the importance of including labor to help improve organizational performance. In the East Bay Municipal Utility District (EBMUD) and Phoenix experiences, both labor and management were intimately involved in the evaluation, modification, and implementation of consultant recommendations. Areas addressed included management systems, work task redesign, team building, and strategic use of information technology. Both utilities had labor forces willing to allow workers to perform multiple jobs utilizing multiple skills in exchange for increased compensation.

But improving an organization's overall performance includes more than merely changing its organizational chart. As evidenced in the EBMUD and Phoenix examples, successful change involves an overall

change in the way members of the organization perceive and carry out their work. In initiating useful changes, the organization must understand the nature of its "core culture." Just as societies and cultures exhibit different customs, traditions, and beliefs, organizations also develop unique cultures. The key to initiating successful change is to understand the key elements of an organization's core culture and how they impact utility characteristics such as strategy, leadership, and business processes.

Financial Incentives

Public water utility service professionals have long contended that utility revenues should be kept separate from other municipal revenues and should be directed solely toward the operation and maintenance of existing facilities and the development of new facilities. They advocate cost-based pricing, dedicated revenues, and long-term capital improvement planning and implementation. Many communities have blended water revenues with other government revenues, allowing revenues needed for upgraded capital facilities and/or enhanced operation and maintenance to be diverted to other government services. But this constitutes a lack of transparency and accountability.

In some cases, such as in New York State, municipalities have found themselves unable to finance additional capital improvements because of constitutional limits on borrowing. As a result, capital improvements have been deferred, resulting in increased operation and maintenance costs and in greater difficulty achieving environmental and public health objectives. In New York City, legislation was passed that allows the city (municipalities) to form a water finance authority that could issue revenue-backed bonds. These funds were exempt from the state's constitutional debt limit and were issued at significantly lower interest rates than subsequent city general obligation finances.

Strategy 2—Contracting All Public Service Operations to the Private Sector

Increasing interest in the prospect of private sector involvement in the water and wastewater industries has led to the emergence of "privatizers," which include investor-owned utilities and other private interests that seek an expanded role in water and wastewater services. Some privatizers will operate utilities only where they hold ownership of the utilities' assets; these are often referred to as investor-owned utilities. However, most privatizers will enter into contractual arrangements with public or private water and wastewater utilities to operate facilities they do not own. Such arrangements are usually referred to as "contract opera-

tions." Some firms own and operate utilities while also providing contract operation services. Hundreds of U.S. water or wastewater systems are operated in this fashion. Most "privatizers" actively market their engineering and managerial expertise and, in some cases, also offer special financing arrangements to the contracting utility or municipality.

The outsourcing of noncore services such as meter reading or provision of supplies to specialists is common in both the private and public sector in the United States, as well as in many other nations. Outsourcing arrangements are intended to allow businesses to focus on their core areas by hiring specialists to perform ancillary work. Many U.S. cities and counties have outsourced the design, financing, construction, and operation of many systems, including airports, hospitals, toll roads, and waste-to-energy refuse disposal systems. But outsourcing of services in the water and wastewater sector is of greater significance than in other sectors, as a larger percentage of water and wastewater services are currently operated by their public owners. Contracted duties in the water utility sector include design and construction, financing, and many services included in operation and maintenance of facilities, including laboratory services, vehicle maintenance, meter reading, and public relations.

Governments usually outsource only a limited portion of their water utility operations to the private sector. According to a recent survey of 261 cities by the U.S. Conference of Mayors Urban Water Council (1997), municipally owned water systems operating under contract serve less than 10 percent of the population and municipally owned wastewater systems operating under contract serve less than 6 percent of the population. That survey also found that 40 percent of municipally owned wastewater facilities have some private sector involvement other than engineering, while another 14 percent are considering it. The U.S. Conference of Mayors' survey and a Water Industry Council survey (1999) indicated that the most frequently cited reason for outsourcing of water or wastewater treatment services was the expected reduction of operating costs. Environmental compliance and political ideology were also noted as factors that encouraged privatized operations (Box 4-2 describes the experience with water services privatization in Atlanta).

American Commonwealth Management Services provides guidelines designed specifically for public utility commissions, other regulators, and grant and loan agencies (Schmidt, undated). These guidelines identify the conditions under which contract operation and maintenance services can best be used, as well as the variety of services available (including management, planning, engineering, record-keeping, reporting, evaluation functions, etc.). The U.S. Environmental Protection Agency has also prepared a quiz (Box 4-3) for municipalities considering contracting operations and maintenance for a wastewater facility (EPA, 1993).

BOX 4-2
Water Services Privatization in Atlanta

On January 1, 1999, the United Water firm assumed operation of the city of Atlanta's water system after nearly a two-year process of public debate, bid solicitation, and selection. Under a 20-year agreement, United Water operates a 136 million gallon/day and a 56 million gallon/day water treatment plant along with approximately 2,400 miles of transmission and distribution water mains. They also provide the utility's water system maintenance, customer service, and billing and meter reading services. In the Atlanta area, United also operates three wastewater treatment plants in northern Fulton County (Campos et al., 1998).

The 20-year water agreement provided for $21.4 million in annual compensation to United Water in return for water services to 1.5 million residents. This represented nearly a 50 percent reduction in operating costs when compared to operating expenses of the municipally run utility in 1998. Although no independent studies have been completed to determine actual savings since United Water has taken over operations, United and city officials at the time of signing the agreement had projected $400 million in savings over the life of the agreement. The savings are expected to go into capital maintenance and replacement programs rather than reductions in water rates.

United Water is the North American subsidiary of parent company Ondeo, a Paris, France based multinational conglomerate. In 2000, Ondeo had revenues of $8.5 million with operations in 130 countries.

U.S. Internal Revenue Service Regulation 97-13 allows contract operators with the financial strength to guarantee long-term performance an opportunity to lock in a municipally assured cash flow of up to, and sometimes exceeding, 20 years (see discussion in Chapter 3). This made it economically reasonable for a utility to operate at a loss for several years as long as it was reasonable to expect to recover that loss in the latter years of the contract. The long-term contract also made possible major infrastructure investment, 20 years being a sufficiently long time to fully depreciate investment in equipment and collection and distribution systems. The long-term contract has allowed contractors to offer municipal clients an "up-front" fee for the right to operate for 20 years. Of course, this fee (often called in the United States a "concession fee") is factored into the annual charge to the client for system operation. Although continuing to remain small relative to the total U.S. population served, following IRS 97-13, the number of large cities contracting for their water and wastewater operations has increased. The award of a long-term contract typically does not depend on lowest price alone but rather on best value—i.e., best combination of successful operating history, financial strength, technical expertise, and price. Nonetheless, most contracts are awarded to the company offering the lowest life-cycle cost.

BOX 4-3
Considering Private Operations and Maintenance: EPA's Quiz for a Municipal Wastewater Utility

If your answer to most of the following questions is "yes," then you may want to seriously consider using contract operations and maintenance.

- *Design problems?* Has the plant had trouble meeting design specifications from the beginning? Have increasing design problems come to light as the plant has aged? Has staff had to jerry-rig solutions to design problems too often? Is the plant being run to design parameters?
- *Excessive costs?* Has the wastewater budget been increasing disproportionately as the plant has aged? Are replacement costs high? Are the same items being replaced too frequently?
- *Personnel problems?* Is morale low? Is staff over-worked, but poorly utilized? Is staffing out of synch with work-load and shift requirements? Are there labor-management disputes? Is salary not commensurate with performance? Is staff hard to acquire and keep?
- *Public-image issues?* Do citizens complain about over-flow and backup problems? Odors? Appearance? Higher user charges? Water-quality problems?
- *Operating inefficiencies?* Do plant managers fail to take advantage of opportunities for cost savings or economies of scale? Are certain operating units underused? Have chemical or energy costs risen excessively?
- *Compliance difficulties?* Has plant effluent frequently been in violation of standards? Has the plant experienced enforcement actions? Is compliance regularly marginal? Are periodic problems from industrial loads frustrating compliance?
- *Training issues?* Do plant managers fail to provide training in a consistent, effective manner? Is staff inadequately prepared to deal with sophisticated equipment? Are there too many specialists and not enough generalists on staff? Does the plant have above average safety problems or lost-time accidents?

SOURCE: EPA (1993).

In addition to national-level regulations, the International Organization for Standardization (ISO) has developed a set of international standards for utility performance. Based in Switzerland, the ISO provides a basis for certifying enterprises based upon performance benchmarks. Certification under ISO 9000 and ISO 14000 uses a standardized system for assessing company performance, particularly in terms of resource management and environmental protection. The U.S. representative to the ISO is the American National Standards Institute (ANSI), whose membership includes more than 1,000 private and public members. ANSI administers and coordinates a voluntary standardization and conformity assessment system in the United States, and provides formal national standards.

Compliance with ISO 9000 and 14000 has been included in water privatization service contracts in the United States, and the familiarity of prospective contractors with ISO procedures has been part of evaluation criteria. A proposal by France to have the ISO set standards for contracts on water privatization around the world was approved in late 2001; as this report went to press, the ISO was establishing a committee to enact this proposal.

Private firms may not be able to assume operations and willingly invest significant resources to fix a water utility's ills and also reduce prices. Private companies and their shareholders will not invest money in a local community without receiving reasonable returns on investment. Over the short term (5-10 years), private firms are most likely to effect changes in organizational structure and functioning, such as staff reductions and supply cost savings that help achieve cost and service efficiencies. The resulting savings may be sufficient to pay for needed capital investments and pay the needed return to the firm's shareholders.

Contractors accomplish operational benefits and savings in cost by being energy-efficient, purchasing-proficient, staffing and training oriented, economically positioned, technically deep process-control versed, automation-knowledgeable, and improvement-astute (PWF, 1994). In Farmington, New Mexico, for example, a 30 percent reduction in water system operating costs was attributed to consolidation of the maintenance groups of different facilities, the installation of management control systems to save on power and chemicals, and the implementation of changes in physical facilities to promote more efficient utilization of the utility plant (Haarmeyer, 1992). On the other hand, it is possible that contractors might achieve cost savings by cutting staff, by not making necessary investments in operations and maintenance, and by reducing necessary long-term investments.

When a public utility's operations are handed over to the private sector, the public agency's importance in running the agency does not diminish, but the way the agency performs its role changes dramatically. For the local government, it becomes a question of contract management versus traditional program management. When a contractor provides the operations, the local government organization's focus is on contract management. The talents and skills needed for contract management are significantly different than the talents and skills needed for traditional operations management. The importance of reorganizing for contract management must be recognized. After all, if an agency could not capably manage itself, it probably would not be able to immediately change and effectively manage outside contractors (Scalar, 2000).

Successful contract operation arrangements ultimately rely upon a good working relationship between the contractor and the public agency.

This relationship begins with a contract that clearly states the unified purpose of the function being turned over to the contractor, a well-defined understanding of customer preferences, and a description of the division of responsibilities between the contractor and the public agency. Each of these responsibilities requires specific performance measurements to assure that the contractor has performed up to expectations and is deserving of the prescribed compensation. Clear and measurable performance indicators are essential to answer questions such as "How will we know if the private operating firm is meeting the terms of the contract?"

Under a well-designed agreement, full-contract operations firms can help pay for the cost of some capital improvements, provide corrective and preventive maintenance, apply specialized knowledge and experience, install computerized management systems, prepare regular reports, document and disclose costs and savings, implement sound management and staff motivation practices, and assume most utility-management headaches (EPA, 1993). Many contract firms prefer to operate under a contract of five years or more so that they can establish a track record with the client, prove their effectiveness, and spread their front-end costs over several years. Some contracts require that the contractor pay fines for violation of drinking water and effluent standards.

Small and Rural Contract Operators

The practice of contract operations has been common in the United States for small and/or rural communities including suburban or ex-urban subdivisions and mobile home parks. Water or wastewater systems for such communities generally serve less than 3,300 households and businesses. In the United States these systems make up 78 percent of all drinking water systems, with a majority of these small systems serving fewer than 500 people (EPA, 1999a; see also Chapter 1). For these small or remote communities, it has often been economical for a specialized contractor to oversee water and/or wastewater system operations of several small communities, rather than to burden a community with a service that might require only a few hours per week of attention. Most contract operators in the country remain small, local "mom and pop" type businesses. According to the EPA, there are approximately 46,000 small and remote water operations in the United States, but they constitute only 15 percent of the volume of water processed (EPA, 1999a). The percentage of these systems that are under contract operations is unknown, but the needs of these small operators and the manner in which these operators interact with their clients and communities differ markedly from large regional companies or large multinational conglomerates.

The needs of firms that operate small and/or rural water utilities differ from those of the major multinational companies. Small utilities cannot take advantage of the economies of scale to the extent that larger utilities can. Small firms usually do not have access to specialized technicians that multinationals retain. The borrowing and bonding power of large firms is essential for competing for and operating large water and wastewater systems. Rural firms are often protected from competition by oft-renewed short-term contracts perpetuated by the long-term involvement of the firms with the community. Small and rural firms also are often too dispersed for multinational firms to be effective competitors, and contracts tend to be too small to be of interest to these large companies.

Contract operators headquartered near the site of operations may have a better understanding of local needs. A relationship may eventually develop between the facility owner and an efficient operator. An operator may have a competitive advantage by being headquartered near the site. The operator may have a detailed understanding of the needs of the facility and the community it serves. In many cases, the contract operator is a former municipal employee stationed at that plant and certified to operate it. The contract operator typically negotiates directly with the owner for the terms and conditions of the contract. Contract terms are usually between one and five years. The contract is typically renewed on a sole source basis for the same reasons it was initially consummated. If the relationship is mutually satisfactory, the level of trust and familiarity that can develop between a client and contractor can create a barrier to new entrants competing for the contract. There are occasions, however, when a contractor terminates a satisfactory partnership. The principals of a contract firm may retire, sell their business, or die. A larger contractor may offer such significant improvements that the community is induced to open the contract process to competition. Such competition from larger regional or national contract operators has occurred more frequently since the mid-1990s.

In 1997, a National Research Council committee reported on small water systems (NRC, 1997). The report noted that water supply is generally acceptable if a well with an ample supply of good-quality water is available. However, this is often not the case, in which event problems are likely to ensue. Improvement costs are high, and the original contractor may not be qualified to make the changes. Small communities that lack sufficient resources for water treatment and distribution can have difficulty meeting federal Safe Drinking Water Act standards. Systems serving fewer than 500 people violate drinking water standards for microbes and chemicals more than twice as often as systems serving larger communities (NRC, 1997). A key problem concerns small, private developers that

build a community distant from a city, where land costs are lower, and they put in their own water supply and wastewater treatment and disposal facilities. Getting approval is generally no problem as the technology is widely employed. The developer or a homeowners association generally owns the facilities, and they almost always contract out the operation and maintenance to private contractors.

Wastewater problems are far more numerous. Package plants for these small communities are "off-the-shelf" but require competent operation and maintenance. Their failures come to the attention of regulatory agencies only when a nuisance is created and complaints are made. In many cases, the facilities put out a poorly treated effluent that is not discerned because it reaches a point of disposal without creating a nuisance. State regulators seldom have the resources to monitor the facilities. Private assistance can be helpful, but small, local private contractors are often not fully qualified, and the facilities are too small to warrant a large and competent contractor's interest. Public or private regionalization (the assumption of the operations of multiple water or wastewater systems in a given area by a government agency or a private organization) is a viable strategy that has proven to be useful in both circumstances. For example, the Greater Cincinnati Water Works, a department of the city of Cincinnati, Ohio, has actively pursued regionalization strategies by providing smaller utilities with technical and operational assistance, wholesale supply of finished water, or a merger of operations into the larger utility when desired. Similarly, the American Water Works Service Company has pursued a specific strategy of purchasing or entering into contract operation agreements with groups of small utilities. These types of regional approaches, which can be accomplished by either public or private organizations, achieve economies of scale from common operations, as well as improved customer service through an organization with access to greater technical and operational skills.

Strategy 3—Combining Public and Private Roles

A third option for public utility officials considering improvements is a mixture of public and private services within the utility. This approach implies that the efficiencies that a private firm can achieve in the operations of specific tasks of the public utility can be achieved at less cost to the consumer despite the need for shareholder return. The key with this option is a careful review of the utility's operations to determine which parts can more efficiently and effectively be provided by internal resources versus outside "private" resources.

In reality, a mixture of public and private services within a utility operation has been a common practice (albeit on a limited scale) for de-

cades. Many U.S. utilities have often used engineering firms to design, prepare bid specifications, and manage construction of new facilities. Some utilities contract with private firms to provide billing and meter reading services, and most utilities use private firms to perform specialized maintenance tasks and laboratory services. However, with technological improvements and extensive use of the Internet, utilities have been able to effectively merge public and private services and to use private firms' services to a larger extent.

The EPA has long advocated the use of public-private contracts as a means of addressing the rising cost of complying with critical environmental regulations (EPA, 1990). The EPA believes these types of partnerships will help reduce costs, speed project completion, guarantee performance, and preserve jobs (EPA, 1990). Some common types of partnerships are summarized in Table 4-1.

The EPA has documented some successful public-private partner-

TABLE 4-1 Public-Private Contract Options

Partnership Option	Description
Acquisition	Public utility sells the facility to private contractor, resulting in private ownership and operation.
Joint Venture	Private contractor owns facility in conjunction with public utility.
Build, Own, and Transfer (BOT)	Private contractor builds, owns, and operates the facility. At the end of the specified period, such as 30 years, the facility may be transferred to the public utility for a nominal fee.
Turnkey Facility	Private contractor designs, constructs, and operates the facility. The public utility retains ownership and generally assumes the financing risk, while the private contractor assumes the performance risk for minimum levels of service and/or compliance.
Full-Service Contract	Public utility contracts with private contractor for a fee to operate and maintain the facility. The public utility owns the facility (although it may have been built by the private contractor).
Contract Operations	Private contractor operates and maintains the public utility's facilities over the long or short term.
Contract Management	Private contractor manages and supervises the public utility's personnel.
Operations Assistance	Private contractor provides transition management or program management to improve effectiveness of the public utility's operations.

ships, including projects in Mount Vernon, Illinois (construction and operation of a wastewater treatment plant); Scottsdale, Arizona (creative financing for drinking water supply); Dowingtown, Pennsylvania (regionalization for upgrading and expanding wastewater treatment facilities); and Kerrville, Texas (competitive negotiation for financing wastewater treatment facilities). Examples of other successful partnerships include the Western Carolina Sewer Authority (two-step competitive bidding for wastewater treatment plant construction and operation) and the Seattle, Washington, Tolt River treatment plant project. Two major privatization initiatives in wastewater treatment (in the city of Indianapolis and the Miami Conservancy District in Ohio) are EPA demonstration projects that will be closely monitored and analyzed. In the year 2000, over 60 competitive government contracts were announced, totaling $113 million in annual revenues (PWF, 2001).

A form of public-private partnerships that has recently gained a wider acceptance is the use of design-build or design-build-operate agreements between public agencies and private firms. In the construction of a capital asset, water utilities can enter into privatization agreements at three separate stages in the development of a capital facility: (1) prior to the design of the project, (2) after completing the preliminary design, and (3) after completing the final design, but prior to construction (Westerhoff, 1986). Each approach has unique advantages and disadvantages. For example, the first approach provides the private firm with the opportunity to construct a facility that it views as the most cost-efficient. The second approach can facilitate joint development of the project, so that the interests of both parties are served. The third approach provides the water utility with maximum control over the design of the project before the private firm begins construction. Box 4-4 shows case studies of DBO projects in Seattle and New Jersey.

Growing Interest in the Design-Build-Operate Model

The design-build-operate model (DBO) of public-private water system partnerships has become popular with some contract operators and private water companies. In this model, one corporate entity, possibly composed of a partnership of several companies, has responsibility to design the water or wastewater facility or system and then build and operate it under contract for a period, typically between 15 and 25 years. The advantage of this system is that the designer is motivated to anticipate operation problems and to design for the best overall performance over the contract period. Financing of the project may also be included as a contractor responsibility although the contracting community typically retains ownership.

BOX 4-4
Design-Build-Operate Projects in Seattle and New Jersey

Seattle: One notable example of cost savings through the design-build-operate model is Seattle's 1997 procurement of a new 120 million-gallon-per-day water treatment plant following substantial completion of a conventional design. The estimate for the construction and operation costs of the conventional design was $171 million over the 25-year maximum project life. The selected DBO proposal was for $101 million, providing savings of $70 million, which is 41 percent of the engineering estimate.

The city is also proceeding with the Cedar Treatment project to treat 180 million gallons per day with provisions to treat 275 million gallons per day, at an estimated DBO savings of $50 million over the estimated cost of a conventional procurement process. The project enhances Seattle Public Utilities' (SPU) existing multiple barrier approach to provide reliable public health protection and specifically provide treatment for *Cryptosporidium*, and it addresses the non-health-related taste and odor issues associated with the Lake Young reservoir on the Cedar supply.

CEDAR TREATMENT PROJECT	Capital Cost (permitting, design, construction, in millions $)	Operating Cost (25-year present value; in millions $)	Total (25-year present value; in millions $)
SPU's estimated cost for design, build, and construction of thefacility using a conventional design-bid-build contracting approach (in 2001 dollars)	$115.0	$49.0	164.0
Amount negotiated with contractor	$78.0	$31.0	109.0
Add estimated cost of SPU oversight	$3.0	$1.30	4.3

The contractor that provides the proposal deemed most advantageous to the community must deliver a finished facility to the community on a certain date and at a guaranteed cost, and the facility must be able to pass an independent test of its performance. After passing an "acceptance test," the facility is placed in service and is operated by the contractor. In this model, one entity bears full responsibility for all elements of the project from design through 15-25 years of operation. This differs from conventional municipal procurements, which typically have started with the noncompetitive selection of a qualified engineering firm to design a new facility under a professional services agreement. Construction of the facil-

New Jersey: A similar but smaller project in Washington Borough, New Jersey demonstrated the differences between the conventional and the DBO model. (Mangravite, 1999). The initial engineering estimate for construction of this 3.6-million-gallon-per-day wastewater treatment plant was $11 million. Private firms offered a combined design-build-operate procurement as a means of reducing overall cost. The borough invited the firms to develop nonbinding conceptual proposals. The Borough and its consultants compared the conventional engineering-construction model of procurement to the design-build-operate model. The Borough's consultants prepared a Request for Proposal for each concept. On the same day, November 7, 1998, the Borough received cost proposals for a DBO project and construction bids for a conventional design. After comparing the costs and benefits, including time to completion and full life-cycle costs, the Borough voted to negotiate with two DBO firms. The DBO advantages were the shorter DBO construction period, a design cost of $370,000, 58.4 percent lower than the estimated cost of sole source conventional design fee, and lower construction costs. The proposed construction cost in the conventional model averaged $10.28 million, which was close to the $10 million estimate, about 10 percent below typical construction costs for a project of this nature. The construction price for the selected DBO proposal, after subtracting cost of design and management, was $7.4 million. This is 16 percent lower than proposed in the conventional model for Washington Borough and 25 percent lower than is typical for this type of project.

SOURCE: Mangravite (1999).

ity is then publicly bid, with the award going to the lowest bidder. After start-up, the municipality operates the facility. In a DBO procurement, the DBO firm is the construction manager. This is done to aggregate all design and construction liability. It also eliminates change orders for all but uncontrollable circumstances.

Another area where privatization can be used is in the development of joint water projects among two or more utilities (Hardten, 1984). The utilities can enter into an agreement with a private firm to develop source of supply, treatment facilities, and possibly distribution networks. By serving more than one community, joint projects can help the utilities share

costs and realize economies of scale. Joint projects also facilitate regional water supply planning and environmental management of water resources.

Lease Financing

For utilities willing to delegate some elements of control, especially ownership, leasing has emerged as an alternative technique for financing equipment and facilities for water utilities. For investor-owned utilities, leasing is a means of reducing equipment costs and eliminating construction expenditures. For publicly owned utilities, leasing is a form of privatization, as well as a means of compensating for the reduced availability of federal and state government construction grants. Leasing can be complex, with tax consequences for the lessee (the water utility) and tax benefits for the lessor (the private firm providing the leased good or the lender). The simplest form of leasing is the direct lease (AWWA, 1986). A leveraged lease is a more complicated three-party lease in which the lessor (the owner) acquires financing from a third party (the lender) for the bulk of the cost of the equipment or facility. A third form of leasing involves certificates of participation (AWWA, 1986).

Leasing provides several advantages for the various parties involved. The primary advantage for the lessee (the water utility) is the capability to have equipment or facilities in place more quickly because of fewer obstacles than with conventional financing. In other words, private financing results in less regulatory oversight, fewer delays in bringing the equipment or facilities on-line, and lower aggregate project costs. The leveraged lease has some unique advantages. For tax purposes, the lessor owns the equipment or facility and thus qualifies for federal tax benefits based on the total equipment or facility cost. The third-party lender receives interest payments that generally exceed those associated with comparable loans. The lessee receives the benefits of lower equipment and facility costs. By transferring a portion of the tax savings linked to equipment purchases and facility construction, the water utility can obtain external financing, thus saving water customers substantial capital costs.

Lease financing has additional advantages (Crane, 1987). Leasing frees some funds for other purposes and reduces the risk of obsolescence associated with aging equipment. In a regulatory context, lease financing can be viewed as a technique for coping with rate shock (large increases in rates to generate sufficient cash to pay for expensive equipment or building replacements), because it alters the capital recovery pattern for the investment. Lease financing permits expense treatment rather than rate-base treatment of the equipment or facility. With rate basing, investments in capital assets (buildings and equipment) begin with high front-end

costs that decline over time with depreciation. The large cash outlay at the time of purchase requires significant rate increases to raise the needed cash. With leasing, level payments are made indefinitely. Leasing can reduce initial revenue requirements and result in lower initial rates, although ratepayers actually may pay more for equipment or facilities in the long term. A similar example would be purchasing versus renting a home. In the purchase arrangement, the new homeowner usually pays a sizable upfront down payment on the purchase price and then makes monthly mortgage payments. Once the loan is repaid, the homeowner holds title to the asset and no longer has to make payments toward its purchase. On the other hand, the renter usually makes lower monthly payments for the use of the home and does not have to make a sizable upfront payment. But because the renter never owns the home, he or she will have to make payments indefinitely.

Disadvantages to lease financing also exist. Leasing essentially shifts some costs from capital to operating expenditures, depending on how lease payments are accounted for. In all leasing arrangements, insurance costs can be substantial since the lessor will require that the lessee be fully insured. In a leveraged lease, transaction costs are substantial, given the number of parties involved and various tax and legal complexities. With certificates of participation, the use of purchase options requires that interest-rate protection be provided to the investors. Finally, lease financing means that the water utility cannot earn a rate of return on the leased asset.

At the completion of the lease term, if the water utility does not want the facility, the lessor is left with an unwanted facility and the risk of being regulated by a regulatory commission. Changes in tax rates may result in lessors not receiving the anticipated tax savings. Lenders face the risk of defaults on payments of interest and principal. Problems with lease financing result primarily from each party having a different view of the arrangement's advantages and disadvantages. The lender seeks a high return on borrowed funds; the lessor is concerned about the repayment of capital and tax benefits; and the lessee is concerned about the impact on costs, revenue requirements, and fulfilling the obligation to serve should something go wrong.[2]

Strategy 4—Private Ownership of Utility Assets

Turning over ownership of utility assets to an investor-owned utility is the most extreme form of privatization, but there are situations where

[2]A bankruptcy by the lessor, for example, could force a sale of facilities, which may not be in the best interest of a utility or its customers.

this might be the best path to follow (Table 4-2 lists the major U.S. investor-owned water utilities).

There are several potential advantages of asset divestiture as a strategy (Beecher, 2000). Local government is released from direct responsibility for managing and planning operations. Monitoring of responsible operation is typically assumed by a state regulatory agency. Divestiture may facilitate regionalization and the integrated operation of water and wastewater facilities. Operating practices, pricing of services, and financing are removed to a greater distance from local politics, while opportunities for fraud and nepotism may be reduced. The privately owned utility will

TABLE 4-2 Larger Investor-Owned Water Utilities in the United States

Water Utilities	Operating Revenues (in millions $)	Residential Customer Connections	Total Water Delivered to System (in billions of gallons)
Pennsylvania American	291	495,917	71
New Jersey American	244	300,755	52
California Water Services	203	339,278	109
Southern Californa (American States)	160	238,511	64
Philadelphia Suburban	151	280,779	40
Elizabethtown (Thames)	133	187,993	49
United New Jersey	124	160,651	38
San Jose Water Co.	116	191,461	51
St. Louis County	106	285,954	61
Indianapolis	94	237,332	51
Bridgeport Hydraulic (Kelda)	92	123,837	25
West Virginia American	78	141,674	19
Illinois American	74	131,255	32
Indiana American	73	152,004	28
California American	68	91,934	24
San Gabriel	53	76,649	28
Florida Water Services	53	129,996	N/A
Middlesex Water Co.	41	51,300	17
Long Island (American)	35	68,271	11
Baton Rouge	34	127,700	21
Suburban Water Systems	32	63,959	17
Tennessee American	32	59,963	14
Virginia American	30	43,929	14
Northwest Indiana (American)	27	57,415	14
United Idaho	26	57,638	16

SOURCE: Adapted from NAWC (1999).

have greater freedom in dealing with the workforce and, through cross-training and other steps, could increase labor efficiency.

Cities that sell their assets can use the proceeds for other municipal purposes. The investor-owned utility becomes a tax-paying corporate citizen. Importantly, asset sales place the utility under the purview of independent state economic regulators who often have a greater capacity for oversight than do local governments. Regulation removes the system from local political processes and provides a powerful system of accountability and performance incentives. Economic regulation requires less duplication of expertise and management than does oversight of privatization contracts.

The National Association of Water Companies commissioned a study of 29 water utility privatizations, which were motivated primarily by the large backlog of needed investments and partly by cash-flow concerns (NAWC, 1999). The projects resulted in operating cost savings ranging from 10 to 40 percent, and previously planned rate increases were avoided. The nine divestitures resulted in asset acquisition payments of $537 million, concession fees of $35 million, and facility investments of $55 million—a substantial infusion of capital to the local communities involved.

There can be disadvantages or risks that are unique to this form of privatization. The valuation of utility properties is difficult, while the resulting upfront payments constitute a one-time windfall. Reacquiring the assets may require the city to exercise powers of eminent domain and can be costly. The city would also need to reacquire expertise in management and operations. The financing and tax advantages of public ownership are lost, and rates may have to be increased to pay for the costs associated with financing, taxes, and profits, particularly if water has been underpriced relative to actual costs. Advocates of private ownership contend that efficiency gains help offset these costs. Economic regulation and cost-based ratemaking may not be considered desirable. The major barrier to asset transfer, however, is the perceived loss of control, a perception exacerbated by the consolidation and globalization of the investor-owned water industry.

ASSURING SUCCESSFUL CONTRACTS

Local officials can implement a variety of safeguards to protect the interests of their communities and their citizens in the privatization process. When considering privatization, local government officials should perform a series of analyses to evaluate water system needs, review current technologies, assess vendor interest, compare risks and benefits, inventory financing alternatives, and appraise legal and regulatory consid-

erations (Raftelis Rate Survey, undated). Fortunately, information sources on how to contract for public services are fairly well developed. For example, public officials can draw on a wealth of information about competitive bidding processes.

Certain safeguards are based on common sense, while others may require more technical capability. Contracts involving larger communities can be complex, and the risks associated with failure can be very high. Yet for small communities, the potential risks are at least as significant because of constraints on local resources. There are also significant health and environmental considerations associated with community water supply, regardless of community size, because even a small mishap in a small community can have serious consequences. Ideally, privatization will enhance, not detract from, compliance with environmental and health standards.

RISK MANAGEMENT

Risk management is an essential part of any privatization agreement. Local government officials can ill afford to enter privatization agreements without a careful analysis of risks and a clear delineation of risk management methods (see example in Appendix C). Savings from privatization will not be realized if the privatization contract allocates costs and risks to the public entity and does not provide the contractor with adequate incentives for efficient and effective performance (Holcombe, 1991). The enticement of profits without risk sharing and accountability will not serve community interests.

According to the EPA, "public-private partnership agreements are designed to allocate risks among the parties in proportion to their abilities to bear risks, and to control factors associated with those risks" (EPA, 1990). Privatization agreements are inherently large and complex because of the numerous parties involved and the range of issues that are covered (construction, operation, technologies, and finance). Professional assistance could prove useful to community leaders in structuring privatization agreements in order to ensure protection of community interests.

CONTRACT OVERSIGHT AND EVALUATION

Continual oversight is a key part of any privatization arrangement. Three key issues for local government officials to consider are the costs of monitoring, alternative monitoring techniques, and responsibility for monitoring (Rehfuss, 1990). Monitoring costs can be significant. Monitoring techniques include inspections, reports, complaints, and accountability and performance standards. Officials at different levels within the

governmental agency can perform monitoring, and an arrangement working well in one organization for one type of contract may not work well under different circumstances.

Some privatization advocates have suggested that the renewal of a contract is proof of success. But contracts may be renewed for a variety of reasons, including the tendency to maintain the status quo, limited alternatives, and the economic and political cost of "undoing" an agreement in place. Politicians usually invest some political capital in the decision to privatize and are generally reluctant to reverse the course. Evaluating successes and failures of water services privatization must reach beyond the single measure of contract renewal. A broader concern is whether privatization achieves desired outcomes and is truly "successful." These outcomes can be measured not only in terms of the provision of water services, but also in terms of economic, environmental, and social goals. Sound evaluation criteria can provide a framework for assessing whether privatization is living up to its promises. Evaluation criteria and methods of evaluation might include but are not limited to the following:

- economic efficiency, as measured in cost effectiveness and cost and benefit terms, as well as in rate impacts on customers;
- environmental quality, as measured in terms of compliance with federal and state water quality standards and indicators of environmental quality;
- customer satisfaction, as measured in opinion surveys, service performance, and complaint records;
- labor relations, as measured in worker safety, benefits, retention, and satisfaction;
- corporate citizenry, as measured in terms of the contractor's presence and relationships in the community;
- equity considerations, as measured in terms of the extension of water services to those less able to afford them; and
- transparency, as measured in terms of public access to meetings and contractual processes.

Evaluation criteria are ideally established early in the process. Mechanisms for monitoring and data collection can subsequently be put in place.

SUMMARY

Public organizations should focus on improving their services to the public and in meeting customers' expectations through responsible expenditure of public funds. The goal of providing water services to the public can be achieved by a public organization or a private organization

or by a combination of both. How a community's public officials choose to provide these services depends on community-specific circumstances. Organizations can be improved by focusing on identified deficiencies or by undertaking a more comprehensive strategic planning process that establishes goals and options and that optimizes the conduct of each operating function based on measured benefits and costs. With a commitment to systematic improvements, both public and private leadership can open a flow of innovation from middle managers and rank-and-file employees so that all employees do their best work in the public interest. For any organization to reach its potential, it is essential for the top members to help the organization maintain a focus on its key objectives. The leadership must encourage an organization and its staff to take significant steps offered by innovative opportunities when warranted, without fear of reprisal from failure.

5

Structural, Pricing, and Regulatory Issues

INFRASTRUCTURE AND CAPITAL INTENSITY

Water and wastewater services require a vast but largely "invisible" infrastructure network that belies its capital intensity. Capital costs are concentrated in source-of-supply and water treatment facilities, transmission and distribution systems, and pumping equipment. Utilities in the energy and telecommunications sectors devote a greater proportion of the revenue dollar to operating expenses than does the water industry (Table 5-1). Even more significant is the ratio of net utility plant to revenues. For investor-owned water utilities (using 1998 data), this ratio is about 3.5:1, which is more than double the ratio found in the other sectors. The capital intensity of the water industry may actually be on the rise (Beecher, 1996). The water sector's capital intensity means that fixed costs are a key characteristic of the industry's cost structure. "Fixed costs" are infrastructure costs associated with water supply, treatment, and distribution. It is thus difficult to reduce capital costs, and even substantial savings in operating costs can help offset capital costs only to a limited extent.

Economies of Scale and Scope

Larger water systems can produce, treat, and deliver water at lower unit costs (dollars per gallon) than smaller systems because of economies in the use of labor and scale economies in raw water supply, water treat-

TABLE 5-1 Capital Intensity for Major Utilities

	Amount (in billions $)			
	Electric Utilities (1998)	Natural Gas Utilities (1996)	Local Exchange Carriers (1999)[a]	Water Utilities (1998)
Operating Revenues	217.8	62.6	113.2	2.8
Operating Expenses	186.1	59.4	93.1	2.2
Net utility Plant	328.2	77.7	165.8	10.1
Ratio of Operating Expenses to Operating Revenues	0.85	0.95	0.82	0.76
Ratio of Utility Plant to Revenue	1.51	1.24	1.46	3.52

[a]Telecommunications companies

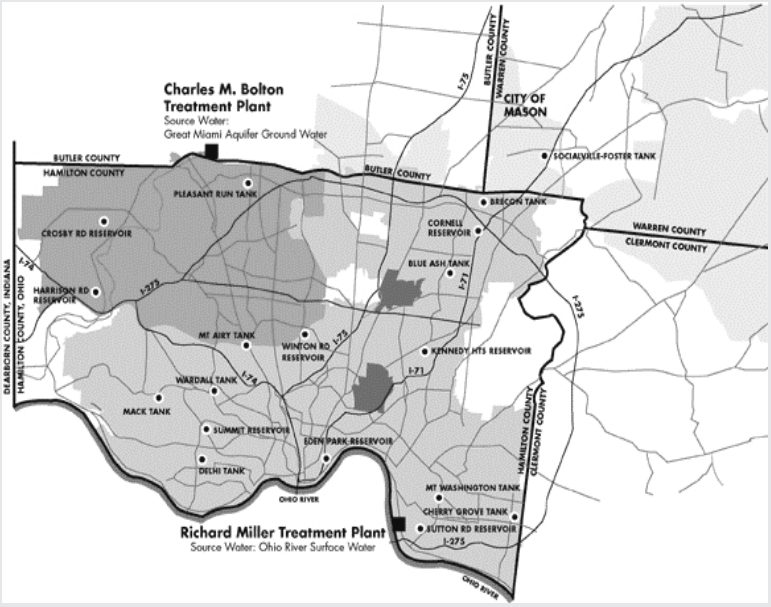
SOURCES: DOE (1998); FCC (1999); NAWC (1998); U.S. Department of Commerce (1999).

ment, and financial and operating services. An example of a large water system is presented in Box 5-1. A larger system has a broader customer base in terms of the level and patterns of demand, which enhances opportunities for optimizing system operations and cost sharing. But water systems exhibit diseconomies of scale in the transmission and distribution of water because water is heavy and incompressible. As water is moved farther from the source and treatment facilities, additional pumping facilities are required. Long-distance transmission of water becomes more economical under some circumstances, with water availability and water quality being key considerations. The net economic benefit of regional solutions is highly circumstantial, owing to the trade-offs between transporting water and developing new sources of supply and treatment facilities.

Economies of scale across the water industry have not been fully realized because of the industry's fragmented structure (e.g., the many small companies that serve small populations). Public ownership can also be a constraint if systems cannot expand beyond geopolitical boundaries to capture potential regional-scale economies. However, public water systems often do expand beyond public boundaries. For example, the Los Angeles area Metropolitan Water District covers many cities, counties, and regions. In the San Francisco Bay area, the East Bay Municipal Utility District covers several cities and jurisdictions. And the New York City water system takes water from multiple watersheds in multiple states. Economies of scale in the water industry exist within both the investor-owned and public sectors and are identified by measures such as rev-

BOX 5-1
A Regional Municipal Water System: Cincinnati Water Works

Cincinnati's Department of Water Works is one of the largest in the country in terms of pumpage, number of customers served, square miles of service area, and miles of pipe in the water system. This department serves about 90 percent of the people in Hamilton County, Ohio, and sections of Butler and Warren Counties. On October 8, 1992, a state-of-the-art granular activated carbon water treatment facility designed to provide the public with the finest-quality water was dedicated. This plant was the first of its kind in the United States and is one of the largest in the world.



SOURCE: City of Cincinnati: Available online at *http://www.rcc.org/cww/source.html#.*

enues per gallon sold and assets per gallon sold. The capital intensity of the industry and its substantial economies of scale have a direct bearing on capital facility planning since it is more cost-effective to add larger increments of capacity. In all utilities, the line between "surplus capacity" for foreseeable needs and "excess capacity" (which could not be justified as part of the rate base under state regulation) can be a fine one. A certain amount of surplus capacity is needed by water utilities in order to provide a margin of safety, including the "safe yield" from supply resources.

Larger, regional water systems could help water utilities achieve lower costs through more effective use of the physical plant and opportunities to reduce total demand variability. Specifically, regional facilities could be sized to meet an efficient, properly priced level of demand while also being large enough to capture economies of scale and provide effective watershed management. Regionalization, or the merging of multiple water utilities into a single administrative unit, can be achieved under public or private ownership and with or without actual physical interconnection.

Economies of scale in the drinking water industry are associated primarily with water source withdrawals and treatment, but these economies can be offset by the costs of transporting treated water long distances. Clark and Stevie (1981) indicated that at distances of only a few miles, diseconomies of transmission and distribution outweighed economies of extraction and treatment. However, more recent studies suggest that treated water can be transported as much as 100 miles under favorable physical conditions (including terrain and gravity effects). The cost effectiveness of long-distance water transmission also depends upon the size of the service markets involved.

As water utilities face higher source-development and treatment costs (the latter associated with standards compliance), the desirability of achieving economies of scale is becoming more pronounced. Technological improvements and lower energy costs have the potential to reduce transmission and distribution costs. The result is that larger, regional water systems are becoming more cost-effective. Even if water can be transported long distances at a reasonable cost, extracting water resources from one region to meet another region's needs can have detrimental environmental and social consequences (Howe, 2000). Importantly, water utilities also can achieve significant planning, management, operational, and financing economies *without* physical interconnection. The larger investor-owned and "multisystem" utilities have demonstrated the benefits of common management. "Satellite management" often is recommended as a regionalization strategy for systems that need professional management but cannot easily be interconnected.

There is less fragmentation of wastewater collection and treatment systems (approximately 16,000 in the United States) than in drinking water supply systems (approximately 54,000 systems in the United States), which suggests (but does not verify) a greater degree of regionalization and consolidaton in the wastewater collection and treatment sector. Many rural areas depend on septic tanks for wastewater treatment. Increasingly, however, these systems pose a threat to water quality in streams and aquifers. Because of the requirements mandated by the total maximum daily load (TMDL) program of the U.S. Environmental Protection

Agency, more rural areas are shifting to centralized management. Regionalization can be achieved with or without physical interconnection, and it can be achieved under public or private ownership. Simple regional cooperation among water utilities also can be beneficial. Some larger municipalities have built or are promoting regional water systems. Most larger investor-owned utilities are regional by nature and have the added benefit of state regulatory oversight.

Water utilities also demonstrate potential economies of scope in terms of joint management of water supply, wastewater treatment, and other services, such as maintenance services for well owners, service line and plumbing services, and even bottled water. Global competitors in the water business, including French firms such Vivendi and Lyonnaise des Eaux, provide a wide range of municipal services. Regional water or wastewater utilities are better positioned to capture both scale economies and economies of scope.

RISING COSTS AND THEIR EFFECTS ON U.S. WATER SERVICES

Costs are rising for the water industry. The need to replace and upgrade the delivery infrastructure will continue to be a driving force over coming decades. The nation's aging distribution systems pose a threat to the quality of drinking water and are also the cause of losses of treated water from distribution systems. Urban systems typically lose 10 to 15 percent of their produced water, although some systems in geologically-unstable areas have reported losses near 50 percent of their produced water (these figures usually represent a combination of actual losses because of leaks and accounting losses because of inaccurate metering). The problem of water system losses grows as systems age. Water losses translate into higher costs and foregone revenues, and also jeopardize the safety and reliability of water service. Replacement costs far exceed original installation costs even when stated in comparable dollars. As cited earlier, one estimate of the investment necessary to maintain the nation's infrastructure over the next 30 years is $250 billion (AWWA, 2001). A report by the Water Infrastructure Network (WIN) estimated the 20-year need for the water and wastewater industries combined at about $1 trillion (WIN, 2000). The lion's share (56 percent) of these costs is for transmission and distribution, followed by treatment (26 percent), storage (9 percent), source-water development (8 percent), and other needs (1 percent).

Another relevant issue is the cost of future raw water supply. In most regions, the low-cost sources of water have already been developed. The marginal cost of new sources of supply has risen sharply, while environmental values and constraints have made new supplies difficult to develop. In many areas, the costs of additional conventional water supplies

exceed those of conservation, reuse, and even desalination. In calculating the costs of supplying water, poor municipal asset accounting procedures may lead to an understatement of costs and inappropriate pricing of water. Many towns do not follow appropriate depreciation procedures for infrastructure, thus understating costs. Western towns that own water rights for their supplies often fail to carry these increasingly valuable rights as assets and then fail to count the opportunity cost of the water as a cost.

An important development in the asset management area is Rule 34 of the Governmental Accounting Standards Board (GASB).[1] GASB 34 is intended to help ensure that local governments are good stewards of the public's assets. According to the rule, "Infrastructure assets that are part of a network or subsystem of a network are not required to be depreciated as long as the government manages those assets using an asset management system that has certain characteristics and the government can document that the assets are being preserved approximately at (or above) a condition level established and disclosed by the government" (GASB, 1999). This statement implies that infrastructure can be maintained in nearly original condition, which is very unlikely for water infrastructure. To the extent it is true, maintenance costs replace depreciation as a cost of operation. It is important to note that GASB 34 deals only with asset accounting and does not address whether the appropriate asset costs are included in setting the pricing structure. Some analysts believe that GASB 34 will stimulate privatization activity in the water sector because it will expose municipal inefficiencies and provide clear incentives for improving asset management through private sector expertise.

Water Pricing

Economists generally agree that water and wastewater services are frequently underpriced. But overcoming historic underpricing can trigger consumer outcry. It is becoming increasingly hard for water utilities to avoid or postpone the cost of maintaining a reliable and compliant drinking water system. Limited public funding and the achievement of economic efficiency mean that the cost of infrastructure improvements must be supported through rates.

[1]The Governmental Accounting Standards Board is an independent, not-for-profit organization founded in 1984. It establishes and seeks to improve financial accounting and reporting standards for state and local governments. Available online at http://www.gasb.org.

Water price increases are outpacing the overall rate of inflation (Beecher, 1995). Water rate design is also becoming more complex as many communities try to recover the true cost of water service and incorporate marginal-cost pricing principles in their rate structures. Many communities use the rate structure as a means of encouraging conservation and have thus moved away from older decreasing block rates and toward uniform, seasonal, or increasing block rate structures believed to better reflect variations in the cost of service while motivating conservation (Raftelis Financial Consulting, 2000).

Some studies show that the public is willing to pay for reliability and for high water quality (Howe and Smith, 1993, 1994). Yet water managers and city councils often lack the political will to practice cost-based ratemaking. They may want to protect residential customers (who are also voters) from higher rates and use water pricing and availability policies to promote economic development even though there is scant evidence to support the usefulness of this strategy. Politicians are more likely to be hesitant to raise rates because of political consequences rather than economic development concerns. Political motives aside, rising prices raise legitimate concerns about the affordability of a highly essential service by poorer segments of the population. Such water pricing issues are germane to all forms of ownership and management of water utility systems.

It is believed by some that private utilities will be more effective than public utilities in terms of operational efficiency, innovation, and other performance indicators and that this should help lower the cost of service. The profit motive and state economic regulation (see below) provide incentives to keep costs low. But the profit motive may also provide incentives to cut corners on long-term investments, reduce efforts to monitor water quality, and avoid conservation and efficiency measures since profits depend upon volumes of water sold. When water services are provided by a privately owned water utility, rates charged may be higher than those provided by a publicly owned utility. Reasons for the rate disparity are listed in Box 5-2.

Economic efficiency is promoted if water rates more accurately reflect the true cost of providing water services. Rate structures can improve economic efficiency by reflecting marginal costs, including the opportunity costs of the water associated with alternative supply options. The prospect of higher rates, however, may discourage asset privatization and has contributed to some instances of "reverse privatization" or "municipalization."

Private contract providers have incentives to increase operational efficiency. State regulation requires cost-based pricing to assure that cost savings from privatization will be passed along to ratepayers. However, there is no assurance that public utilities will pass along such savings,

BOX 5-2
The Public-Private Rate Disparity

The following factors may account for differences between public and private water prices:

- Profits. Private systems must recover a return on equity.
- Taxes. Private systems pay income and other taxes.
- Financing. Public systems may have access to tax-exempt bonds and to state revolving loans and other public funds.
- Subsidies. For cities, subsidies can flow to or from water and wastewater systems.
- Costing. Private systems charge a depreciation expense and may recover other costs.
- Rate practices. Public systems can charge higher rates to customers outside of boundaries.
- Charges. Public and private systems can charge system-development charges to pay for capacity.
- Investment deferral. Some systems, public and private, defer or avoid capital investment.
- Economic regulation. Regulated private systems must set rates based on costs.

SOURCE: City of Cincinnati. Available online at *http://www.rcc.org/cww/source.html#*.

although most public utilities are required to operate on a "no profit" basis, so that savings could be passed on if they are not spent.

REGIONALIZATION AND CONSOLIDATION

The water services industry's fragmented nature and the existence of scale economies suggests there are opportunities for water system *regionalization*. Regionalization in government operations usually means that one or more communities turn over their assets (and, in their view, local control) to another public agency or regional authority. Similarly, regionalization in the water utility sector refers to the consolidation of facilities or activities among contiguous or nearby systems. Unfortunately, discussion of other ways to achieve the benefits of regionalization without communities turning over assets and local control is often lost in the debate. In contrast to regionalization, where multiple utilities merge into one larger organization, *consolidation* is the mutually agreed upon takeover of one system by another. A consolidation may consist of, for ex-

ample, two private water utilities merging to form one utility. Consolidation is generally viewed as a broader process and may encompass mergers among systems in different locales (i.e., at the corporate level). Given the similarities, the two terms are often used interchangeably.

A recent survey of the literature on regionalization and consolidation (Beecher, 1996) suggests that consolidating water system operations and/or management may represent a viable alternative from several perspectives (see Table 5-2). For example, from an economic perspective, consolidation can help lower capital and operating costs and prices. From a financial perspective, consolidation can help raise the capital needed to replace and improve an aging water delivery infrastructure. From an engineering perspective, consolidation can improve operational performance. From a natural resources perspective, consolidation can enhance environmental protection, resource conservation, and contingency planning for conditions of scarcity caused by natural disasters or other supply emergencies.

The formation of regional systems around watersheds can be beneficial (see Chapter 6). The public policy and public administration literature also supports the idea of provision of many services (such as utilities and transportation) because public goals may be achieved more cost effectively. A more recent rationale for regionalization and consolidation comes from the 1996 Safe Drinking Water Act (SDWA), which increases the need to ensure and build the technical, financial, and managerial capacity of water systems. Several specific provisions in the act also require consideration of structural alternatives that involve fundamental changes to the organization, ownership, or management of a water system, including regionalization and consolidation. The capacity development provisions of the law (which refer to improvements in technical, financial, and management capabilities to comply with regulations), as well as certain variance and enforcement provisions, will slow the creation of new systems and encourage personnel with existing water systems and regula-

TABLE 5-2 Perspectives on Consolidation

Perspective	Key Reasons
Economic	Economies of scale and scope (lower unit costs)
Financing	Access to capital and lower cost of capital
Engineering	Operational efficiency and technological improvement
Natural resource	Resource management and watershed protection
Federal standards	Compliance with standards at lower cost, greater capacity development, and greater affordability of water service

SOURCE: Beecher (1996).

tors to consider changes in ownership, physical interconnection, and other structural alternatives. Regulatory policy is a key element in this process.

The primary barriers to consolidation are not technical or economic, but institutional and political. Institutional factors such as laws, regulations, and decision makers do not necessarily favor water system consolidation. Another contributing factor is the somewhat parochial nature of water supply as a utility enterprise. Energy and telecommunications companies tend to serve large regional territories and continue to merge into even larger conglomerates, while water is local in character. Communities sometimes use water and wastewater utilities to try to control and manage economic development, albeit inefficiently. The identity of a water services system, in keeping with public ownership and the "public works" perspective, often is intrinsically tied to the local community.

From the perspective of local communities, the chief concern about regionalization and consolidation is surrendering control, either to a regional authority or to state public utility regulators. The desire of communities to retain local control and use political processes to govern water utility decisions has tended to thwart regionalization efforts. These are legitimate public policy concerns that cannot be eschewed or dismissed. In fact, regionalization will be successful only when communities feel it is in their best interest and that they will have appropriate access to the utility and influence on its decision-making.

A common method used to achieve regionalization of utilities is with interagency contracts. In many metropolitan areas of the United States, the large urban water or wastewater system has contracts with the adjoining water utilities of the smaller suburban communities. Through these contracts, the larger utility provides all services or a subset of services to the smaller community. The net result is that many of the economies of scale of large operations are made available to the smaller community, and the smaller community retains local control and local ownership of its assets. Some private operators try to achieve the same results by marketing their services to multiple communities in a region. Their operations plan is to secure contracts for many utilities in a geographic area and then drive down costs through economies of scale by centralizing services such as call center operations, laboratory services, technology maintenance, purchasing, and even plant operations. Private operators and public agencies can thus broaden their boundaries of operations beyond the communities that abut their existing system. In the 1980s, the cable television industry followed a similar strategy when cable television companies moved into a region to market their services and secure franchises from local communities.

The rationale for regionalization is stronger in a setting of rising costs and prices. Although the industry cannot control many *types* of costs—

infrastructure replacement and treatment costs—it *can* help control costs through efficiency and innovation. Clearly, models of implementation are needed to involve communities in the process of regionalization, initially and on an ongoing basis.

Regionalization is widely regarded as a beneficial option for restructuring the water industry and for overcoming the fragmentation of 50,000 community water systems across the United States. At issue is whether the public or private sectors are best able to advance regional solutions. Larger, private (investor-owned) utilities are regional by nature. They are unconstrained by local geopolitical boundaries, and perhaps less constrained by local political agendas related to water supply and development. Privatization contracts generally address only the needs of a single locality and may not present a vehicle for cost-effective regionalization. In theory, a contractor might help provide regional services but this would require approvals from various local governments. Other forms of water services privatization, such as build-own-operate, can be designed to address regional needs.

REGULATION

Regulation of water systems reflects the U.S. system of federalism or shared responsibility for governance. All community water systems are subject to regulation by state drinking water primacy agencies pursuant to the federal Safe Drinking Water Act (SDWA). Systems must, at a minimum, meet federal standards, but states can impose additional standards. States have primacy with respect to water quantity regulation, including regulation of withdrawals and diversions. Interstate, state, and regional authorities can also exert significant influence. Examples include the Delaware and Potomac River Basin commissions (formed under interstate compacts) and the Florida Water Management Districts (intrastate). The imposition of quantity and quality regulations should not depend on ownership.[2] That is, enforcement and permitting processes should apply equally to all types of systems.

Much of the criticism of the U.S. model of regulation, which emphasizes ratebase, rate-of-return, and rate design determinations, focuses on issues related to incentives. The system is not entirely without incentives, as underperforming utilities will not earn their authorized return. Under the traditional model, utility incentives for efficiency and innovation are constrained because gains achieved by cost savings are generally allo-

[2]Some private owners assert that they are treated differently than public owners in terms of regulatory compliance.

cated to ratepayers with subsequent rate adjustments. The United Kingdom has tried to address this issue by implementing a price-cap model, which effectively allows regulated utilities to retain efficiency gains as long as price limits are not exceeded. However, the system also involves a number of potential adjustments and performance requirements. The United Kingdom model has received mixed reviews, but is still a relatively new approach. Many state commissions in the United States are moving toward performance-based regulation for the energy sector, having already done so for telecommunications. With time, interest in performance-based regulation of water utilities will likely grow (for further discussion of U.S. public utility regulation, see Phillips, 1993).

Economic Regulation

Economic regulation involves the control of prices and profits of investor-owned utilities. Economic regulation by states is regarded as a substitute for competitive markets and public ownership, which presumably ensures accountability by other means (see Table 5-3). That private monopolies need to be regulated, but public monopolies do not, is a subject of debate.

Water utilities are by nature highly monopolistic; that is, competition between them is limited by the physical and economic properties of service. For publicly owned monopolies, accountability is assured through electoral and other public channels (namely, municipal governance). For privately owned monopolies, accountability is assured through economic regulation by state commissions. Economic regulation applies to virtually all private water utilities (although not private contract companies), and some publicly owned systems in some states opt to provide this level of oversight.

State public utility commissions in the United States apply a ratebase/rate-of-return method of economic regulation, whereby they contemplate the value of assets on which a return can be earned (the ratebase), the authorized (but not guaranteed) rate of return to recover capital costs, and the allowable operating expenses for the utility. Once the utility's total revenue requirements are established, regulators also approve the prices that can be charged to various classes of utility customers (the tariff).

Various well-established standards of prudence and reasonableness are applied in the regulatory review process. Regulated companies must operate within the parameters approved during its most recent rate case. During periods of rising costs, rate cases often are conducted on an annual basis. In between rate cases, the utility must operate in a manner that preserves its ability to recover costs and its authorized return. To help

TABLE 5-3 Regulatory Jurisdiction for Water Utilities

	Regulatory Jurisdiction				
Area for Regulation	Federal	Interstate	State	Substate	Local
Water Quality	Congress, EPA	River basin commissions	Drinking water primacy agencies (SDWA)	None	Health departments
Water Quantity	None	River basin commissions	Water resource agencies	Water management districts (varies)	None
Water Prices	None	None	Public utility commissions (mostly investor-owned systems)	None	Public ownership, other local controls

control prices and profits of investor-owned water utilities, they are regulated by state public utility commissions. Commission jurisdiction over different kinds of systems, and the scope of commission authority over different kinds of activities, both vary substantially from state to state. Some analysts view economic regulation of utility revenues and rates as a deterrent to privatization because regulation constrains profitability and does not provide the performance incentives of competitive markets (Haarmeyer, 1993; Raftelis, 1989). Some analysts also believe that regulation provides disincentives (or inadequate incentives) to investor-owned utilities for furthering consolidation through mergers and acquisitions. In fact, the private sector is looking for a clear, transparent, and predictable set of rules (which constitutes good regulation).

In 1995, 46 state commissions regulated approximately 8,750 water utilities, while 28 state commissions regulated approximately 2,150 wastewater utilities. Commission jurisdiction is summarized in Figure 5-1 and Table 5-4. The commissions do not exercise uniform authority over all of the systems under their jurisdiction. Investor-owned utilities are the most comprehensively regulated. In 21 states, jurisdiction extends to certain types of publicly owned or nonprofit water utilities.

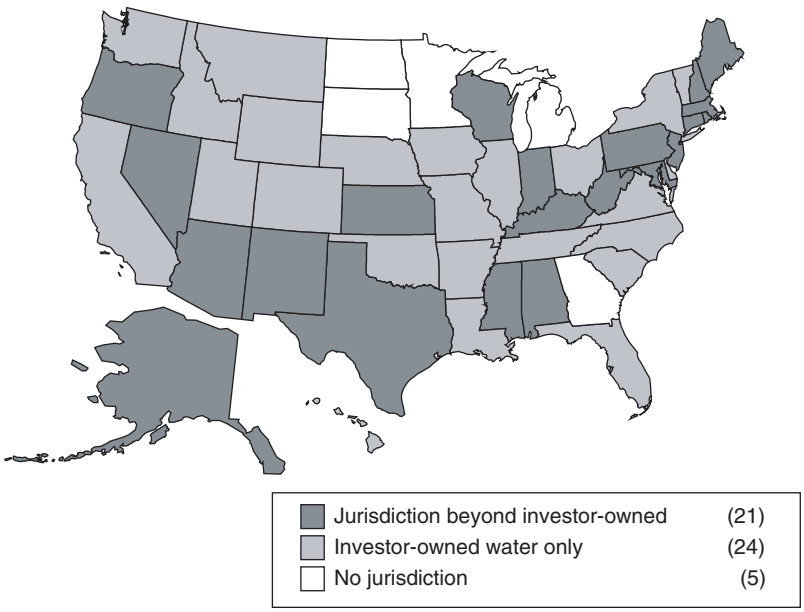


FIGURE 5-1 Regulatory jurisdiction for water utilities. SOURCE: Beecher (2000).

TABLE 5-4 Commission-Regulated Water and Wastewater Utilities

	Water Utilities		Wastewater Utilities	
Utility Ownership	Number of Commissions	Number of Utilities	Number of Commissions	Number of Utilities
Investor-Owned or Private	46	4,092	28	1,233
Municipally Owned	11	1,547	6	649
Districts	7	1,300	4	205
Cooperatives	4	1,436	2	50
Homeowners' Associations	6	85	1	0
Nonprofits	1	73	1	15
Other	1	1	0	0
Total	76	8,534	42	2,152

SOURCE: Beecher (1995).

In general, regulation is viewed as a deterrent to asset transfers and as unnecessary or undesirable when extended to contract operations. In terms of investor ownership, however, regulation can be beneficial in terms of stabilizing revenues, ensuring cost recovery, and providing a guarantee of a reasonable return on investment. Regulation requires utilities to accept a degree of regulatory risk, but it shields them from other forms of risk, including risks associated with municipal politics at the local level and, to some degree, global competition.

Economic regulation by the states offers certain advantages over alternative methods for overseeing utility monopolies, setting rates for service, and resolving conflicts. Most smaller cities do not have comparable expertise and resources. State commissions demonstrate economies of scale and scope in regulation when compared to decentralized oversight by local governments. Although their traditional policies are based upon rate-based/rate-of-return methods, the commissions also have responded to the economic and technological changes affecting the utility industries, including emerging competition.

Privatization through local "outsourcing" requires significant safeguards, or local contracting and oversight can be prone to corrupt influences. State commissions can make politically unpopular decisions and can be more flexible and less arbitrary than regulation imposed through legislative or judicial means. New roles for regulatory agencies, such as dispute resolution for contractual agreements, might also prove beneficial. In general, state regulation can be used to further various state policy goals, such as efficiency pricing, integrated resource planning, and universal service. Regulation is an imperfect substitute for competition—as is government ownership. The rate-based/rate-of-return method can pro-

vide too much incentive for overinvestment and too little incentive for cost control and innovation. The method also tends to be historically focused and reactive. Regulation may also have social and environmental implications. The regulatory process can be time-consuming, costly, and bureaucratic. Finally, regulation can be unresponsive to broader market forces.

Some weaknesses in the regulatory model can be addressed through deregulation and some through regulatory reform. In recent years, as technological and market advances have introduced competition, deregulation has become an option for some segments of the telecommunications and energy industries. Deregulation of investor-owned water utilities, where monopoly power is persistent and competition is limited, is not well supported. However, another form of deregulation occurs when local governments assume the oversight function. Many advocates of privatization believe that local control is preferable to state regulation.

Regulation and Privatization

It can be argued that privatization and economic regulation share the common goal of establishing managerially sound and financially viable water and wastewater systems. Strategic use of acquisition and other regulatory incentives already has had a considerable influence on the restructuring of the water industry. Modern public utility regulation ideally encourages utilities to meet least-cost and efficiency goals, and it uses market-like methods in the process (for example, competitive bidding). It may be easier to reward investor-owned utilities than unregulated utilities for implementing efficiency and other desirable measures. Regulation can be an agent of privatization by providing positive incentives for the expansion of investor-owned systems. Moreover, regulation can provide a level playing field for emerging markets (or "structured competition").

Economic regulation may account for at least some of the performance differences between publicly and privately owned utilities. Utilities that underperform routinely find it difficult to achieve their authorized rate of return. Tables 5-5 and 5-6 summarize potential regulatory roles for changes in ownership and service contracts. The role of regulation tends to be more obvious in cases involving transfers of assets to and from private utilities. However, regulators may also look at the prudence and terms of service contracts in which regulated utilities are engaged as either providers or recipients.

Regulators have several means for encouraging privatization through investor ownership, all of which involve making it easier for regulated systems to acquire other systems. Regulatory methods that encourage the private sector role include acquisition adjustments and other acquisition

TABLE 5-5 Potential Regulatory Roles in Privatization—Ownership Transfers

Current Ownership	Ownership After Transfer	
	Public	Private
From public ownership	Generally not regulated. In some cases, providing utility service outside of municipal boundaries may be regulated by the state commissions.	A certificate of public convenience and necessity may be required, particularly if the acquisition is made by a newly formed private utility. The transfer of assets and financial arrangements probably requires approval as well. Acquisition adjustments require a determination of ratemaking treatment.
From private ownership	The transfer of assets and ownership probably requires regulatory approval. Regulators also may want assurances that the transfer is in the public interest. In most cases regulation will not prove to be a significant barrier to the transfer.	Regulatory approval may be required for both utilities in the transaction. The transfer of assets and ownership probably requires regulatory approval. It may be necessary to modify the acquiring utility's certificate of public convenience and necessity. Acquisition adjustments require a determination of ratemaking treatment.

SOURCE: Beecher et al. (1995).

incentives; modified ratemaking, including consideration of future costs and cost adjustment mechanisms; single-tariff (or uniform) rates across a regional territory; profit-related incentives, including rate-of-return incentives and profit sharing; and consideration of changing risk profiles in ratemaking (Beecher et al., 1995). In effect, these techniques can enhance the financial viability of acquisitions. Regulators also may encourage privatization by streamlining regulatory procedures and narrowing the scope of regulation.

Regulatory jurisdiction for privatizatized operating contracts is more limited. Only a few states have adopted specific authority in this area, in many instances limiting regulatory authority for contractual arrangements:

TABLE 5-6 Potential Regulatory Roles in Privatization—Service Contracts

Service Provider	Service Recipient: Publicly Owned Utility	Service Recipient: Privately Owned Utility
Publicly owned utility	Generally not regulated. In some jurisdictions, utility service outside municipal boundaries may be commission-regulated.	The contract may be reviewed for prudence and financial terms.
Privately owned utility	Subsidiary activities may be regulated to shield captive customers from risks associated with diversification. Prudence of contracts may be reviewed.	Regulatory approval may be required for both utilities in the transaction. The contract may be reviewed for prudence and financial terms. Subsidiary activities may be regulated to shield captive customers from risks associated with diversification.
Service vendor	Generally not regulated, particularly if contractual procedures and local government authority provide sufficient protection. In some cases, the vendor can appear to behave as a public utility entity, which could trigger regulatory intervention.	The contract may be reviewed for prudence and financial terms. Regulators may want to review contractual terms in relation to the obligation to serve, service reliability, and service quality.

SOURCE: Beecher et al. (1995).

- The New Jersey legislature endorsed the concept of privatization and streamlined regulatory review of contract agreements by the Board of Public Utilities in the Water Supply Public-Private Contracting Act (effective May 11, 1995).
- Legislation enacted in Florida in 1996 (Statutes at 153.9) exempts from commission jurisdiction any wastewater facility operated by private firms under contract with a county, municipality, or district. The statute is comprehensive, except for the obvious fact that it does not address privatization agreements for water service.
- In California, wastewater privatizers must "apply to the commission for a determination that the proposed privatization project is not a public utility . . . and is therefore exempt from commission regulation" (California Statute 10013). Californians also amended their state's Constitution with passage of Proposition 218 (effective January 1, 1997) to require voter approval for local taxes and user fees under specified circumstances (also see Sherman, 1997).

• The state of Indiana enacted privatization legislation in 1995 (amending Title 36 of the Indiana code) to provide new options for designing, constructing, and operating municipal facilities under privatization agreements. However, the statute does not address a role for the state regulatory commission with respect to private operations of water or wastewater systems.

In practice, there has been little state-level regulatory review of privatization agreements. To many privatization advocates, economic regulation is not necessary because local governments can "regulate" through the contract vehicle and associated review processes. Others have suggested, however, that a regulatory role might be justified under some circumstances to prevent abuses of monopoly power by profit-seeking contractors, to ensure that cost reductions are reflected in the rates charged for service, and to protect communities and water customers in the context of constrained local regulatory capacity.

Emerging regulatory approaches tend to focus on performance issues and the limitations of the traditional regulatory approach in providing performance incentives. Performance-based ratemaking, or benchmarking, and price caps may change the regulatory environment for privatization and create better opportunities for utilities to profit from efficiency and innovation.

An emerging issue in the context of regulation is the diversification of traditional water utilities. Many of the larger investor-owned water utilities have created holding companies in order to provide both regulated and unregulated services. For regulators, these structures (which have been widely used in other sectors) can raise concerns about cost allocation and related transactions. More important is the issue of risk allocation. Regulators want to ensure that captive ratepayers of the utility monopoly do not bear burdens and risks associated with the utility's unregulated ventures.

Finally, the movement to deregulate network industries is presenting new challenges to water utilities (Beecher and Rubin, 2000). Although the industry may be mildly contestable, and some forms of structured competition can be implemented, there is little evidence to support the deregulation of private water utilities.

6

Broader Implications of Water Services Privatization

Changes initiated by water services privatization may have wide-ranging effects, as the process of providing water supply and wastewater treatment services affects parties beyond the supplier and the consumer. Water's fluid nature may lead to significant indirect, beneficial (and at times detrimental) impacts on the local economy, the environment, and other "third parties." Customers and voters in water districts often view these indirect impacts as part of the set of services provided by the utility, and there may be apprehension regarding the protection of these indirect benefits under privatization arrangements. This apprehension may be a significant cause of the cautious approach to water privatization observed in the statistics listed in Chapter 1.

Because there are few economies of scale to be gained from the water delivery infrastructure, privatized systems can only offer advantages by generating cost savings in three components of water supply: labor efficiency, centralization of financial and operating services, and improvements in the management and yield of the basic water supply and nondistribution system assets. Water services privatization may thus effect changes in local employment and supply acquisition, as well as changes in the land and recreational assets related to the basic water supply. This chapter examines some broader and longer-term implications of water services privatization: community values, environmental protection and long-term water supply, and regional economic development.

PRIVATIZATION AND COMMUNITY VALUES

Concerns that communities typically cite with regard to privatization include the following (Limbach, 1993):

- fear over the loss of employment and pensions for the municipal utility work force;
- possible loss of grant money or tax-exempt financing for capital improvements;
- higher water rates because private firms charge full costs and must pay taxes and earn a profit;
- surrender of control over ratemaking and other financial issues to state public utility commissions;
- loss of control of daily operations and of service standards, as well as planning for long-term growth and economic development.

These points are often regarded as deterrents to privatization, although they may be better characterized as issues of interest to affected stakeholders, which include governments, employees and labor unions, citizen-taxpayers, customer-ratepayers, and local groups representing business, consumer, and environmental interests.

Privatization is often advocated in terms of lowering costs and promoting cost efficiency. Albeit important, cost efficiency, defined here as a minimized cost for a given level of service, is but one of several criteria for evaluating the provision of public services. In many public water agencies, some degree of cost efficiency in water service delivery is sacrificed in the interest of achieving other community goals such as equity, provision of recreational opportunities, and provision of water that exceeds quality standards.

Maintaining the local public works department may provide a mechanism to preserve local jobs and, in some jurisdictions, serve as a means of preserving opportunities for political patronage. A related economic issue is whether equipment and supplies are purchased locally. Large utility companies often use out-of-town or out-of-state call centers and procurement to reduce costs. To counter these concerns, water services privatization agreements are often structured to preserve jobs and benefits by streamlining the labor force only through attrition and retirement. Improvements in working conditions, safety, and upward mobility have been cited in Indianapolis and elsewhere.

The prospect of water services privatization raises a number of issues related to service quality. As described in Chapter 3, surveys have indicated that consumers have a substantial willingness to pay for safe and reliable water. Customers expect their water provider to meet (or exceed)

standards for public health and environmental stewardship. Both publicly and privately owned water utilities (or utility operators) must comply with applicable standards. Most communities want to ensure that safety and reliability are not compromised by water services privatization. Even with privatization, customers will hold public officials accountable for the safety and reliability of water services delivery.

Privatization may raise concerns about the terms of service and the need for consumer protections, particularly for residential customers. As rates rise, provision of lifeline rates and provision of other mechanisms to ensure basic affordable water service are likely to emerge as important regulatory issues. Some communities offer bill-payment assistance and protection against disconnection. Extending water service to unserved areas or areas where the quality of service is currently unacceptable may be a community goal. However, the method by which the additional costs of such extensions are spread among the existing customers may be politically contentious. Providing a forum for consumers to resolve complaints is important for all utility operations, whether private or public. State public utility commissions provide this function for regulated investor-owned utilities. Privatization arrangements may or may not provide this function at a local or regional level.

Maintaining Local Capabilities

Privatization of governmental functions creates the need for expanded capability in contract oversight, monitoring, and enforcement. As water delivery functions are shifted to the private sector, the contracting government needs to assure that its internal administrative capacity can engage in and support the privatization process, monitor performance, and enforce provisions of the contract. Communities often lack the necessary expertise and financial resources to conduct sound evaluations of public-private financing options (Compton, 1992). The process of preparing and overseeing an initial bid can be daunting. Local governments should recognize the inherent tensions in the "principal-agent" relationship between city and private contractor (see Kettl, 1993). No matter how well a privatization arrangement is crafted, the interests of the principal (the city) seldom match those of the agent (the private contractor). Ensuring sustainable performance requires a long-term commitment to the oversight process. Information on enforcement and dispute resolution methods can be obtained from larger agencies or public sources such as the Environmental Protection Agency (EPA, 1997).

Water services privatization raises issues of lost capability and expertise. If a municipality chooses to terminate a contract and reinitiate service, it may have to rebuild in-house capability in terms of personnel,

equipment, and expertise. Furthermore, a city that privatizes its water services may lose ancillary services, such as snow removal or emergency management. The loss of capacity may increase costs in other service areas. Fortunately, there are numerous sources of information that provide advice on contracting for municipal services. In some areas of the United States, there are other private water service providers that a municipality could contract to take over a terminated service contract.

When the roles of the private sector in water utility operations are expanded, local government must understand that its role in the utility's operations changes dramatically. A key change is shifting from personnel management to contract management. When operations are directly managed by a public utility, the utility's emphases are on personnel management and longer-term planning. When a contractor provides the operations, however, local government's major focus becomes contract management. The talents and skills needed for these roles are significantly different than those in traditional water utility operations. Water services privatization can blur responsibilities and obscure ultimate accountability in such areas as environmental compliance and permitting.

Another example of privatization's implications for public goods is found in water delivery capacity for fire-fighting demands. The water main and local storage capacities needed for this purpose frequently determine the level of infrastructure investment. Fire-fighting services represent a public good that benefits all structures in the area. As a result, water for fire fighting is specified in the contract with the private operator.

Political Considerations

Strategies for improving water utility performance must be implemented within a local political environment shaped by the values and interests of the community and elected officials. In some localities, decisions about water utility ownership have been brought before voters in the form of nonbinding referendums. More often, political leadership plays a significant role in supporting privatization, as in the case of former Indianapolis Mayor Stephen Goldsmith. Goldsmith built a national reputation for promoting privatization of city services, and stated he could "run the city with four contract managers" (Fantauzzo, as cited in Scalar, 2000). The chief lesson, however, is that privatization usually needs a local champion in order to find a place on the political agenda.

Political conflict can be a deterrent to privatization. Local politicians may fear losing control of the agency and the loss of jobs. Long-standing relationships between local officials and suppliers are also a factor, as is the strength of labor unions. In some instances where companies have

succeeded in persuading municipalities to privatize operations or assets, companies have been required to avoid layoffs and reduce jobs only through attrition (Byrne, 1996). And, as noted in earlier chapters, responsibility for the provision of water will always rest with the public agency. Whether a public or private operation provides water services, failure to fulfill the expectations of the community is likely to result in a public outcry.

IMPLICATIONS FOR ENVIRONMENTAL AND WATER SUPPLY PROTECTION

Concerns about control over public land and watershed issues are frequently debated in discussions regarding water services privatization. Opponents of privatization believe that basic water supplies and related land resources are most properly owned and managed by the public sector and usually fear that resources will be improperly managed or squandered under private ownership. Others contend that responsible resource management is irreconcilable with profit seeking. It should be noted that the privatization of water services is not necessarily linked with ownership of watershed areas and raw water resources. That is, water services may be privatized in a watershed in which lands and raw water supplies are still publicly owned.

Watershed management typically provides public benefits such as recreational access, aesthetic aspects, ecosystem preservation, and downstream water quality. Water quality and quantity can be degraded if watershed managers, public or private, are provided with improper incentives. Because providing these watershed-related benefits does not add to a water utility's profits, long-term watershed conservation may be deemphasized or neglected. In addition, the length of most management contracts is generally less than the time in which ecosystem impacts can be distinguished from natural fluctuations of the system.

Private acquisition of watersheds is sometimes motivated by the development potential of those lands, which often have become desirable for residential use. A prominent example of land-use conflicts between private water companies and local residents was in Old Tappan, New Jersey (Hanley, 1999). The dispute, which came to a head in 1999, centered on wooded land adjoining the Lake Tappan reservoir that the private owner, United Water, wanted to sell for high-value residential use. Local townspeople wanted the wooded area preserved and used as a regional park. The case is complex, but it illustrates the potential conflicts facing private resource ownership in situations where the value of the resource is changing (see Box 6-1).

BOX 6-1
The Connecticut Water Companies Case

In 1975, the U.S. Environmental Protection Agency was about to publish its drinking water regulations under the 1974 Safe Drinking Water Act; the earlier 1962 standards, issued by the U.S. Public Health Service, applied only to communities providing water for interstate carriers, which did cover most large cities. The projected turbidity maximum contaminant level was to be reduced from 5 turbidity units to 1 turbidity unit.

Many long-standing private water companies in Connecticut that were within commuting distance of New York City owned reservoirs and watershed lands that served their service areas. These watersheds were well protected and there was little development. Before new regulations required filtration, water from these reservoirs was treated only by chlorination. With these new regulations, the companies decided to sell their watershed lands, citing two justifications: the funds would help pay for the filtration, and the filtration would mitigate the damage done to the water quality by the developments.

The watershed lands over the years had grown greatly in financial value, with increasing number of people employed in New York City seeking housing in western Connecticut. The land sales would redound to the financial advantage of the companies' shareholders. However, there were rising concerns over the proliferation of trace synthetic organic chemicals and over whether the introduction of conventional filtration would assure mitigation.

An engineer of the Connecticut State Department of Health succeeded in getting the state legislature to declare a two-year moratorium on sales of watershed lands while a Council on Water Company Lands was created to evaluate the issue. The council, after a period of study and public hearings, recommended that sales of the land to private parties for development should not be permitted, and legislation to that effect was adopted. Sales of land to the state for parks were not precluded.

The water companies sued the state (Bridgeport Hydraulic Company et al., appellants, v. Council on Water Company Lands of Connecticut et al. Defendants), alleging that the law was unconstitutional. The Federal District Court for Connecticut in 1977 upheld the state, primarily based on its right to exercise police powers, which include the protection of the public health (Citation: 453 F. Supp. 942, D. Ct.1978). The U.S. Supreme Court affirmed the District Court (Citation: 439 U.S. 999, 99 S.Ct. 606, 58L. Ed 2d 674, 1978). Few, if any, states have followed suit.

Public resource managers, however, are not inherently more sensitive to environmental values than are private water system operators. For example, in 1998 a group of 16 national and California environmental organizations wrote to the California Department of Water Resources (DWR), arguing that that agency should use economic criteria and more cost-effective methods in planning water supplies and wastewater treat-

ment for California. Among the points made was the DWR's failure to incorporate economic criteria in the long-term Water Plan (Bulletin 160), which led to incorrect estimates of future demands and incorrect estimates of water available for environmental purposes.

The use of lands and streams for water services may involve tradeoffs against ecosystem quality and recreation. For example, a city's main drinking water supply may consist of a reservoir surrounded by a wooded alpine area. Maintaining high-quality water in that reservoir may require the city to limit or ban recreational activities (e.g., hiking, biking, off-road vehicles) from that watershed. Conversely, a city seeking to expand its water supply may be unable to impinge upon valuable riparian and recreational resources. An example occurred in Colorado in the late 1980s, when the city of Denver planned to build the Two Forks Dam on the South Platte River southwest of Denver. The city was ultimately denied a permit by the U.S. Environmental Protection Agency to construct the reservoir because of the uniqueness of the South Platte Valley's ecosystems and the excellent trout fishing on that section of the South Platte.

Another public good issue is the protection of cultural values. Access to water supplies is often an important dimension of local values in both large and small communities. The concept that the community's natural resource base is a shared asset often imparts commonality and cohesiveness. Access to hunting on watershed lands or fishing on reservoirs may be important to local residents. The sale of these assets to outside interests may deny access and cultural linkage to the natural resource. As an example of community coherence, California farmers stated in response to a survey that they would consider transferring water to other users within the same sector and watershed, but that they would regard transfers to other sectors and watersheds with suspicion (Berk and Whelan, 1994). Out-of-basin transfers of water rights may adversely affect regional water supplies and water quality of the exporting region (Howe et al., 1990).

PRIVATIZATION AND REGIONAL ECONOMIC GROWTH

The reliability of a region's water supply is widely perceived to have significant impacts on regional economic development. The city of San Diego, for example, spent large amounts of money and political effort during the late 1990s trying to develop an independent source of water supply. San Diego currently relies on the Metropolitan Water District (MWD) for a majority of its supplies, and MWD provides the sole source of imported water. Because the system of water priority allocation is based on when a city joined the MWD, among the cities in the district, San Diego has the lowest priority for water in times of shortage. In 1991, when San Diego was suffering from a drought and was threatened with severe wa-

ter supply reductions, the city attempted to purchase additional water supplies from entities outside the region. Those supplies, however, had to be transported through MWD's distribution system—for which they would be charged high "wheeling" charges by MWD. This dependence on another water agency and the resultant uncertainty of supplies are seen as disincentives to new economic activity.

In the arid U.S. West and Southwest, constraints on water supplies and wastewater treatment services have sometimes been used to restrict urban and suburban development. Concern has been expressed that privatization of water development and delivery may then open the door to unfettered development. However, municipal utilities sometimes have a legal obligation to serve areas outside municipal boundaries. Regulations that require demonstration of the existence of a long-term water supply are usually permissible under local government police powers. Regardless, even with high connection fees, water costs constitute only a small percentage of residential or commercial development costs and are thus unlikely to change many development decisions.

The limited ability to use water supplies as a growth control measure is reflected in efforts by the city of Santa Barbara, California. In the 1960s, in an effort to explicitly restrict urban growth, the city declined the offer to connect to the California State Water Project. However, despite the absence of new water supplies in Santa Barbara County, residential development continued rapidly. The tightening of the water supplies in Santa Barbara County came at the expense of their drought contingency supply margin. In California's most recent major drought, Santa Barbara resorted to water rationing, experienced severe fires, and even purchased an expensive desalination plant to augment supplies. The desalination plant has subsequently been dismantled and sold, partly because the high cost of water from the plant led to extensive and effective water use efficiency and conservation programs.

Economics of Water Marketing in the Western United States

In the arid parts of the western United States, urban areas are continually faced with acquiring reliable additions to water supply to accommodate expanding populations. Water marketing arrangements of various types have evolved to facilitate the transfer of water from older, less productive uses (usually agriculture) to urban use. For example, the "CalFed" agreement in California between several state and federal agencies will use a market-based "environmental water account" (EWA) to supply water for environmental purposes. The EWA will enable urban regions to acquire water for environmental and recreational purposes from willing sellers. Most sales are likely to be from the agricultural sector to the urban

BOX 6-2
The Impact on Regional Employment of Trading Water Supplies

A case study of the 1991 California Emergency Drought Water Bank showed that the sale of water between regions and users in California in 1991 had a positive net effect on employment. Jobs were lost in the water exporting regions, but the gain in jobs in the importing regions outweighed the losses. The table below shows the estimated impacts on employment by sector.

The agricultural industry had a net reduction in jobs because of sales to the water bank. However, the state of California as a whole benefited from 3,741 additional jobs from the transfers. These broad measures show that, in terms of both income and jobs, the water bank generated substantial net gains to the state and most regions. Most transfers occurred without any independent environmental review. Subsequent studies of third-party economic and environmental effects found the costs to be relatively small compared to the water banks social benefits.

In contrast to the temporary transfers under the California Water Bank, permanent transfer of water rights outside a region can lead to substantial negative impacts on the local economy. Howe et al. (1990) demonstrated significant regional losses of income and employment in farming and linked activities. Alternatives to permanent sales of agricultural water exist. "Drought lease-outs" or options can modulate the negative impacts. Under these arrangements, the water remains in farming in most years, thus maintaining agricultural operations and providing a source of secondary income for associated businesses. Since the farmer is still active and a resident in the region, the stream of option payments will add to regional income. Also, the negotiation of water sales options allows enough time to negotiate third party compensation where appropriate.

Statewide Employment Impacts of the 1991 Water Bank

Sector	Jobs Lost	Jobs Gained	Net Change in Jobs
Exporting Agricultural Regions	3,130	1,490	–1,640
Importing Agricultural Regions	0	1,150	1,150
Importing Urban Regions	0	4,240	4,240
Net Statewide Change	3,130	6,880	3,750

sector. Cal-Fed has the goal of reducing the transaction costs of water transfers by providing an internet-based information clearinghouse for water trades.

Water markets have long been used in transferring water from agricultural uses to municipalities (see NRC, 1992). Water markets could be considered a form of privatization, but they have existed for 100 years, independent of urban water utilities. Naturally, urban utilities (public or private) avail themselves of the services of water markets in the acquisi-

tion of new supplies or drought-year lease-outs, but a full treatment of such markets is outside the purview of this report.

Water markets raise several issues, including negative impacts on "third parties" and the environment. Water quality can be negatively affected in the exporting area if it is not protected by state laws governing transfers in the exporting area. "Secondary impacts" in the form of reduced tax bases and reduced employment can be serious for the exporting area (see Howe, 2000). On the other hand, the net employment effects of water transfers are often positive in the longer term, as higher-value uses of water replace lower-value uses. The experience with the California Water Bank of 1991 shows that even short-term, temporary transfers can result in an employment gain (see Box 6-2).

Interregional transfers of water by private sales can impose costs on other local users, particularly if groundwater is involved. In a 1995 California case, small farmers who relied on groundwater in Butte County were severely impacted when nearby large farms sold their groundwater pumping rights to municipal areas. This case spawned a county-level water transfer code that restricts the ability of individual parties to transfer water in the county.

SUMMARY

Privatization of water services often results in a range of effects felt beyond the supplier and the consumer. These include employment, considerations of local control and oversight capabilities, and environmental and economic impacts. The appropriate balance of public and private ownership and operation for a municipality is a function of values that go beyond the cost, reliability, and quality of water. Communities must decide the degree to which private contractor objectives and likely performance are compatible with a range of community values such as environmental preservation, cultural impacts of water, recreational and aesthetic values, and preservation of local employment. The prospects of water services privatization tend to increase awareness of water's importance to a community's economy, culture, and environmental resources. It is not clear if either public or private utility operators will be more sensitive to the broad implications of privatization; there is anecdotal information that supports both views. The community and water service provider will be better served to the extent that these broader considerations of water management are made transparent and are publicly discussed.

7

Conclusions

Water services privatization takes many forms, and no one type fits all situations, complicating the choices that communities face if they consider reorganizing their water and wastewater utilities. The range of choice extends from (1) "outsourcing" of various services such as provision of supplies and meter reading; (2) private contract operation and maintenance of existing plants; (3) contracts for the integrated design, construction, and subsequent operation of new facilities (DBO contracts); and (4) sale of public utility assets to investor-owned companies that take responsibility for all operations, maintenance, and expansion of services. Outright sale of public assets has been infrequent in the United States except for "regionalization" of small utilities. Nonetheless, investor-owned companies have historically played and continue to play an important role in providing water services in the United States.

Private contractors are often large companies with extensive experience and expertise that they can bring to bear on local operations. Contractual arrangements usually give them greater freedom in dealing with the workforce, which is often the greatest single source of cost savings. Large operating savings have, indeed, been achieved under existing contracts. Under some circumstances, private companies can provide needed capital. Also, private operators, being under contract or owning the utility, are often farther removed from local politics. This has the advantage of less political intervention in matters of technical management, but can lead to less transparency and accountability.

The largest gains from the new water utility privatization environment in the United States are likely to come from improved operations of the majority of water utilities that will remain publicly owned. The presence of private alternatives has clearly motivated improved performance on the part of public utilities. "Contestability" for public utilities has been ratcheted up by the existence of attractive private alternatives. Some larger public systems are actively working with smaller suburban utilities to provide better water sources and better management. This form of regionalization promises to yield large benefits.

Small- to medium-sized utilities face the greatest challenges and problems and are prime candidates for availing themselves of private services. Small and medium-sized utilities often lack needed expertise to meet today's high standards for drinking water and wastewater treatment. Consolidation and regionalization of small-to-medium sized utilities holds great promise for improved performance. New management, communication, and monitoring technologies create opportunities for economies of scale and scope. The small water utilities that comprise 85 percent of all water utilities could benefit from physical consolidation or provision of services through regionalization. Both are being provided by leading public utilities as well as by private companies specializing in assistance to small utilities.

Procurement processes through which private services are solicited are increasingly standardized, reducing uncertainty on both the public and private sides. The challenge is to find ways of standardizing procedures to reduce costs while not infringing on the freedom of municipalities or contractors to propose innovative approaches.

Communities often express concerns when considering privatization options, which include possible impacts on public goods such as environmental protection, water quality protection, transparency of decision processes, and openness to public input. The capacity to take over operations in case of contractor failure to perform is an issue, as is the need for the municipality to develop the capability to monitor the work of the contractor—a set of skills that differs from those needed for ordinary municipal operation. Concern for the continued employment and welfare of the utility workforce is often expressed. Possible loss of services provided by the water utility for other municipal departments (e.g., snow removal, flood-control measures, drainage systems) is a concern at times. In a longer time perspective, there are concerns about maintenance of watershed lands, protection of raw water sources, and provision of recreational opportunities, as well as public health, under privatization. Reservoir and watershed lands are often highly valuable, and there may be pressure to develop these lands if privately owned. However, privatization of opera-

tions and maintenance need not imply turning over ownership of land and water rights.

Another concern is that water rates charged to customers following privatization have in some instances gone up. But rates can move in either direction, depending on the financial condition of the utility, the cost savings realized, and near-term improvements and investments called for under the contract. Historically, public utility water rates have been only loosely tied to costs, while public officials have sometimes been unwilling to charge appropriate prices because of a tradition of underpricing. However, customers appear to highly value reliability and quality, and surveys have shown customers have a significant willingness to pay for high-quality services.

The term "privatization" tends to evoke the presence of a competitive environment with the attendant advantages of competitive markets, especially in the U.S. setting of markets that are frequently quite competitive. However, the "natural monopoly" attributes of water services (capital intensity, high costs of duplicating infrastructure) make competition of the usual type unlikely or impossible. Strong competition is likely to exist at the point in time when private proposals are submitted, and competition may continue along the boundaries of the service area. But during the contract period, continued monitoring of performance is needed to protect against failures to perform according to the contract. Conditions of the contract must substitute for active year-to-year competition. Investor-owned utilities (assets privately owned) are subject to regulation by state commissions but these commissions frequently lack the resources to oversee all utilities, especially under newer forms of ownership. In the case of publicly owned utilities, the supposition is that city government will monitor performance and prevent abuses.

There are elements of an "uneven playing field" in the competition between public utilities and private operators, especially relating to the availability of capital funds. Municipalities can issue tax-free bonds that carry lower interest rates than private bonds or loans. They often have access to "state revolving funds" not available to private firms. Until recently, there have been legal constraints on the private operation of physical plants that have been financed through public funds. As noted in Chapter 1, Congress initiated these financial arrangements shortly after World War I and has maintained them to the present. It is thus a major public policy debate whether the subsidies to public utilities thus provided are justified by public good advantages of public ownership and operation or whether they constitute an economically inefficient and unfair financial framework. Several financial reforms are now being debated that would tend to level the financial playing field.

The use of water markets to effect transfers of water from lower-valued to higher-valued uses is a different form of privatization that has long existed in the western United States but that is becoming increasingly important in all parts of the country. Utility managers, public or private, will have to learn to deal with these institutional innovations. These transfers can be temporary or permanent and are usually from agriculture to urban uses. The use of systems of water ownership and marketing that were developed in western states is expanding to other parts of the United States to allow the voluntary transfer of established water rights or contracts to new permanent or emergency uses. Water markets are subject to some degree of state supervision to protect other water users and various social and environmental values that can be impacted by changes in water use. Acquisition of water supplies through water markets will require collaboration of utility managers with state regulatory agencies.

The backgrounds and training of water system managers have been changing to prepare managers for the new privatization environment. Water utility managers today often have educational backgrounds not only in traditional civil engineering curricula, but also in fields such as public administration, law, and economics. Utility managers are also acquiring the skills needed for broader interaction with the public and with politicians, and they are more aware of the social and environmental dimensions of water utility operations.

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Appendixes

A

Privatization of Water Services in England and Wales

The transfer of nearly all of the water supply and wastewater-related assets in England and Wales, serving some 50 million people, from public to private ownership in 1989 represents the largest and highest level of privatization in the world. It has had strong endorsement by advocates of privatization and by officials of the World Bank. Current evaluations of this privatization range from highly favorable to highly negative. This case deserves special attention because it is the largest available case study of water industry privatization. Its lessons must not be ignored.

Experience with water supply management in England, and particularly London, deserves special attention because private water service began there in the late sixteenth century and continued for some 300 years. Over time all water supply and sewerage services, except for 28 private water supply companies, became the responsibility of local governments. In 1973, a revolutionary change in water services management occurred when virtually all 1,500 public water-related services in England and Wales were integrated into 10 regional public water authorities under the 1973 Water Act (Okun, 1977). Five years later, with a new Conservative government, almost all of the country's public services were being privatized. The water authorities and all their holdings were put up for sale to private entrepreneurs in 1989, the largest, most comprehensive public conversion to private ownership in the world.

THE EARLY YEARS: THE NINETEENTH CENTURY

The nineteenth century saw the extensive growth of piped water services in cities, accompanied by the introduction of flush toilets that were responsible for the heavy pollution of the rivers in the cities. An example is London, where the tidal Thames River received household wastes via sewers initially introduced to carry off rainwater from city streets. Private water companies were furnishing piped water to various parts of the city, several taking their water from the heavily polluted Thames River. Periodic cholera epidemics were responsible for high death rates among rich and poor alike, with a quarter of a million people, mostly in London, dying of cholera between 1848 and 1854 (Harrison, 1961). One of the companies elected to filter Thames River water (it was one of the first to do so) while others took the water without treatment. The source of the cholera had not then been established; it had been attributed to inhalations from the foul air arising from the putrid Thames River.

Two private water companies had been serving households in the same area on the south side of the Thames when one elected to improve the taste and odor of its supply by moving its intake upstream of the city while the other continued to draw from its original intake. Dr. John Snow, physician to Queen Victoria and possibly the world's first epidemiologist, established that the cholera fatality rate associated with the latter company in the summer of 1854 was 315 per 10,000 households, almost 9-fold greater than the rate among the customers of the company that had moved its intake. That study and his study of the cholera outbreak that occurred among people who carried water from a hand-pump on a well on Broad Street were the first studies to establish that water was the source of cholera outbreaks (Okun, 1996). This was decades before the germ theory of disease had been recognized.

Not all of London's water companies were as assiduous in improving their water supplies; most drew from springs and wells and enjoyed monopolies with little regulation from the city. Complaints about the service, and an increasing appreciation that contamination of the source water was responsible for the spread of disease, led many cities to take over responsibility for water supply. In London, the problems led to the establishment of the Metropolitan Water Board in 1902, an independent public body created to serve water to all of the metropolitan area of greater London. London remains the only large city in England that takes run-of-river water from unprotected watersheds, and it has continued to have problems with pollution from upstream cities and industry.

THE POST WORLD WAR II ERA: THE BEGINNING OF REGIONALIZATION

During the height of the Battle of Britain, a Central Advisory Water Committee was created to address the inadequacy of the capabilities of many small water systems to maintain service, especially in fighting fires resulting from the bombing. The committee initiated the Water Act of 1945, which called on the government to promote the "regrouping" of water supply services. Large water systems were to take over service to smaller communities in their vicinity, and in the absence of a large system, the small systems were to establish regional systems. From an original 1,186 water systems serving about 40 million people in 1945, the number of separate systems fell to 187 systems serving about 50 million people in 1974.

Although sewerage service had been extended to more than 95 percent of the population of the country, little attention had been given to wastewater treatment. Wastewater treatment for a few large cities was state of the art, but the management of water supply was almost entirely separate from the management of wastewater. Some 1,400 separate municipal wastewater systems existed, but the treatment by the smaller communities was generally unsatisfactory.

Regionalization and Integration of Water Management

Full regionalization was established by the Water Act of 1973. Not only did this act reduce the number of public bodies responsible for water supply from 187 to 10 water authorities (WAs) (the statutory private water companies were allowed to continue as agents for the water authorities in which they were located), but it integrated all water-related activities of government. The 10 water authority service areas were based on hydrologic boundaries, with some covering one river basin and others serving several river basins. The authorities were given ownership of all publicly owned facilities and land and were given the responsibility for the ownership, planning, design, construction, operation, and financing of facilities for water supply, sewerage, ambient water quality, water-based recreation, drainage and flood control, inland fisheries, and navigation.

The financing of water supply facilities in England has traditionally been by rates on properties; residential services were not metered. Financing wastewater treatment had been difficult, requiring subsidies from the national government. Water authorities were to be self-sustaining, and grants previously required from the national exchequer would no longer be forthcoming. With basinwide authorities, investments in reduc-

ing contaminants could be based on the most economical approach to maintaining river water quality. Treatment to remove pollutants could be concentrated on the larger cities on the watershed, where economies of scale make it unnecessary to provide removals at the smaller cities.

The reorganization obliged many middle management technical people to take early retirement as the staff requirements were significantly reduced. A test of the water authorities came a year after their inauguration. The 16 months from May 1975 to August 1976 were the driest in England and Wales since data were first collected in 1727. However, where serious water shortages would have been expected in the smaller communities, the economic impact was minimal because of the better management of resources; few physical interconnections had yet been made. The promise of the early years of the regionalization was great both in performance and in efficiency.

The Road to Privatization

The Water Act of 1973 had been passed under a Conservative government, but when the Labour party came into power in 1974 when the reorganization took place, little changed. However, with a Conservative return to power in 1979 under the leadership of Margaret Thatcher, major changes began to be introduced, codified in the 1983 Water Act. The period was characterized in a book, *Troubled Waters*, by David Kinnersley (1988), who entitled one chapter "The Undoing of All-Purpose Authorities." The membership of the water authority governing boards was changed, initially to reduce their number, and then to reduce and finally eliminate local government membership entirely. Chairmen (there were no female chairs) and members came from industry with little background in public management or environmental affairs, let alone knowledge of water-related issues. Meetings, previously hospitable to public participation, were closed to the press and the public. Any hopes the local governments had entertained of receiving compensation for their assets that had been transferred to the water authorities were dashed.

The two major problems faced by the water authorities were finance and water quality in the rivers, and these were aggravated by the policies of the government. The rates were adequate for operation and maintenance, but funds for capital construction were not available. The government limited external borrowing by the water authorities. One reason later given for privatization was the need for capital to replace and build infrastructure. Although responsibility for the safety of drinking water continued to rest with local government health agencies, the water authorities were charged with responsibility for pollution control, creating a

"poacher-gamekeeper" problem. The water-quality problem was more a result of financial constraints than of the conflict of interest. With the change in character of the water authority governance, the lack of commitment to improved water quality was subject to deserved criticism.

Privatization

In the May 1987 announcement of its intention to privatize the water authorities, the government gave as the only reason its being "increasingly concerned by the role of the water authorities as both poachers and gamekeepers in this field." There was strong opposition from a wide range of individuals and groups (Jeffery, 2000). People who had had few reservations about the privatization of competitive industries such as British Airways often seemed to see water as "different." In one way this was understandable, given the monopoly nature of the industry. Some of the opposition came from the trades unions, which were concerned about job losses and/or worsening terms and conditions of service. There was also a common feeling that water ought not to be a vehicle for generation of profits. The government proposed a new method of economic regulation, that was a complex mixture of control of price increases, environmental regulation, and control of drinking water quality. Many were suspicious of this system. The government argued that the ability to make profits within such a regulatory system would spur new companies to improve efficiency, which otherwise would be lacking.

In addition, it was agreed that some £24 billion would need to be invested in water and sewerage facilities over the next 10 years to catch up on arrears after years that the government itself had limited the capacity of the water authorities to obtain funds for capital construction. By privatizing, not only would the exchequer not be strained, but it would receive a tidy bounty from the sale of the authorities, whose assets had been accrued from investments over generations by the citizens through their local authorities. The intent of the privatization thus was not to improve the lot of the people in England and Wales, other than those who are shareholders in the water companies.

The perception of the people of England and Wales about the privatization has been anything but favorable. The prices of the shares had been set low to assure their quick purchase, and their value immediately jumped considerably. The salaries of government water executives were modest by comparison with the salaries of captains of industry who had taken over the water companies. A combination of increasing rates, poorer service, and a perception of the "high life" of the private water managers did not endear the companies to their customers. Also, much of

the water company energy was devoted to investments abroad. In addition to being active in the developing world, private water firms have become major players in the United States.

The Conservative government exchequer had made a killing in the sale of its "crown jewels" to the water companies, but none of these funds found their way back to the people or their local governments that had made the initial investments. Much of what was being accomplished could have been done without privatizing the water authorities. On the other hand, some positive results have been achieved. The Office of Water Regulation (OFWAT, 2000) has published its 1999-2000 reports on levels of service and financial performance and expenditure for the water industry in England and Wales. In the first of these reports, the director general, Sir Ian Byatt, wrote, "The water industry is serving its customers and the environment, well. The performance of companies in supplying water, dealing with waste water and responding to customer contact has improved significantly over the ten years since privatisation." In the same report, Michael Rouse, the chief inspector of the Drinking Water Inspectorate, writes, "My annual reports, which provide the detailed information, have demonstrated significant improvements in water quality since the start of the regulatory system in 1990" (quoted in Jeffery, 2000).

In the report on finance, Sir Ian notes that "the Environment Agency is satisfied that, as a whole, the industry's delivery of environmental improvements over the past five years is generally in line with the Agency's expectations. In the few cases where shortfalls have been experienced it can usually be attributed to problems in obtaining planning permission or other reasons not within the direct control of companies." He continues, "Capital expenditure in the year totals £3.6 billion, bringing investment to £17.5 billion in the last five years and nearly £35 billion since privatisation. This is approximately double the average level of expenditure in the 1980s." On operating costs, Sir Ian reports, "Total operating expenditure (excluding restructuring and other provisions) in 1999-2000 was £247 million lower than in 1994-1995, around 9% in real terms" (quoted in Jeffery, 2000).

So capital investment in the water industry has doubled since privatization, enabling an extremely high level of compliance with demanding water-quality regulations and improved security of service. Levels of service to customers have improved, and companies have improved their efficiency.

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B

Overview of the Safe Drinking Water Act (SDWA)

The reauthorized federal Safe Drinking Water Act was signed on August 6, 1996. The Act encompasses several major themes:

Standard-Setting Process

- The law updates the standard-setting process by focusing regulations on contaminants known to pose greater public health risks.
- It replaces the current law's demand for 25 new standards every three years with a new process based on occurrence, relative risk, and cost-benefit considerations.
- It also requires the U.S. Environmental Protection Agency (EPA) to select at least five new candidate contaminants to consider for regulation every five years.

Consumer Confidence Reports

- EPA is directed to require public water systems to provide customers with annual "Consumer Confidence Reports" in newspapers and by direct mail.

SOURCE: American Water Works Association. Available online at http://www.awwa.org/bluethumb/understandingthesafe.htm

- The reports must list levels of regulated contaminants with Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs), along with plainly worded definitions of both.
- The reports must also include a plainly worded statement of the health concerns for any contaminants for which there has been a violation, describe the utility's sources of drinking water, and provide data on unregulated contaminants for which monitoring is required, including *Cryptosporidium* and radon.
- EPA must establish a toll-free hot line customers can call to get additional information.

Source-Water Protection

- EPA is required to publish guidelines for states to develop water source assessment programs that delineate protection areas and assess contamination risks.
- A source water petition program for voluntary, incentive-based partnerships among public water systems and others to reduce contamination in source water is authorized.

State Revolving Loan Fund

- The law establishes a new State Revolving Loan Fund (SRLF) of $1 billion per year to provide loans to public water systems to comply with the new SDWA.
- It also requires states to allocate 15 percent of the SRLF to systems serving 10,000 or fewer people unless no eligible projects are available for loans.
- It also allows states to jointly administer SDWA and Clean Water Act loan programs and transfer up to 33 percent between the two accounts.

Small System Assistance

- EPA is required to identify technologies that are affordable for small systems to comply with drinking water regulations.
- Technical assistance funds and Small System Technical Assistance Centers are authorized to meet the training and technical needs of small systems.
- States are authorized to grant variances for compliance with drinking water regulations for systems serving 3,300 or fewer persons.

Operator Certification

- EPA is required to publish certification guidelines for operators of community and nontransient noncommunity public water systems.
- States that do not have operator certification programs that meet the requirements of the guidelines will lose 20 percent of their SRLF grant.

Capacity Development

- States must ensure that all new systems have compliance capacity and that all current systems maintain capacity, or they will lose 20 percent of their SRLF grant.

Increased Communication

- Although EPA will continue to provide policy, regulations, and guidance, state governments will now have more regulatory flexibility—allowing for improved communication between water providers and their local regulators.
- Increased collaboration will result in solutions that work better and are more fully supported by the regulated community.

Monitoring

- States that have a source water assessment program may adopt alternative monitoring requirements to provide permanent monitoring relief for public water systems in accordance with EPA guidance.

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Seattle Public Utilities Treatment Plant, Design-Build-Operate Project, Risk-Sharing Matrix

Risk	Allocation	Remarks
Design		
Technology Selection	Contractor	City reviews designs through an established review procedure in Service Agreement.
Technology Obsolescence	Contractor/ City	Contractor is responsible for selecting technology that is proven, will be permitted by agencies, and will meet performance guarantees. Contractor is responsible for technology obsolescence, except for change in law, unforeseen circumstances, and unspecified conditions for raw water and water demand.
Unforeseen Preexisting Site Conditions	City	Risks for change in law, unforeseen circumstances, and preexisting site conditions are the city's risks.
Construction/Commissioning		
Construction Period	Contractor	City monitors construction and tests to determine compliance with service agreement.
Acceptance Test	Contractor	Service agreement specifies guaranteed construction period after fulfillment of conditions precedent. Notice to proceed given after conditions precedent satisfied.
Payment	City/ Contractor	Facility not deemed suitable for commercial operation until test is passed. Retest principles outlined in service agreement. Construction payment based on drawdown and milestone schedule in service agreement. City is responsible for payment when milestones are met by contractor.

Risk	Allocation	Remarks
Operations and Maintenance		
Payment	City	City monitors performance via review of records and reports. City may conduct periodic inspections.
Preventive Maintenance	Contractor	Monthly service fee paid with a fixed and variable component consistent with tax laws and forms of financing (i.e., pass-through costs, the only variable component). Monthly reports typically accompany invoices.
Repairs and Replacements	Contractor/ City	Standard-of-care provisions and contractual obligations requiring proactive preventative maintenance program.
Capital Improvements	Contractor/ City	Contractor is responsible for all repairs and replacements to meet performance requirements, except for certain major improvements where the city may be responsible for costs. Contractor is responsible for all capital improvements required to meet performance requirements, except for certain major improvements where the city may be responsible for costs. City is responsible for capital improvements as a result of changes to performance standards. Renegotiation principles are included in the service agreement.
Supply of Raw Water		
Infrastructure (e.g., pipelines, reservoirs, etc.)	City	City is responsible for supplying water to facility site at interface point. Contractor assumes responsibility at the interface point.
Quantity	City/ Contractor	Specified range of flows based on historical data is provided in the service agreement. Contractor assumes risk for flows within the specified range. City provides relief for flows outside of the range. Contractual provisions included for contractor to justify adjustments to service fees for flows outside of specified ranges.
Quality	City/ Contractor	Specified ranges of quality based on historical data are provided in service agreement. Contractor assumes risk for quality within the specified range. City provides relief for raw water quality (additional payment or reduction in treatment rate) outside of range.
Plant Performance		
Quality (without change in law)	Contractor	Contractor is responsible for supply of specified water quality. Contractual provisions for the need to shut down facility if raw water quality prohibits ability to meet standards.

Risk	Allocation	Remarks
Quality (with change in law)	City	City is responsible for costs associated with upgrading and operating facility to meet new standards. Renegotiation principles are included in service agreement.
Quantity and Flow	Contractor/ City	Contractor is responsible for flows within specified range. Contractual provisions for delivery of water quantities requested by city outside of specified range.
Infrastructure for Transmission	City	City is responsible for installing and maintaining transmission and distribution systems for specified and requested flows.
Environmental/Permitting		
Additional Environmental Review	Contractor	Contractor is responsible for complying with mitigation in existing final Environmental Impact Statement (EIS) and to prepare supplemental EIS/addenda if needed.
Existing	Contractor	Contractor is responsible for reporting to regulatory agencies and the city. City monitors contractor's performance.
Change in Law	City/ Contractor	Typically allocated to the city. Limited risk can be allocated to contractor (i.e., dollar limit). Renegotiation principles are included in service agreement.
Permitting	Contractor/ City	Contractor secures most permits. City may be co-permittee. Securing permits typically undertaken as part of conditions precedent in service agreement.
Other Factors		
Financing	City	City responsible for financing project as part of conditions precedent.
Escalation of Costs—Construction	Contractor/ City	Contractor holds price until a specified calendar date. Thereafter, price escalates at a percentage of a specified index (i.e., CPI, ENR, etc.)
Escalation of Costs—Operation	City	Service fee escalates annually at a percentage of a specified index (i.e., CPI). Certain pass-through costs are allowed.
Taxation	Contractor	All taxes (i.e., income tax) are contractor's responsibility.
Natural Disaster	Contractor/ City	Insurance; renegotiation principles; force majeure provisions. City has responsible risk for amounts above uninsured portions.
Industrial Relations		
Prevailing Wage Rates/Force Majeure	Contractor	Contractor's choice whether or not to pay prevailing wages. Contractor's risk if initial choice not to pay such rates is incorrect.

Strikes	Contractor/ City	For local strikes against the facility, contractor assumes risk. For national strikes, city assumes risk.

SOURCE: Westerhoff, G. P., D. Gale, P. D. Reiter, S. A. Haskins, and J. B. Gilbert. 1998. The Changing Water Utility: Creative Approaches to Effectiveness and Efficiency. Denver, Colo.: American Water Works Association.

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Biographical Information

CHARLES W. HOWE, Chair, is a professor of economics at the University of Colorado, Boulder. Dr. Howe is currently serving as the lead author on the water resources chapter for the Intergovernmental Panel on Climate Change (IPCC), as well as serving as a member of the World Water Vision group sponsored by the World Bank and UNESCO. Dr. Howe has contributed to several National Research Council (NRC) programs, including the Water Science and Technology Board (committee member, Irrigation-Induced Water Quality Problems) and the Climate Board (chair, panel on climate research; member of the board). Dr. Howe received his Ph.D. and M.A. degrees in economics from Stanford University and his B.A. degree in economics and business administration from Rice University.

JEAN E. AUER is the former mayor of Hillsborough, California. Ms. Auer has been active in California and U.S. water management issues over the past three decades. She has worked with the California State Water Resources Control Board (public member, 1972-1977) and with the League of Women Voters Water Resources Task Force (1984-985). She was a director of the American States Water Company (1995) and serves on the Water Education Foundation Board (1992-1995). Ms. Auer received her B.A. degree (cum laude) in education from Ohio University.

JANICE A. BEECHER is a principal with Beecher Policy Research, Inc. in Indianapolis, Indiana. Dr. Beecher's areas of expertise include regulatory policy-making and decision-making. She was previously a senior research scientist and the director of regulatory studies at the Center for Urban

Policy and the Environment, School of Public Affairs, Indiana University (Indianapolis). She has also managed the water research program at the National Regulatory Research Institute (NRRI) at Ohio State University. Dr. Beecher has a B.A. degree in economics, political science, and history from Elmhurst College and M.A. and Ph.D. degrees from Northwestern University.

Charles A. Buescher, Jr., is the associate director of the School of Environmental Engineering at Washington University in St. Louis, Missouri. Mr. Buescher has served as executive vice-president of the Continental Water Company and has served as chairman of the board for the following: St. Louis County Water Corporation, Northern Illinois Water Corporation, Northwest Indiana Corporation, and the Long Island Water Corporation. Mr. Buescher served on the NRC Committee on Water Treatment Chemicals, 1980-1982. Mr. Buescher received his B.S. and M.S. degrees in civil engineering from Washington University.

Larry Chertoff is the executive director of the Water Industry Council, the trade association that represents national private water and wastewater companies. Mr. Chertoff is also the former principal quantitative analyst (chief economist) for New York City's Environmental Protection Administration and the president of Environmental Market Analysis, Inc. He also serves as advisor to the New York City Comptroller and the New York City Office of the Public Advocate. Mr. Chertoff received his B.A. degree in economics from New York University and holds M.A. degrees in economics (public regulations) and education from the New School of Social Research and Hofstra University.

Jerome B. Gilbert (NAE) is a consulting engineer who provides advice on water management, water transfers and rights, regulatory compliance, and rate analysis. Mr. Gilbert was the general manager and chief engineer (1981-1991) for the East Bay Municipal Utility District (MUD) in the Oakland, California, region and is a consultant to several large U.S. cities. He is currently chair of the Management and Policy Council of the International Water Association. Mr. Gilbert was a member of the NRC Water Science and Technology Board (1982-1986) and served on several NRC committees. Mr. Gilbert holds B.S. and M.S. degrees from the University of Cincinnati and Stanford University, respectively.

Richard Howitt is professor of economics at the University of California-Davis. Dr. Howitt's research focuses on resource and environmental economics, quantitative methods, and econometrics. Much of his research has focused on California's water resources, including water markets in the San Joaquin Valley and the Westlands Water District. Dr. Howitt received his M.S. and Ph.D. degrees in economics from the University of California-Davis.

DANIEL A. OKUN (NAE) is Kenan Professor Emeritus of environmental engineering at The University of North Carolina at Chapel Hill. He started teaching at UNC more than four decades ago. He earned a B.S.C.E. from Cooper Union, an M.S.C.E. from California Institute of Technology, and an Sc.D. in sanitary engineering from Harvard University. His career in environmental engineering spans more than 60 years. His primary interests are in the scientific, technical, and institutional issues in water management in the United States and abroad. He is a former Water Science and Technology Board chair and has served on numerous NRC committees.

DAVID E. RAGER is the chief executive officer of Cincinnati Water Works. Mr. Rager previously served as assistant city manager for Cincinnati, as well as the director of the city's Safety Department. As CEO of Cincinnati Water Works, he has worked to institute private business practices within the utility, including the utilization of employee work teams and customer focus groups and use of new technologies to manage costs. Mr. Rager holds a B.A. degree in urban planning and design from the University of Cincinnati and an M.B.A. degree from Xavier University.

WILLIAM G. REINHARDT is the editor/publisher of Public Works Financing/PWF International, an independent monthly journal focused on issues related to merging project financing structures with public works development. Mr. Reinhardt has participated on several panels and has advised numerous governments and organizations on various issues related to infrastructure finance and privatization, including the Organisation for Economic Co-operation and Development, the Organization of American States, and U.S. Agency for International Development and the governments of Mexico and Spain. Mr. Reinhardt received his B.A. degree from Gettysburg College.

WILLIAM STASIUK is a former deputy commissioner for the New York City Department of Environmental Protection and the former director of the Bureau of Water Supply, Quality, and Protection. Much of Dr. Stasiuk's experience has been with the New York State Department of Health and the State Department of Environmental Conservation. He worked for these two agencies in a variety of positions between 1966 and 1996. His past positions include director, Center for Environmental Health, 1985-1996, and associate director, Division of Environmental Health, 1978-1981. Dr. Stasiuk received his B.S. degree in civil engineering from Manhattan College, his M.S. degree in sanitary engineering from Manhattan College, and his Ph.D. degree in environmental engineering from Rensselaer Polytechnic Institute.

STAFF

JEFFREY W. JACOBS is a senior staff officer with the National Research Council's Water Science and Technology Board and served as this committee's study director. Dr. Jacobs' research interests include institutional and policy arrangements for water resources management and international cooperation in water development. He has studied these issues extensively in the Mekong River basin of Southeast Asia and has also conducted comparative studies in water policy in the Mekong and Mississippi River systems. Dr. Jacobs received his Ph.D. degree in geography from the University of Colorado-Boulder.

ELLEN A. DE GUZMAN is a research associate at the NRC's Water Science and Technology Board. She received her B.A. degree from the University of the Philippines. She has worked with a number of studies including among the most recent, Committee to Review the New York City Watershed Management Strategy, Committee on Drinking Water Contaminants (Phase II), Committee on Risk-Based Analyses for Flood Damage Reduction, Committee on Intrinsic Remediation, and Committee to Assess the U.S. Army Corps of Engineers Water Resources Project Planning Procedures. She co-edits the WSTB newsletter and manages the WSTB homepage.

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