

August 2002

WATER INFRASTRUCTURE

Information on Financing, Capital Planning, and Privatization



Contents

Letter		1
Executive Summary		2
	Purpose	2
	Background	4
	Results in Brief	4
	Principal Findings	6
	Agency Comments	9
Chapter 1	Introduction	10
	Federal, State, and Local Entities Play Important Roles in Ensuring Safe Drinking Water and Effective Wastewater Treatment	11
	Addressing Future Drinking Water and Wastewater Infrastructure Needs Will Require Major Investments	13
	Adequacy of User Charges Is Key Indicator of Sound Management at Drinking Water and Wastewater Utilities	15
	Utilities Use Approaches Such as Asset Management and Privatization to Increase Operational Efficiency	16
	Objectives, Scope, and Methodology	17
Chapter 2	User Charges and Other Local Sources of Funds Covered Much, but Not All, of Utilities' Cost of Providing Service	21
	Funds Collected from Local Sources Were Often Less Than Utilities' Cost of Providing Service	21
	Funds from Local Sources Generally Exceeded Operation and Maintenance Costs	27
	User Charges Represented a Major Source of Local Funds, but Were Increased Two Times or Fewer by Half of the Utilities	29
Chapter 3	Many Utilities Lacked Comprehensive Asset Management Plans, but Most Had Identified Future Capital Needs	32
	Many Utilities Lacked Comprehensive Asset Management Plans Despite Pipelines in Poor Condition, Some Utilities Had Deferred Maintenance, Capital Improvements, or Both	37
	Age and Condition of Pipelines	39
	Rehabilitation and Replacement Activities	41

	Most Utilities Had Capital Improvement Plans, but Many Questioned Adequacy of Future Funding	46
Chapter 4	Profit Potential Is Key Factor in Private Companies' Decisions to Assume Operation or Ownership of Utilities	49
	Profit Potential Is Key Consideration for Private Companies	49
	States' Policies May Also Influence Companies' Decisions	54
Appendix I	Survey of Drinking Water Utilities	57
Appendix II	Survey of Wastewater Utilities	67
Appendix III	GAO Contacts and Staff Acknowledgments	78
Tables		
	Table 1: Estimated Percentages of Utilities That Used Each Source of Funding in Their Most Recently Completed Fiscal Year	23
	Table 2: Relationship between the Frequency of Rate Increases and Utilities' Ability to Cover Their Cost of Providing Service Using Revenues from All Local Sources, 1992–2001	30
	Table 3: Frequency of Rate Increases, 1992 through 2001, by Size of Population Served	31
	Table 4: Extent to Which Utilities' Asset Management Plans Covered Assets and Key Elements	35
	Table 5: Desired and Actual Rehabilitation and Replacement Rates for Pipelines (on average, for fiscal years 1998 through 2000) ⁴³	
	Table 6: Relationship between Adequacy of Projected Funding to Meet Needs Over the Next 5 to 10 Years and Other Key Variables Related to Funding	48
Figures		
	Figure 1: Estimated Life of Pipes According to Major Eras of Water Main Installation	13

Figure 2: Extent to Which Utilities' Actual Rate of Pipeline
Rehabilitation and Replacement Met or Exceeded Their
Desired Rate (on average, fiscal years 1998 through 2000) 42

Abbreviation

EPA **Environmental Protection Agency**



United States General Accounting Office
Washington, DC 20548

August 16, 2002

The Honorable Robert Smith
Ranking Minority Member
Committee on Environment and Public Works
United States Senate

The Honorable Michael Crapo
Ranking Minority Member
Subcommittee on Fisheries, Wildlife, and Water
Committee on Environment and Public Works
United States Senate

In response to your request, this report provides information on the financing and planning activities of public and private drinking water and wastewater utilities, as well as issues related to privatizing these utility functions.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to appropriate congressional committees, the Administrator of the Environmental Protection Agency, and the Director of the Office of Management and Budget. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

Please call me at (202) 512-3841 if you or your staff have any questions. Major contributors to this report are listed in appendix III.

David G. Wood
David G. Wood
Director, Natural Resources
and Environment

Executive Summary

Purpose

According to the Environmental Protection Agency (EPA) and water utility industry groups, communities will need an estimated \$300 billion to \$1 trillion over the next 20 years to repair, replace, or upgrade aging drinking water and wastewater facilities; accommodate a growing population; and meet new water quality standards. As the agency that regulates drinking water and surface water quality, EPA provides a significant amount of financial assistance for these facilities. Other federal agencies, as well as states, also provide assistance. Given the magnitude of estimated needs, some industry groups are seeking increased federal funding, and the Congress is considering several legislative options.

While drinking water and wastewater utilities use a multitude of funding sources—including federal and state loans and grants, bonds, and other debt and equity instruments—they rely primarily on user charges. Indeed, operating principles established by water utility associations call for fully supporting the utilities’ operating and capital costs through user and service charges. Utilities that follow these principles derive a “cost of providing service” to establish their revenue requirements and set their user rates. Depending on the utility, the cost of service may include operation and maintenance expenses, taxes (or payments in lieu of taxes), depreciation, debt service payments, contributions to specified reserves (for example, putting aside funds for future capital needs), other capital expenditures, and a rate of return on the value of the utility’s assets. According to water utility associations, utilities should manage their capital assets to maximize the useful life of the assets, control operating costs, and generally enhance the efficiency of their operations. Utilities can develop asset management plans, which should contain such key elements as an assessment of the physical condition of all capital assets, descriptions of the criteria used to measure and report on the condition of the assets, information on the condition in which the assets will be maintained, and a comparison of the planned and actual dollar amounts used to maintain the assets at the established condition level. To address financial and management challenges, some publicly owned utilities have entered into public-private partnerships that use private sector resources in an effort to upgrade or replace deteriorating infrastructure or to operate more efficiently.

The respective Ranking Minority Members of the Senate Committee on Environment and Public Works and its Subcommittee on Fisheries, Wildlife, and Water, asked GAO to examine several issues relating to the funding available to help meet the capital investment needs of the nation’s drinking water and wastewater facilities. Given the broad scope of the request, GAO agreed to provide the information in two reports. The first

report, issued in November 2001, addressed the amounts and sources of federal and state financial assistance for drinking water and wastewater infrastructure during fiscal years 1991 through 2000.¹

This second report examines (1) how the amount of funds obtained by large public and private drinking water and wastewater utilities—those serving populations greater than 10,000—through user charges and other local funding sources compare with their cost of providing service, (2) how such utilities manage existing capital assets and plan for needed capital improvements, and (3) what factors influence private companies' interest in assuming the operation or ownership of publicly owned drinking water and wastewater facilities. To address the first and second objectives, GAO mailed questionnaires to 1,425 public and private drinking water systems and 2,391 public and private wastewater systems, which it identified using EPA databases. In the analysis, utilities were weighted to account statistically for all utilities in the population, including those not selected in the sample. Overall, GAO received responses from an estimated 77 percent of the drinking water utilities serving more than 10,000 and 73 percent of the wastewater utilities of this size. GAO used the weighted results to make estimates about the entire population of drinking water and wastewater utilities serving more than 10,000. The percentages cited throughout the report are thus estimates and have 95-percent confidence intervals of plus or minus 10 percentage points or less. (Copies of the questionnaires, including a summary of the utilities' responses, are included as appendixes I and II.) To address the third objective, GAO obtained information from officials with five private companies that have significant experience with privatization agreements and are among the most active participants in this field, either nationally or regionally. In addition, because company officials identified state requirements and policies as a significant factor in privatization decisions, GAO contacted officials in eight states (California, Connecticut, Georgia, Indiana, New Jersey, Pennsylvania, Texas, and Washington) that the companies, EPA, and industry associations identified as having requirements or policies that could affect privatization decisions.

¹See U.S. General Accounting Office, *Water Infrastructure: Information on Federal and State Financial Assistance*, [GAO-02-134](#) (Washington, D.C.: Nov. 30, 2001).

Background

Americans rely on their drinking water and wastewater utilities to provide clean and safe water for a variety of uses and to protect public health and the environment. Regulated under the Safe Drinking Water Act and the Clean Water Act, respectively, community drinking water systems and wastewater collection and treatment facilities are critical elements in the nation's infrastructure. Local drinking water and wastewater utilities, supported primarily through user charges, have invested billions of dollars over the past century in the facilities that supply the nation's drinking water and treat its wastewater. In many instances, local communities have received financial assistance from federal and state programs. However, even with maintenance and repair activities, infrastructure deteriorates over time and eventually needs replacement and the estimated needs for upgrading existing facilities and building new ones are very large, up to \$1 trillion.

In response to growing concerns about the condition of the existing water infrastructure and calls for increased financial assistance, the Congress is considering a number of infrastructure-related proposals. At the local level, community leaders are faced with increasing demands for funding all types of infrastructure and services and must find new ways to control costs or build public support for necessary expenditures. Water utility associations, including the Association of Metropolitan Sewerage Agencies, the Association of Metropolitan Water Agencies, the American Water Works Association, and the Water Environment Federation, have established operating principles and guidance for managing utilities' assets and planning for future capital needs. In addition, public-private partnerships offer one approach to increasing utilities' operational efficiency.

Results in Brief

According to GAO's survey, the amount of funds obtained from user charges and other local sources of revenue was less than the full cost of providing service—including operation and maintenance, debt service, depreciation, and taxes—for over a quarter of drinking water utilities and more than 4 out of 10 wastewater utilities in their most recent fiscal year. Revenues from user charges and other local sources were adequate to cover at least operation and maintenance costs for nearly all of the utilities; however, an estimated 29 percent of the utilities deferred maintenance because of insufficient funding. Revenues from user charges accounted for most of utilities' locally generated funds—at least three-quarters of all funds from local sources for at least three-quarters of utilities. GAO's survey found that about half of the utilities raised their user rates two times or less from 1992 to 2001.

GAO's survey found that more than a quarter of utilities lacked plans recommended by utility associations for managing their existing capital assets, but nearly all had plans that identify future capital improvement needs. Among the utilities that had plans for managing their existing assets, more than half did not cover all their assets or omitted key plan elements, such as an assessment of the assets' physical condition. In addition, while most utilities had a preventive rehabilitation and replacement program for their pipelines, for about 60 percent of the drinking water utilities and 65 percent of the wastewater utilities, the actual rate of rehabilitation and replacement in recent years was less than their desired levels, and many had deferred maintenance, capital expenditures, or both. Almost all utilities reviewed their future capital improvement needs annually, whether or not a formal plan was in place. Many utilities also had plans for financing their future capital needs, but nearly half believed that their projected funding over the next 5 to 10 years would not be sufficient to meet their needs.

A privatization agreement's potential to generate profits is the key factor influencing decisions by private companies that enter into such agreements with publicly owned utilities or the governmental entities they serve, according to the companies GAO contacted. In assessing profit potential, the companies cited several specific criteria, such as the extent of opportunities to enhance operational efficiency, the utility's proximity to the companies' existing operations, the potential for system growth, and the potential need for capital investments. State policies can also influence privatization agreements. For example, two states that GAO contacted restrict the use of design-build-operate contracts, which give a single entity complete control over a project. Other states offer incentives to encourage the takeover of financially troubled public utilities.

Principal Findings

User Charges and Other Local Sources of Funds Covered Much, but Not All, of Utilities' Cost of Providing Service

GAO found that revenues from user charges exceeded the cost of service at an estimated 39 percent of the drinking water utilities and 33 percent of the wastewater utilities. (For the purpose of this analysis, GAO defined a utility's cost of service as operation and maintenance expenses, taxes, depreciation, and debt service.) When revenues from user charges were combined with funding from other local sources, such as hook-up and connection fees and sales of services to other utilities, an estimated 71 percent of the drinking water utilities and 59 percent of the wastewater utilities covered their cost of providing service. For both drinking water and wastewater utilities, GAO did not find statistically significant differences between utilities by the size of the populations they serve; that is, smaller utilities were neither more nor less likely than larger utilities to have covered their cost of providing service with revenues from user charges and other local sources. Similarly, GAO did not find statistically significant differences between drinking water utilities by public or private ownership.²

According to GAO's survey results, about 85 percent of drinking water utilities and 82 percent of wastewater utilities covered at least the operation and maintenance portion of the cost of providing service using revenues from user charges alone. Moreover, adding other locally generated funds to the user charges, about 93 percent of the utilities covered their operation and maintenance costs. Operation and maintenance costs are of particular interest because historically, wastewater utilities—as a condition of receiving certain grants under the Clean Water Act—generally were required to cover these costs with user charges. While drinking water utilities are not subject to a similar requirement, both EPA and water industry associations consider adequate user charges to be a key indicator of utilities' financial health. Despite covering operation and maintenance costs, an estimated 29 percent of the utilities deferred maintenance because of insufficient funding.

GAO found that more than half of utilities whose revenues from user charges and other local sources did not cover their cost of providing

² GAO did not receive enough responses from privately owned wastewater utilities for a meaningful analysis of ownership types. According to EPA, most privately owned wastewater systems serve populations of less than 10,000.

service raised their rates two times or less during the 10-year period from 1992 to 2001. Overall, GAO found no statistically significant differences in the frequency of rate increases between the utilities that did not cover their costs and those that did.

Many Utilities Lacked Comprehensive Asset Management Plans and Had Deferred Maintenance or Capital Improvements, but Most Had Identified Future Capital Needs

According to GAO's survey, a significant percentage of drinking water and wastewater utilities—about 27 percent and 31 percent, respectively—did not have plans for managing their existing capital assets, although some utilities were in the process of developing such plans. Further, of the utilities with plans, more than half did not include all of their assets or omitted one or more key elements recommended by industry associations; for example, 16 percent of drinking water utilities' plans and 21 percent of wastewater utilities' plans did not include information on the condition level at which the utility intends to maintain the assets. GAO found no statistical differences among utilities of different sizes with regard to the inclusion or exclusion of any of the key elements in their asset management plans. However, GAO found that the plans developed by privately owned drinking water utilities tended to be more comprehensive than those developed by publicly owned utilities.

According to GAO's survey results, some utilities had significant portions of pipelines in poor condition; for example, more than one-third of the utilities had 20 percent or more of their pipelines nearing the end of their useful life. Nevertheless, for about 60 percent of drinking water utilities and 65 percent of wastewater utilities, the actual levels of pipeline rehabilitation and replacement in recent years were less than the utilities' desired levels. For example, GAO's survey indicates that roughly half of the utilities actually rehabilitated or replaced 1 percent or less of their pipelines annually, even though an estimated 89 percent of drinking water utilities and 76 percent of wastewater utilities believed that a higher level of rehabilitation and replacement should be occurring. Further, in each of three categories—maintenance, minor capital improvements, and major capital improvements—about one-third or so of the utilities had deferred expenditures in their most recent fiscal years, and 20 percent had deferred expenditures in all three categories. With one exception, there were no statistically significant differences among utilities of different sizes; however, GAO found that public drinking water utilities were more likely than their privately owned counterparts to defer maintenance and major capital projects.

Overall, GAO's survey results indicate that about 90 percent of drinking water and wastewater utilities had capital improvement plans to identify future capital needs, and about 90 percent of utilities reviewed their needs annually whether or not they had developed formal plans. About 95 percent of the utilities' capital improvement plans covered 5 years or more—with about 25 percent of drinking water utilities and about 20 percent of wastewater utilities covering 10 years or more. The smallest systems (those serving 10,001 to 25,000 people) were slightly less likely than larger systems to have such plans. Most of the utilities with capital improvement plans also had plans for financing the projects they identified; according to GAO's survey, 86 percent of the utilities had such financing plans, including virtually all of the largest utilities (those serving populations of over 100,000). However, about 45 percent of the drinking water and wastewater utilities anticipated that their projected funding would not be sufficient to cover future needs over the next 5 to 10 years. Regarding this outlook, there were no statistically significant differences among wastewater utilities of different sizes; however, the largest drinking water utilities were less likely to believe that their projected revenues would be insufficient to cover anticipated future needs than their smaller counterparts. Also, public drinking water utilities were somewhat more likely than privately owned systems to have concerns about future funding.

Profit Potential Is Key Factor in Private Companies' Decisions to Assume Operation or Ownership of Drinking Water or Wastewater Utilities

Privatization agreements range from contracts to operate and maintain local drinking water or wastewater facilities to outright ownership by private entities. Not surprisingly, all five of the companies GAO contacted evaluate the potential for profits when considering entering into privatization agreements. Criteria important to assessing the profitability of a proposed utility privatization agreement include the potential to improve the efficiency of the utility's operations; the proximity to the company's other utility operations; the potential for system growth; the terms of a proposed contract; and the potential need for capital investments. Each of the five companies GAO contacted employs a somewhat different business strategy in its pursuit of privatization agreements, such as placing more emphasis on contract operations rather than assuming ownership of utilities or focusing on utilities of particular sizes or in particular locations. Differences in the companies' business strategies had some influence on the relative importance of the factors to each company. In addition to identifying the site-specific factors they consider in evaluating privatization opportunities, representatives from all five companies also provided comments on state requirements or policies that can facilitate or impede privatization arrangements.

Officials in eight states GAO contacted said their primary interest is the delivery of adequate service to the public, whether the service is provided by publicly or privately owned utilities. However, some requirements and policies can affect companies' privatization decisions. For example, among the states GAO contacted, state regulators in Indiana and Pennsylvania have established programs that provide incentives to acquire or take over troubled utilities. In Indiana, for example, the acquiring utility is often permitted an "acquisition adjustment," which allows the utility to charge customers higher rates. On the other hand, state policies may have the effect of limiting privatization; two of the states GAO contacted restrict the use of design-build-operate contracts. In Texas, for example, the state requires the use of qualification-based criteria for selection of engineering design services and a bidding process for construction services, requirements that effectively preclude combining design, construction, and operating services in a single procurement.

Agency Comments

GAO provided a draft of this report to EPA for its review and comment. GAO received comments from officials in EPA's Office of Water, including the Office of Ground Water and Drinking Water and the Office of Wastewater Management. EPA agreed with the information presented in the report and characterized the findings as interesting and informative. EPA officials also provided several technical comments and clarifications, which GAO incorporated as appropriate.

Chapter 1: Introduction

Americans rely on their drinking water and wastewater utilities to provide clean and safe water for a variety of uses and to protect public health and the environment. Regulated under the Safe Drinking Water Act and the Clean Water Act, respectively, community drinking water systems and wastewater collection and treatment facilities are critical elements in the nation's infrastructure. Local drinking water and wastewater utilities, supported primarily through user charges, have invested billions of dollars over the past century to create the treatment, collection, storage, and distribution facilities that supply the nation's drinking water and treat its wastewater, in accordance with applicable federal and state quality standards. In many instances, local communities have also received financial assistance from federal or state programs to improve or expand their water infrastructure. Even with maintenance and repair activities, infrastructure deteriorates over time and eventually needs replacement. According to recent estimates, the level of investment that will be required over the next 20 years to repair, replace, or upgrade aging facilities; accommodate the nation's growing population; and meet new quality standards will be very large, up to \$1 trillion. Moreover, following the terrorist attacks of September 11, 2001, both drinking water and wastewater utilities may have to make additional investments to increase the security of their operations.

In response to growing concerns about the condition of the existing water infrastructure and calls for increased financial assistance, the Congress is considering a number of infrastructure-related proposals. At the local level, utility managers must find new ways to control costs or build public support for increasing the rates charged to customers. Among the options available to help local utilities meet the challenges they face are ensuring that revenues are adequate to cover costs, finding more cost-effective ways to manage utility assets, and entering into public-private partnerships.

Federal, State, and Local Entities Play Important Roles in Ensuring Safe Drinking Water and Effective Wastewater Treatment

The Environmental Protection Agency (EPA) sets standards for the quality of drinking water and wastewater and issues other regulations and guidance to implement the requirements of the Safe Drinking Water Act and the Clean Water Act. Under the Safe Drinking Water Act, EPA is required to establish (1) standards or treatment techniques for contaminants that could adversely affect public health and (2) requirements for monitoring the quality of drinking water and for ensuring the proper operation and maintenance of water systems. The Clean Water Act's National Pollutant Discharge Elimination System program limits the types and amounts of pollutants that industrial and municipal wastewater treatment facilities may discharge into the nation's surface waters. EPA has issued national guidance and regulations to assist the states in establishing standards to protect the quality of their waters and in issuing permits to facilities to limit discharges of pollutants.

Both federal and state agencies also provide a significant amount of funding for drinking water and wastewater infrastructure through grant and loan programs. In November 2001, we reported that from fiscal year 1991 through fiscal year 2000, nine federal agencies made available about \$44 billion for capital improvements at drinking water and wastewater systems, and states made available about \$25 billion over the same period.¹ EPA represents the largest source of financial assistance at the federal level through its Drinking Water and Clean Water State Revolving Funds, contributing about 56 percent of the total. Under these programs, EPA provides grants to the states to capitalize revolving loan funds. The states, which are required to contribute matching funds equal to 20 percent of the EPA grants, make loans to local communities or utilities; as loans are repaid, the states' revolving loan funds are replenished. In addition to contributing over \$10 billion to match EPA's capitalization grants for the Drinking Water and Clean Water State Revolving Funds, the states made over \$9 billion available under state-sponsored grant and loan programs and provided about \$6 billion through general obligation and revenue bonds and other funding mechanisms.

At the local level, a variety of public and privately owned utilities operate thousands of systems that supply drinking water and treat wastewater for millions of Americans. In total, about 55,000 community drinking water

¹In constant year 2000 dollars. See U.S. General Accounting Office, *Water Infrastructure: Information on Federal and State Financial Assistance*, GAO-02-134 (Washington, D.C.: Nov. 30, 2001).

systems and nearly 30,000 wastewater treatment and collection facilities are subject to numerous treatment, testing, and operational requirements under the Safe Drinking Water Act and the Clean Water Act, respectively. Although many of these utilities are quite small, particularly in the case of drinking water systems,² larger utilities serve most of the U.S. population and account for most of the infrastructure needs identified in periodic surveys of such needs conducted by EPA. Specifically, according to EPA's Safe Drinking Water Information System, as of January 2001, 4,079 utilities, or about 7 percent of all community water systems, each served more than 10,000 people and accounted for about 65 percent of the estimated infrastructure needs for drinking water utilities. In the case of wastewater utilities, about 8,744 treatment and collection facilities, or about 29 percent of the total, are estimated to serve more than 10,000 people. These facilities account for approximately 89 percent of the estimated infrastructure needs for wastewater utilities.³

Publicly owned drinking water and wastewater utilities include systems owned by municipalities, townships, counties, water and/or sewer districts, and water and/or sewer authorities. Private ownership encompasses a broad range of owners, from homeowners' associations, mobile home parks, and other entities whose primary business is unrelated to water supply or wastewater treatment, to larger, investor-owned companies. About half of the nation's drinking water systems and an estimated 20 percent of the wastewater systems are privately owned, according to EPA and industry sources. According to EPA, most of the privately owned drinking water and wastewater systems serve populations of less than 10,000.

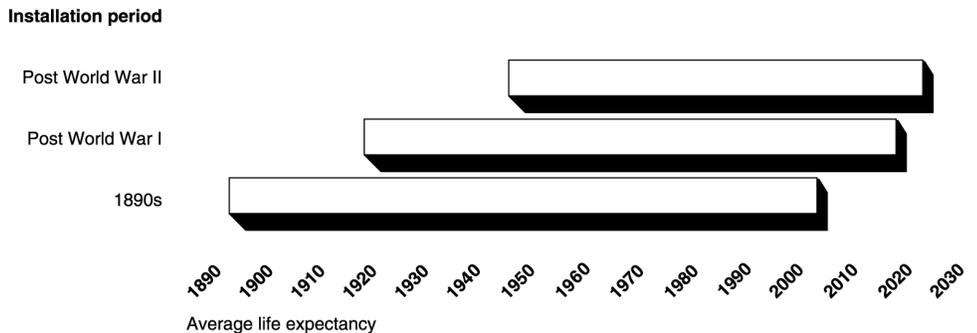
²For example, nearly 60 percent of the community drinking water systems serve populations of 500 or fewer.

³For the purposes of our review, we focused on wastewater treatment facilities only to avoid double counting collection facilities that serve multiple treatment plants. According to an EPA official, wastewater treatment facilities serving 10,000 or more people account for approximately 65 percent of the estimated infrastructure needs for wastewater utilities.

Addressing Future Drinking Water and Wastewater Infrastructure Needs Will Require Major Investments

EPA and a variety of industry groups are predicting that major investments will be needed to upgrade, repair, or replace existing infrastructure; meet demands for additional capacity; or comply with new regulatory requirements. Pipeline rehabilitation and replacement represents a significant portion of the projected infrastructure needs. According to EPA estimates, for example, at least half of the drinking water and wastewater infrastructure need is in the form of pipes buried under ground. A study sponsored by a major water industry association concluded that much of the existing pipe network is at or near the end of its expected lifespan.⁴ Using average life estimates for different types of pipe and counting the years since the lines were originally installed, the study predicts that drinking water utilities will face significant repair and replacement costs over the next 3 decades. Other studies make similar predictions for the pipelines owned by wastewater utilities.⁵ Figure 1 shows the estimated life expectancy of the pipelines installed during major periods of utility growth.

Figure 1: Estimated Life of Pipes According to Major Eras of Water Main Installation



Source: American Water Works Association Water Industry Technical Action Fund, *Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure* (Denver, Colo.: May 2001) pp. 10-11.

⁴American Water Works Association Water Industry Technical Action Fund, *Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure* (Denver, Colo.: May 2001).

⁵For example, see Water Environment Research Foundation, *New Pipes for Old: A Study of Recent Advances in Sewer Pipe Materials and Technology* (2000).

While the size, period covered, and specific assumptions of individual estimates vary, the amount needed for future capital investments in water and wastewater infrastructure will be substantial. Several recent studies project future infrastructure needs over a 20-year period:

- According to EPA's 1999 survey of drinking water infrastructure needs, the estimated needs would be at least \$150.9 billion through 2019, including an estimated \$83.2 billion just for water transmission and distribution lines.⁶
- Similarly, EPA's 1996 survey of "clean water" needs estimated that total wastewater infrastructure-related needs will be about \$128 billion through 2016.⁷ In a subsequent analysis, EPA estimated that an additional \$56 billion to \$87 billion would be needed to correct existing sanitary sewer overflow problems.
- In April 2000, the Water Infrastructure Network, a consortium of industry, municipal, state, and nonprofit associations, projected needs of up to 1 trillion dollars over the next 20 years for drinking water and wastewater utilities combined, when both the capital investment needs and the cost of financing are considered.⁸
- In May 2002, the Congressional Budget Office estimated that the cost of drinking water and wastewater infrastructure over the next 20 years would be \$492 billion under a low-cost scenario and \$820 billion under a high-cost scenario, including both the cost of physical capital and interest on loans and bonds.⁹

Whatever the level of investment turns out to be, the needs will be likely be met by some combination of local, state, and federal funding sources. As the Congressional Budget Office noted in its recent report, society as a whole will ultimately foot the bill, whether through the rates charged to users or through federal, state, or local taxes.

⁶U.S. Environmental Protection Agency, *Drinking Water Infrastructure Needs Survey: Second Report to Congress*, EPA 816-R-01-004 (Washington, D.C.: February 2001).

⁷U.S. Environmental Protection Agency, *1996 Clean Water Needs Survey Report to Congress*, EPA 832-R-97-003 (Washington, D.C.: September 1997).

⁸Water Infrastructure Network, *Clean & Safe Water for the 21st Century* (April 2000).

⁹Congressional Budget Office, *Future Investment in Drinking Water and Wastewater Infrastructure*, (Washington, D.C.: May 2002). The report states that assumptions about the rate at which drinking water pipes are replaced, the savings associated with improved efficiency, the costs of controlling combined sewer overflows, and the borrowing term are primarily responsible for the difference between the low and high estimates.

Adequacy of User Charges Is Key Indicator of Sound Management at Drinking Water and Wastewater Utilities

Drinking water and wastewater utilities need revenue to maintain current service levels, meet new demands for service, adequately maintain existing plant and equipment, and plan for future needs in an orderly manner. To accomplish these goals, water industry associations generally support the principle that utilities should generate enough revenue through user rates and service charges to fully cover the cost of providing service, without relying on subsidies from other revenue sources.¹⁰ That is, the rates that utilities charge their customers should be sufficient to finance all of the utilities' operating and maintenance expenses as well as capital costs. For example, according to a group of water industry associations known as the H2O Coalition, water utilities should move toward becoming self-sustaining by charging their customers rates that reflect the full cost of service, thus ensuring that utilities will get as much of the revenues they need as possible from their customers.¹¹ EPA's Office of Water also supports the concept of fiscal sustainability for water utilities and sees rates that result in revenues sufficient to meet the cost of service as a measure of the utilities' financial health.

In some instances, drinking water and wastewater utilities may have to establish user rates that meet certain minimum requirements as a condition of receiving federal or state financial assistance. For example, the Clean Water Act requires wastewater utilities that received construction grants under title II of the act to establish rates that generate enough revenue to cover operation and maintenance costs. Less specific requirements apply to wastewater utilities that receive loans under the Clean Water State Revolving Fund Program. Although the Safe Drinking Water Act does not contain any explicit requirements for minimum user charges at drinking water utilities, EPA has addressed the issue indirectly in guidance to the states. Under the Safe Drinking Water Act Amendments of 1996, states are required to develop programs to ensure that drinking water systems have the financial, managerial, and technical capacity to comply with national drinking water regulations. EPA's guidance on implementing such programs suggests that the criteria for assessing the

¹⁰Among the associations that support the principle that utilities should be self-sustaining are the American Water Works Association, the Association of Metropolitan Sewerage Agencies, the Association of State Drinking Water Administrators, the National Association of Water Companies, the National Council for Public Private Partnerships, and the Water and Wastewater Equipment Manufacturers.

¹¹The H2O Coalition includes the National Association of Water Companies, the National Council for Public-Private Partnerships, the Water and Wastewater Equipment Manufacturers Association, and the Association of State Drinking Water Administrators.

systems' financial capacity include a determination of whether water rates and charges are adequate to cover the cost of water.¹²

Utilities Use Approaches Such as Asset Management and Privatization to Increase Operational Efficiency

In addition to maintaining adequate user charges, utilities can ensure that their revenues are sufficient by increasing their operational efficiency and thus controlling their costs. One approach recommended by industry experts is "asset management." The goal of asset management is to manage infrastructure assets so that the total cost of owning and operating them is minimized and desired customer service levels are maintained. The asset management process involves assessing the condition of a system's infrastructure assets, estimating the life expectancy of these assets, and ensuring that sufficient funds are allocated over the life of the assets to optimize their value.

Asset management is seen as particularly relevant to the water utility industry because drinking water and wastewater utilities are capital-intensive and have a sizeable investment in pipes and other assets with a relatively long service life. According to a comprehensive industry handbook on managing capital assets, there is a growing awareness among water utilities that "preserving the life and function of infrastructure assets will help optimize operations and maintenance and identify needed capital resources, thereby reducing funding gaps between future capital needs and available financial resources."¹³ Given the magnitude of the estimates for future infrastructure needs, it is important for utilities to adopt a strategy for managing the repair and replacement of key assets as cost-effectively as possible.

In recent years, privatization of public facilities and services, particularly at drinking water utilities, has been occurring in the United States at an increasing rate. Some municipal drinking water and wastewater utilities have explored privatization as another option for increasing operational efficiency. Privatization is commonly defined as any process aimed at shifting functions and responsibilities, in whole or in part, from the municipal government to the private sector. Municipalities may turn to

¹²U.S. Environmental Protection Agency, *Guidance on Implementing the Capacity Development Provisions of the Safe Drinking Water Act Amendments of 1996*, EPA 816-R-98-006 (Washington, D.C.: July 1998).

¹³Association of Metropolitan Sewerage Agencies, *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance*, p. 4.

privatization agreements to address issues such as needed infrastructure improvements, rising costs, or more stringent regulatory requirements.

Privatization can take different forms, ranging from contracting for specific services to the actual sale of a facility to a private company. The most common form of privatization is contracting, which typically entails a competition among private bidders to perform certain activities. In the case of drinking water and wastewater utilities, such activities typically include operation and maintenance. When a municipality contracts with a private company for services, the government remains the financier and has management and policy control over the quality of services to be provided. In some instances, privatization involves the transfer of the ownership of utility assets from a municipality to the private sector. Once the assets have been sold, the government generally has no role in their financial support, management, or oversight.

Objectives, Scope, and Methodology

The Ranking Minority Member, Senate Committee on Environment and Public Works, and the Ranking Minority Member, Subcommittee on Fisheries, Wildlife, and Water, Senate Committee on Environment and Public Works, asked us to examine several issues relating to the funding available to help meet the capital investment needs of the nation's drinking water and wastewater facilities.¹⁴ This report provides information on

- how the amount of funds obtained by large public and private drinking water and wastewater utilities—those serving populations greater than 10,000—through user charges and other local funding sources compare with the cost of providing service,
- how such utilities manage existing capital assets and plan for needed capital improvements, and
- what factors influence private companies' interest in assuming the operation or ownership of publicly owned drinking water and wastewater facilities.

To address the first two objectives, we obtained information on utility finances and capital management practices by surveying, using a mailed questionnaire, drinking water and wastewater utilities that serve

¹⁴As noted earlier, our November 2001 report addressed the amounts and sources of federal and state financial assistance for drinking water and wastewater infrastructure during fiscal years 1991 through 2000. See [GAO-02-134](#).

populations greater than 10,000. We developed similar but separate questionnaires, one for drinking water utilities and one for wastewater utilities. We focused on utilities serving populations of more than 10,000 because they (1) accounted for a large share of infrastructure needs and (2) were more likely than their smaller counterparts to have the means to respond to our survey. A copy of the drinking water utility questionnaire, with summary response data, is in appendix I, and a copy of the wastewater utility questionnaire, with summary response data, is in appendix II.

We obtained contact information for the drinking water utilities from EPA's Safe Drinking Water Information System database. We mailed questionnaires to all 480 private drinking water utilities and to a sample of 945 public drinking water systems, stratified by size of population served (the size categories appear on the questionnaires), identified in the database. (Thus, we sent questionnaires to a total of 1,425 utilities.) We obtained contact information for the public and private wastewater utilities from EPA's Clean Water Needs Survey database and EPA's Permit Compliance System database.¹⁵ EPA does not collect information specifically on the size of the population served by wastewater utilities. However, EPA officials estimate that facilities that process more than 1 million gallons of wastewater per day are roughly equivalent to facilities that serve populations of more than 10,000 people. Thus, we used EPA's data on plant capacity to approximate the sizes of wastewater utilities. We then mailed questionnaires to all 2,391 of the systems estimated on this basis to serve populations greater than 10,000.

We included on the questionnaires a "screening" question to make certain that the responses we obtained and used were in fact from utilities that served populations greater than 10,000. We obtained 821 useable responses from drinking water utilities and 1,113 useable responses from wastewater utilities. In the analysis, utilities were weighted to account statistically for all utilities serving populations greater than 10,000, including those not selected for our sample. Overall, using response data from the screening question and from nonrespondent follow-up efforts to adjust the estimated number of drinking water and wastewater utilities serving populations greater than 10,000, we estimate that 77 percent of the

¹⁵We did not send questionnaires to drinking water and wastewater utilities whose ownership was specified as "federal government," "state government," "native American," or "not specified."

drinking water utilities serving more than 10,000 people and 73 percent of the wastewater utilities of this size responded to the survey. We used the weighted results to make estimates about the entire population of such drinking water and wastewater utilities. Therefore, all utility percentages cited in the remainder of the report are estimates and have some sampling error associated with them. All estimates cited have 95-percent confidence intervals of plus or minus 10 percentage points or less; that is, we are 95 percent confident that the “actual” population value is contained in an interval of 10 percentage points above or below the estimate. We used these sampling errors to assess statistically significant differences between percentages as well.

In addition to sampling errors, surveys can be subject to other types of systematic error or bias that can affect the results, commonly referred to as nonsampling errors. For example, questions may be misinterpreted; the respondents, as a group, may differ from those who did not respond in ways that are important; or response data could be erroneously transcribed or entered into a database. We took several steps in an attempt to reduce such errors. For example, to minimize the chances of questions being misinterpreted, we developed our survey questions with the aid of a survey specialist. We discussed the questionnaire with officials from the EPA’s Office of Water; the Association of Metropolitan Sewerage Agencies; the American Water Works Association; the Water Environment Federation; three consulting firms that specialize in the water utility industry: Beecher Policy Research, Inc., Hayden Reynolds & Associates, Pty. Ltd., and PA Consulting Group; and public utility commissions in the states of West Virginia and Wisconsin. In addition, we pretested the questionnaires with five drinking water utilities and five wastewater utilities.¹⁶ To maximize our response rate, we sent reminder postcards and mailed two follow-up questionnaires to all nonrespondents. All data were double keyed during data entry, and we verified a sample of the resulting automated data. We ran various edit checks and other computer analyses to identify inconsistencies and potential errors in the data, and a technical specialist independently reviewed all computer programs.

One of our objectives was to compare public and privately owned utilities. However, we did not receive enough responses from privately owned

¹⁶The five drinking water and five wastewater utilities were chosen to represent a variety of size categories (based on population served by each utility) and both public and private ownership.

wastewater utilities for a meaningful analysis (as noted previously, according to EPA, most privately owned wastewater systems serve populations of less than 10,000 people). Therefore, our analyses concerning utility ownership type were limited to drinking water utilities only. In comparing utilities according to the size of the population served, we collapsed the size categories into four: utilities serving populations of 10,001 to 25,000; 25,001 to 50,000; 50,001 to 100,000; and over 100,000.

To address the third objective, we interviewed officials from five private companies that have significant experience with privatization agreements and are among the most active participants in this field either nationally or regionally. The companies are American Water Works Service Company, Inc., United States Filter Corporation, and United Water (companies that operate nationally in a total of 40 states); ECO Resources, Inc., which operates principally in the Southwest; and Philadelphia Suburban Water Company, which focuses its operations in the mid-Atlantic and Midwest. In addition, because company officials identified state requirements and policies as a significant factor in their investment decisions, we interviewed officials from eight states (California, Connecticut, Georgia, Indiana, New Jersey, Pennsylvania, Texas, and Washington) that the companies, EPA, or industry officials identified as having requirements or policies that could affect privatization.

We conducted our work between May 2001 and July 2002 in accordance with generally accepted government audit standards.

Chapter 2: User Charges and Other Local Sources of Funds Covered Much, but Not All, of Utilities' Cost of Providing Service

According to our survey, the amount of funds obtained from user charges and other local sources of revenue was less than the full cost of providing service—including operation and maintenance, debt service, depreciation, and taxes—for an estimated 29 percent of drinking water utilities and 41 percent of wastewater utilities. (Our survey requested information on utilities' revenues and costs during their most recently completed fiscal year.) Revenues from user charges and other local sources were adequate to cover at least operation and maintenance costs for over 93 percent of the utilities, but about 29 percent of the utilities deferred maintenance during the same time period because of insufficient funding. Revenues from user charges usually accounted for most of utilities' locally generated funds. Our survey found that about half of the utilities raised their user rates infrequently—once, twice, or not at all—from 1992 to 2001.

Funds Collected from Local Sources Were Often Less Than Utilities' Cost of Providing Service

We found that revenues from user charges and other local sources often fell short of utilities' cost of providing service, as defined below. According to EPA and major water industry associations, in order to be self-sustaining, drinking water and wastewater utilities must recover the full cost of providing service through their user rates and service charges. Rates that generate sufficient revenue to cover the full cost of service lessen the need for external assistance, such as federal or state grants and loans. Determining the cost of service establishes a utility's revenue requirements and, accordingly, can serve as a basis for its rate structure.

According to the National Regulatory Research Institute, “determining utility revenue requirements involves an examination of aggregate annual costs, including operating as well as capital costs,” to derive the utility's cost of providing service.¹ In a November 1993 report, the Institute explained that water utilities generally use one of two basic methods of determining their revenue requirements for the purpose of setting user rates, largely depending on whether the utility is public or privately owned:²

¹The National Regulatory Research Institute was established by the National Association of Regulatory Utility Commissioners in 1976 at the Ohio State University and is the official research arm of the association. The Institute provides research and assistance to state public utility commissions and other selected national and international clients. See National Regulatory Research Institute, *Meeting Water Utility Revenue Requirements: Financing and Ratemaking Alternatives* (Nov. 1993) p. 63.

²*Meeting Water Utility Revenue Requirements: Financing and Ratemaking Alternatives*, p. 64.

- Under the “utility” approach, which is typically used by investor or privately owned utilities, the total cost of service includes operation and maintenance expenses, taxes, depreciation, and a rate of return on the value of the utilities’ assets less accumulated depreciation.
- Under the “cash needs” approach, used by many public utilities, the total cost of service includes operation and maintenance expenses, tax equivalents (e.g., payments in lieu of taxes), debt service payments (including both interest charges and repayment of principal), contributions to specified reserves, and capital expenditures not financed by either debt or contributions.

To determine whether revenues from user charges and other local sources were large enough to cover the cost of providing service among the utilities covered by our survey, we adapted the utility approach. We developed a modified utility method because it allowed us to (1) adopt a standard approach to deriving the “cost of providing service” for both public and privately owned utilities, thereby enabling more meaningful summaries and comparisons among all of the utilities and (2) make the most effective use of the categories of cost data we collected. Specifically, to calculate the cost of service, we included the amounts reported for operation and maintenance expenses, taxes, and depreciation.³ We also included the amounts reported as debt service (including interest charges and repayment of principal) as a surrogate for rate of return, a category for which our survey did not request information.⁴ Because of the approach we used, we may have overstated some utilities’ costs and thus the number of utilities that did not cover their costs. The reason is that for some utilities the portion of debt service attributable to repayment of principal may have been covered, in part, by the inclusion of depreciation in computing the cost of service.

³Our survey allowed utilities to report miscellaneous costs under an “Other” category, and some utilities did so. When appropriate, we recategorized these costs. For example, some public systems reported transfers to other city departments in the Other category; when the survey document indicated that the transfer was for administrative services, such as accounting or legal services, we included the amount in the “Operations and Maintenance” category. When it was not possible to discern a more appropriate category for particular costs, we included them in the calculation of cost of service as other costs.

⁴We considered using the cash needs approach to calculate the cost of service because most of our respondents were public utilities and, as such, were more likely to use the applicable cost categories. However, while our survey requested information on the amount of utilities’ capital expenditures during their most recently completed fiscal year, the survey did not specifically request information on “capital expenditures not financed by either debt capital or contributions.”

User Charges Represent One of Many Sources of Funding Used by Utilities

Our survey showed that virtually all utilities obtained revenues from user charges during their most recently completed fiscal year. Other common funding sources included hook-up and connection fees and interest earnings, used by an estimated 80 to 90 percent of utilities. Table 1 summarizes the types of funding used by drinking water and wastewater utilities during their most recently completed fiscal year, according to our survey.

Table 1: Estimated Percentages of Utilities That Used Each Source of Funding in Their Most Recently Completed Fiscal Year

Funding source	Estimated percentage of utilities using funding source ^a	
	Drinking water	Wastewater
User charges	98	97
Other local revenues		
Property taxes	8	10
Sales to other utilities	42	32
Product sales	^b	12
Special operating cost levies	3	39
Interest earned	77	78
Assessments	14	21
Permit and inspection fees	41	50
Hook-up, connection, or tap fees	89	78
Reserves	35	37
Other	51	29
Grants		
Federal grants	16	18
State grants	21	31
Other grants	4	4
Debt and equity		
Federal loans	12	8
State loans	25	40
Commercial loans	9	6
Revenue bonds	36	36
General obligation bonds	19	23
Private activity bonds	2	<1
Sale of stock	2	0
Other short-term debt	8	5
Other long-term debt	7	3
Other debt and equity instruments	2	1
Other	7	7

^aOur survey did not collect information on the dollar amount of funding generated by nonlocal sources.

^bOur survey also did not collect information on whether drinking water utilities obtained revenues from product sales. This may account for the large percentage of such utilities that used the Other category under the Other local revenues category (51 percent compared to 29 percent of wastewater utilities).

Source: GAO's analysis of survey data.

User Charges and Other Local Revenues Were Less Than Many Utilities' Cost of Providing Service

Using the modified utility approach described earlier, we analyzed our survey data to compare utilities' costs and revenues. Among other things, we found that for many utilities, revenues from user charges alone were not enough to cover the cost of service in their most recently completed fiscal year. Specifically, we found that revenues from user charges exceeded the cost of service at an estimated 39 percent of the drinking water utilities and 33 percent of the wastewater utilities. However, combining revenues from user charges with funding from other local sources, such as hook-up and connection fees and sales of services to other utilities, we found that more utilities were able to cover their cost of providing service. Specifically, for an estimated 71 percent of the drinking water utilities and 59 percent of the wastewater utilities, user charges plus other local revenues exceeded the cost of providing service.

We analyzed our survey data to determine if there were any statistically significant relationships between certain utility characteristics and the utilities' ability to cover costs with user charges and/or other local revenues. First, we examined these relationships for both (1) the size of the population served by the utilities and (2) the type of ownership (public or private). We found the following:

- For both drinking water and wastewater utilities, there were no statistically significant differences between utilities based on the size of the populations they served; that is, smaller utilities were neither more nor less likely than larger utilities to have covered their cost of providing service, whether we looked at revenues from user charges alone or revenues from all local sources.
- Among drinking water utilities, ownership type did make a difference when comparing the cost of providing service with revenue from user charges alone. We found that 62 percent of public drinking water utilities did not cover their cost of service with user charges alone, compared with 44 percent of privately owned systems. However, when we included revenues from other local sources in the analysis, we found no statistical difference between public and privately owned drinking water utilities.

EPA has reached similar conclusions about the ability of some utilities to cover their costs. For example, in a July 1999 report on the characteristics of small drinking water systems, defined as those serving less than 10,000 people, EPA compared such systems to larger ones serving more than 10,000 people—the same group included in our study. EPA reported that an estimated 20 percent of the larger systems did not have sufficient revenues to cover their debt service costs after paying operating expenses.⁵ In the case of wastewater utilities, a September 1990 study on user fees reported that when total wastewater revenues were compared to total wastewater treatment costs, a significant percentage of the utilities included in the study—31 percent of those serving populations of 10,000 to 100,000 and 26 percent of those serving over 100,000 people—were operating with a revenue shortfall.⁶ As defined in the study, total treatment costs consisted of debt repayment costs plus operation, maintenance, and equipment replacement costs.

We next analyzed our survey data to determine if there were any statistically significant relationships between utilities' ability to cover costs with user charges and/or other local revenues and other characteristics. Overall, we found few significant differences; that is, for the most part, utilities that covered their cost of providing service with revenues from user charges and/or other local sources did not differ—on the basis of characteristics we examined—from those that did not. More specifically, we found the following regarding utilities' ability to cover their cost of providing service with user charges and other local revenues and the following characteristics:

- *Use of federal or state grants or loans.* An estimated 24 percent of the drinking water utilities and 36 percent of the wastewater utilities that did not cover their costs obtained federal and/or state grants during their most recently completed fiscal year. These utilities obtained grants at about the same rate as the drinking water and wastewater utilities that did cover

⁵U.S. Environmental Protection Agency, *National Characteristics of Drinking Water Systems Serving Populations Under 10,000*, EPA 816-R-99-010 (Washington, D.C.: July 1999). Among other things, the report compares the financial characteristics of several different subsets of small systems serving less than 10,000 people to the systems that serve more than 10,000 people in a number of ways, including the ratio of annual debt service payments to net available revenue (i.e., total revenues minus operating and maintenance expenses).

⁶U.S. Environmental Protection Agency, *National Wastewater User Fee Study of the Construction Grants Program*, EPA 430/09-90-011 (Washington, D.C.: September 1990).

their costs. Similarly, when we included utilities that received federal or state loans in our analysis—in addition to the utilities that received assistance from grants—we found that an estimated 43 percent of the drinking water utilities and 60 percent of the wastewater utilities that did not cover their costs used some form of federal or state grant or loan. These utilities received assistance at about the same rate as utilities that did cover their costs.

- *Dedication of rate revenues for specific purposes.* We found no statistical differences regarding the extent to which utilities' rates included amounts to cover the cost of preventive rehabilitation and replacement programs for pipelines. Based on our survey, an estimated 85 percent of the utilities' rates included such amounts, whether or not the utilities covered their cost of providing service. Similarly, both drinking water and wastewater utilities that covered their cost of service were no more likely than those that did not to dedicate a portion of revenues from user charges specifically to future capital needs. Overall, according to our survey, about 70 percent of drinking water and wastewater utilities dedicated a portion of their user charges to future capital needs in developing their rates.
- *Existence of rate relief or other subsidy for lower-income customers.* About the same percentage of utilities offered some type of subsidy to lower-income customers—about 14 percent of the drinking water utilities and about 13 percent of the wastewater utilities—whether or not the utilities covered their cost of service.

More comprehensive information might have allowed us to draw some clearer distinctions between utilities that did and did not cover their costs. However, to limit the burden on our survey respondents, we did not ask utilities to report the amount of any assistance they received, and we requested data on only the most recently completed fiscal year.

Funds from Local Sources Generally Exceeded Operation and Maintenance Costs

Annual operation and maintenance costs are those associated with operating and maintaining a utility—including the costs of labor, energy, chemicals, and accounting services. Operation and maintenance costs are of particular interest because of certain requirements imposed on many wastewater utilities as a condition of receiving construction grants under the Clean Water Act. Specifically, the wastewater utilities are required to generate sufficient revenues through user charges to cover operation and maintenance costs.⁷ According to EPA's 1990 report on wastewater user fees, all wastewater utilities serving more than 10,000 people at that time received such grants.⁸ While drinking water utilities are not subject to a similar requirement, both EPA and key water industry associations consider adequate user charges to be a key indicator of utilities' financial health.

According to our survey results, an estimated 85 percent of drinking water utilities and 82 percent of wastewater utilities were able to cover their operation and maintenance costs using revenues from user charges alone. Moreover, adding other locally generated funds to the user charges, we estimated that over 93 percent of the utilities were able to cover their operation and maintenance costs. With one exception, we also found that a utility's size or type of ownership did not influence its ability to cover operation and maintenance costs. However, privately owned drinking water utilities were somewhat more likely to have sufficient revenues from user charges to cover their operation and maintenance costs than public utilities (the estimates were 91 percent compared to 85 percent).

Our findings are consistent with EPA's July 1999 report on the characteristics of small drinking water systems, which compared systems serving less than 10,000 people to systems serving more than 10,000 people. EPA reported that 13 percent of the larger systems (those serving populations of more than 10,000) had operation and maintenance

⁷The user charge requirement applies to construction grants awarded under title II of the Clean Water Act. According to EPA, although most of these grants were expended long ago, the user charge requirement applies "in perpetuity," as long as the facilities for which the grants were used remain in operation.

⁸*National Wastewater User Fee Study of the Construction Grants Program*, p. 2. The last year for which the Congress authorized funding for construction grants was 1990.

expenses that exceeded their operating revenues.⁹ For the purposes of its study, EPA defined operating revenues as the sum of water sales and the following water-related revenues: connection fees, inspection fees, developer fees, usage fees, other fees, and general fund revenues. Interest earned, primary business revenues, fines or penalties, and other water related revenues were not included. Although our results indicate that a smaller percentage of utilities were not covering their costs than EPA's study concluded, we defined local sources of revenue more broadly than EPA and included some categories, such as interest earnings and reserve payments, that were used by large percentages of utilities. EPA has not done a similar analysis of wastewater utilities.

While our survey shows that, for an overwhelming majority of utilities, locally generated funds met or exceeded their operation and maintenance costs, it provides some indications that utilities' costs may be lower than they should be to adequately maintain facilities and equipment. Specifically, we looked at the extent to which utilities that were covering their operation and maintenance costs also deferred maintenance "because available funding was not sufficient." We found that for both drinking water and wastewater utilities, an estimated 29 percent of the utilities that covered their costs also deferred maintenance in their most recently completed fiscal year. However, there was no statistical difference in the extent to which the utilities deferred maintenance, whether they covered their operation and maintenance costs or not.

The fact that utilities were deferring maintenance suggests that either unanticipated expenses forced the utilities to reschedule planned maintenance or their budgets were never sufficient to cover the needed expenses in the first place. According to EPA and water industry experts, deferring maintenance beyond the optimal point for system repair and renewal can lead to earlier capital replacement needs and increases in the cost of providing service.

⁹*National Characteristics of Drinking Water Systems Serving Populations Under 10,000*, p. 4-1. EPA compared the financial characteristics of small systems and larger ones, in this instance, by dividing operating revenues by operation and maintenance expenses and deriving an "operating ratio" as a measure of financial health. Generally, an operating ratio below 1 is considered to be an indicator of weak financial health.

User Charges Represented a Major Source of Local Funds, but Were Increased Two Times or Fewer by Half of the Utilities

User charges represent a major source of locally generated funding at both drinking water and wastewater utilities. According to our survey, for about half of the utilities, user charges accounted for at least 90 percent of their local funds in their most recently completed fiscal year.¹⁰ User charges accounted for at least three-quarters of the funds from local sources at an estimated 80 percent of the drinking water utilities and about 75 percent of the wastewater utilities.

We analyzed the data on utilities' user charges to determine if the utilities' ability to cover their cost of providing service was related to the frequency of their rate increases. As noted earlier, our survey-based estimates are that 29 percent of drinking water utilities and 41 percent of wastewater utilities had revenues from user charges and other local sources that were less than their cost of providing service. As table 2 shows, we found that more than half of these utilities reported raising their rates infrequently—once, twice, or not at all—during the 10-year period from 1992 to 2001. However, overall we found no statistically significant differences in the frequency of rate increases between the utilities that did not cover their costs and those that did.

We did not ask utilities to provide information on the magnitude of their rate increases. Some utilities may have a strategy of seeking fewer but larger rate increases. This strategy could enable them to cover more of their costs if the rate increases, though infrequent, are sufficiently large.

¹⁰About 21 percent of the drinking water utilities and 23 percent of the wastewater utilities indicated that they had local sources of funding in addition to user charges, but they did not report an amount. We have no way of knowing whether the amounts these utilities reported as user charges actually represented revenues from all local sources or from user charges alone. We excluded these utilities when we calculated the percentage of locally generated funding represented by user charges.

Table 2: Relationship between the Frequency of Rate Increases and Utilities' Ability to Cover Their Cost of Providing Service Using Revenues from All Local Sources, 1992–2001

Number of rate increases	Estimated percentage of utilities that increased rates, by frequency of increase			
	Drinking water		Wastewater	
	Did not cover cost of providing service	Covered cost of providing service	Did not cover cost of providing service	Covered cost of providing service
0	11	7	15	13
1-2	41	44	37	38
3-4	21	22	23	19
5-7	19	17	17	18
8-10	9	9	8	11

Source: GAO's analysis of survey data.

Other studies provide some data on the magnitude and frequency of rate increases by water utilities. In its July 1999 report on the characteristics of small drinking water systems, EPA examined the frequency and magnitude of rate increases and found that for larger systems (those serving more than 10,000 people), about 2-½ years had elapsed, on average, since the last increase.¹¹ In addition, EPA reported that the average size of the increase was 14 percent. Similarly, data collected by the Association of Metropolitan Sewerage Agencies for its 1999 financial survey indicated that the current rates had been in effect for an average of about 2-½ years. This survey also found that the sewer rates had increased 9 percent annually, on average, between 1996 and 1999.¹²

We further analyzed our survey data to determine if the frequency of rate increases varied depending on the utilities' size. We found that larger utilities, particularly those serving more than 100,000 people, were more likely to have had 5 to 10 rate increases from 1992 to 2001 than smaller

¹¹National Characteristics of Drinking Water Systems Serving Populations Under 10,000, p. 4-8.

¹²Association of Metropolitan Sewerage Agencies, *AMSA 1999 Financial Survey: A National Survey of Municipal Wastewater Management Financing Trends* (1999), pp. 13, 65. The survey included 119 utilities serving populations greater than 21,000. Of the 93 utilities that provided information on how long current rates had been in effect, 45 reported that their rates had been in effect for less than 1 year prior to the survey; the longest period of time that a rate was unchanged was 17 years.

utilities. Conversely, smaller utilities were more likely than larger ones to have increased their rates infrequently during the 10-year period. Table 3 summarizes the results of our analysis.

Table 3: Frequency of Rate Increases, 1992 through 2001, by Size of Population Served

Frequency of rate increases, by population served	Estimated percentage of utilities that increased rates, by frequency	
	Drinking water utilities	Wastewater utilities
No increases		
10,001-25,000	8	15
25,001-50,000	12	14
50,001-100,000	7	17
Over 100,000	6	13
1-2 increases		
10,001-25,000	51	41
25,001-50,000	44	44
50,001-100,000	36	32
Over 100,000	27	23
3-4 increases		
10,001-25,000	19	22
25,001-50,000	24	21
50,001-100,000	25	21
Over 100,000	23	17
5-7 increases		
10,001-25,000	16	16
25,001-50,000	14	13
50,001-100,000	22	18
Over 100,000	24	29
8-10 increases		
10,001-25,000	6	7
25,001-50,000	6	9
50,001-100,000	10	11
Over 100,000	21	18

Source: GAO's analysis of survey data.

When we analyzed the data according to the utilities' ownership type, we found no statistical differences in the frequency of rate increases at drinking water utilities, whether they were public or privately owned.

Chapter 3: Many Utilities Lacked Comprehensive Asset Management Plans, but Most Had Identified Future Capital Needs

According to our survey, more than one out of four utilities lacked plans recommended by utility associations for managing their existing capital assets. Further, over half of the utilities with plans did not cover all their assets or omitted key plan elements, such as an assessment of the assets' physical condition. In addition, while most utilities had a preventive rehabilitation and replacement program, for about 60 percent of the drinking water utilities and 65 percent of the wastewater utilities, the actual rate of pipeline rehabilitation and replacement in recent years was less than their desired levels. Further, in their most recent fiscal year, an estimated one-third of the utilities deferred maintenance; one-third deferred major capital improvements; and one-third deferred minor capital improvements.

Our survey indicates that about 90 percent of the utilities had capital improvement plans that identify future needs and that about the same percentage of utilities reviewed their capital improvement needs annually whether or not a formal plan was in place. Utilities' capital improvement plans generally had a long-term focus—the large majority covered 5 years or more—as recommended by industry associations. Most utilities also had plans for financing their future capital needs, but an estimated 45 percent believed that their projected funding over the next 5 to 10 years would not be sufficient to meet the needs.

Many Utilities Lacked Comprehensive Asset Management Plans

According to our survey, more than 25 percent of drinking water and wastewater utilities lacked asset management plans, although some were in the process of developing such plans. Of the utilities with plans, more than half did not include all of their assets or omitted key plan elements.

Drinking water and wastewater utilities manage their existing capital assets to maximize the useful life of the assets, control operating costs, and generally enhance the efficiency of their operations. According to a comprehensive industry handbook, published in 2001, the term “asset management” means managing infrastructure-related assets, such as pipelines and equipment, to minimize the total cost of owning and operating them while maintaining adequate service to customers.¹ The

¹The Association of Metropolitan Sewerage Agencies developed the handbook, *Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance*, in partnership with the Association of Metropolitan Water Agencies, the American Water Works Association, and the Water Environment Federation, to help water and wastewater utilities adopt advanced management methods that can reduce long-term costs and improve service to customers.

handbook states that asset management allows an organization to characterize the condition of capital assets and quantify an ongoing renewal program to maximize their reliability. The handbook further provides that a goal of an asset management system should be “the ability to merge what is known about an organization’s capital assets with rehabilitation standards and costs and with risk assessments of asset failures to identify critical assets.”²

For the purposes of our survey, we focused on four areas identified as key elements of good asset management systems: an inventory of the assets, assessment criteria, the assets’ condition, and the planned and actual expenditures to maintain the assets.³ More specifically, we asked drinking water and wastewater utilities (1) if they had plans for managing their existing capital assets and (2) if so, whether these plans included a complete assessment of the physical condition of all capital assets, descriptions of the criteria used to measure and report on the condition of the assets, the condition level at which the assets will be maintained, and a comparison of the planned and actual dollar amounts used to maintain the assets at the established condition level. For each of the key elements, we also asked if the plans covered all or some capital assets or did not address the element at all.

Some Utilities Did Not Have Plans

Based on the results of our survey, a significant percentage of drinking water and wastewater utilities—an estimated 27 percent and 31 percent, respectively—did not have plans for managing their existing capital assets. However, 40 percent of the drinking water utilities and about 50 percent of the wastewater utilities were developing such plans at the time of our survey.

²*Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance*, p. 154.

³We focused on elements of an asset management system identified by the Governmental Accounting Standards Board in a June 30, 1999, statement that made comprehensive changes in state and local governments’ financial reporting. Among other things, it requires, for the first time, the governments to report information about public infrastructure assets, including their drinking water and wastewater facilities. Specifically, the governments must begin reporting depreciation of their capital assets or implement an asset management system. See *Governmental Accounting Standards Board Statement No. 34, Basic Financial Statements—and Management’s Discussion and Analysis—for State and Local Governments*.

When we looked at the characteristics of the utilities without asset management plans, for the most part, we found no statistical differences between utilities of different sizes for either drinking water or wastewater utilities, with one exception: about twice as many of the smallest drinking water utilities—those serving populations of 10,001 to 25,000—lacked plans compared with the largest ones, serving populations of over 100,000 (the estimates were 34 percent and 17 percent, respectively). We also found that public drinking water utilities were somewhat more likely than their privately owned counterparts not to have plans for managing their existing capital assets (an estimated 29 percent compared with 11 percent).

**Many Utilities' Plans Did
Not Cover All Assets or
Lacked Key Elements**

According to our survey, more than two-thirds of the utilities had asset management plans—an estimated 69 percent of the drinking water utilities and 65 percent of the wastewater utilities—but many of the plans did not cover all of the utilities' assets or did not contain one or more key elements.⁴ Table 4 summarizes the extent of coverage of utilities' assets and the four key elements in utilities' asset management plans.

⁴Three percent of drinking water utilities and 4 percent of wastewater utilities did not indicate that they did or did not have a plan.

Chapter 3: Many Utilities Lacked Comprehensive Asset Management Plans, but Most Had Identified Future Capital Needs

Table 4: Extent to Which Utilities' Asset Management Plans Covered Assets and Key Elements

Plan element	Estimated percentage of plan coverage			
	Drinking water utilities		Wastewater utilities	
Complete assessment of the physical condition of the utility's capital assets	All assets	41	All assets	38
	Some assets	53	Some assets	54
	Not addressed in plan	6	Not addressed in plan	7
Descriptions of the criteria used to measure and report the assets' condition	All assets	30	All assets	26
	Some assets	53	Some assets	51
	Not addressed in plan	17	Not addressed in plan	23
Condition level at which utility intends to maintain the assets	All assets	34	All assets	25
	Some assets	50	Some assets	54
	Not addressed in plan	16	Not addressed in plan	21
Comparison of the planned and actual dollar amounts used to maintain the assets at the condition level established by the utility	All assets	28	All assets	22
	Some assets	40	Some assets	41
	Not addressed in plan	32	Not addressed in plan	36

Note: Numbers are estimated percentages of all utilities that have plans.

Source: GAO's analysis based on survey data.

Significantly, our survey results indicate that over 50 percent of utilities' asset management plans did not cover all assets. Industry associations for both drinking water and wastewater utilities advocate the inclusion of all capital assets in such plans. They also believe that good asset management planning starts with a comprehensive inventory of existing assets and encompasses other elements addressed in our survey as well. In fact, the comprehensive industry handbook cited earlier indicates that an integrated asset management system includes, among other things, a maintenance management system as well as components designed to

inventory and analyze the condition of a utility's assets.⁵ Using this information, utilities can optimize decisions on what system components require maintenance or need to be rehabilitated or replaced, when these actions need to occur, and what they will cost.

To minimize the reporting burden on utilities, we did not ask the surveyed utilities to be more explicit about the types of assets that were or were not covered by the plans. However, some evidence suggests that utilities might not be developing comprehensive plans for the management of their pipelines, a potentially critical omission considering that pipelines account for about 75 percent of the nation's investment in drinking water and wastewater infrastructure. A study sponsored by the American Water Works Association Research Foundation concluded that effective planning for pipeline rehabilitation and replacement falls into three categories: (1) developing asset inventory data on pipe condition by segment, (2) developing priorities for annual replacement plans, and (3) developing long-term plans to optimize the rate of replacement.⁶ However, the report states that 15 of the 18 utilities reviewed for the study had not developed comprehensive information projecting their pipeline replacement needs based on when the pipes were installed and how long they are expected to last.

⁵*Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance*, pp. 156-157.

⁶American Water Works Association Research Foundation, *Financial and Economic Optimization of Water Main Replacement Programs* (Denver, Colo.: 2001). This study included 18 utilities—13 in the United States, 2 in Canada, and 3 in Australia. The objective of the study was to identify and document best practices in planning for the rehabilitation and replacement of aging, deteriorated water main piping.

For utilities with plans, we analyzed our survey data according to the size of the utility. We found no statistical differences among utilities of different sizes with regard to the inclusion or exclusion of any of the four key elements in their asset management plans. However, when we similarly analyzed the data according to the type of utility ownership, we found that the asset management plans developed by privately owned drinking water utilities tended to be more comprehensive than those developed by publicly owned utilities. For example, we found that an estimated

- 55 percent of private utilities' plans covered all capital assets, compared with 40 percent of public utilities;
- 46 percent of private utilities' plans included criteria for all assets, compared with 28 percent for public utilities;
- 43 percent of private utilities' plans included the condition level at which the assets would be maintained, compared with 33 percent for public utilities; and
- 40 percent of private utilities' plans included a comparison of the planned and actual expenditures for maintaining the assets, compared with 26 percent for public utilities.

Despite Pipelines in Poor Condition, Some Utilities Had Deferred Maintenance, Capital Improvements, or Both

According to our survey results, some utilities had significant portions of pipelines in poor condition; for example, more than one-third of utilities had 20 percent or more of their pipelines nearing the end of their useful life. We also found that for an estimated 60 percent of drinking water utilities and 65 percent of wastewater utilities, the actual levels of pipeline rehabilitation and replacement in recent years were less than the utilities' desired levels. Further, in each of three categories—maintenance, minor capital improvements, and major capital improvements—an estimated one-third or so of utilities had deferred expenditures in their most recent fiscal year, and 20 percent had deferred expenditures in all three categories.

Drinking water and wastewater utilities carry out various activities to ensure efficient and cost-effective operations and plan for needed improvements. According to the industry handbook, for example, utilities carry out planned maintenance of plant, equipment, and pipes to prevent, minimize, or delay failures or shutdowns that result in unplanned

maintenance activities and increased costs.⁷ Utility officials told us that they also rehabilitate existing assets, such as pipelines, to extend their useful life. Both regular maintenance and rehabilitation of key assets help utilities keep their operating costs as low as possible. When maintenance and asset rehabilitation are no longer cost-effective options and capital assets reach the end of their useful life, they must be replaced, often requiring large investments. Despite their needs, utilities may have to postpone capital improvements because revenues are not sufficient to finance the costs or more immediate needs divert resources away from the planned improvements. However, deferring major or minor capital improvements can ultimately result in higher costs to the utilities. For example, additional costs may be incurred to repair damage associated with the failure of a major asset that was not replaced when planned.

**Some Utilities Had
Pipelines in Poor
Condition and
Rehabilitation and
Replacement Rates That
Were Less Than Desired**

In looking at how utilities were managing their existing capital assets, we decided to focus on utilities' pipelines for several reasons. First, as noted earlier, EPA estimates that underground pipelines account for about 75 percent of the nation's existing capital investment in drinking water and wastewater infrastructure. Moreover, aging pipelines—including the water supply, transmission, and distribution lines at drinking water utilities and the sanitary sewer lines and other underground systems at wastewater utilities—represent a significant share of the estimated future capital investment needs. In May 2001, the American Water Works Association, citing a "huge wave of aging pipe infrastructure," predicted significant increases in pipe break rates and repair costs over the next 30 years—even if utilities increase their investment in pipe replacement by several times over today's levels.⁸ According to EPA's 1999 Drinking Water Infrastructure Needs Survey, the largest category of need is the installation and rehabilitation of transmission and distribution systems—accounting for \$83.2 billion, or 55 percent of the needs projected through 2019. For wastewater systems, EPA's 1996 Clean Water Needs Survey projected infrastructure-related needs for wastewater systems of \$128 billion through 2016. However, according to an EPA official, the needs survey estimate substantially underestimates the needs associated with the rehabilitation and replacement of the underground infrastructure because these needs are frequently not detected and therefore tend not to be

⁷*Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance*, p. 80.

⁸*Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure*, p. 13.

included in long-range capital plans. As a result, the national survey tends not to include these costs. However, EPA has developed a more comprehensive estimate that does include such needs. Although the new estimate has not yet been released, the official confirmed that at least half of the projected capital need for wastewater systems will be associated with the rehabilitation and replacement of the underground infrastructure.

Given the projected needs for rehabilitating and replacing drinking water and wastewater pipelines, we asked for more detailed information on their age and condition. Among other things, this enabled us to explore the relationship between the age and condition of utilities' pipelines and their rehabilitation/replacement activities.⁹

Age and Condition of Pipelines

For our survey, we asked the utilities to estimate the percentage of their pipelines that were installed during each 25-year period between 1900 and 2000, as well as prior to 1900 and from 2000 to the present. Our results indicate that, in general, for about a third of utilities, a significant portion of their pipelines is relatively new—50 percent or more was built since 1975. At the other end of the spectrum, for an estimated 5 percent of the utilities, a significant portion of their pipelines is quite old: 50 percent or more was built before 1925.

Also, according to our survey, significant portions of pipelines are in poor condition at some utilities. Specifically, we estimate that for more than one-third of utilities, 20 percent or more of their pipelines were nearing the end of their useful life; and for 1 in 10 utilities, 50 percent or more of their pipelines were nearing the end of their useful life.

By size and type of utility, our survey results indicate the following:

- Utilities with 20 percent or more of their pipelines in poor condition tended to be smaller. In the case of drinking water utilities, an estimated 35 percent of the systems serving 10,001 to 25,000 people and 41 percent of the systems serving 25,001 to 50,000 people fell into this category, compared with 24 percent of the largest systems (those serving over

⁹For wastewater utilities, the information on the condition of pipeline, and its rehabilitation and replacement, represents what the utilities reported for their sanitary sewer lines. Our survey also requested information on combined storm/sanitary sewer lines, but because only about 20 percent of the utilities reported having such lines, we did not include the information in our analysis.

100,000 people). Among wastewater utilities, the survey data indicate that 42 percent of the smallest (serving 10,001 to 25,000 people) have at least 20 percent of their pipelines in poor condition, compared with 24 percent of the largest systems. We found no statistically significant differences between utilities in other size categories.

- Wastewater utilities with 50 percent or more of their pipelines in poor condition also tended to be smaller. A somewhat larger percentage of the systems serving populations of 10,001 to 25,000 and 25,001 to 50,000 fell into this category than systems serving more than 100,000 people (an estimated 14 and 13 percent, respectively, compared with 3 percent). We found no statistical differences among the population size categories for drinking water utilities.
- There was no statistical difference between public and privately owned drinking water utilities in terms of the percentage of pipelines reported to be nearing the end of their useful life.

In exploring the relationship between age and condition of the pipelines, we found some indication that utilities with a preponderance of “newer” pipelines were less likely to have pipelines in poor condition. For example, according to our survey, among drinking water utilities that had built three-quarters or more of their pipelines since 1950, an estimated 47 percent of the utilities reported having 20 percent or more of their pipelines nearing the end of its useful life. In contrast, an estimated 72 percent of the utilities that reported having less than 20 percent of their pipelines in poor condition had a preponderance of newer pipelines. Our findings were similar with regard to wastewater utilities.

However, the relationship between pipeline age and condition was not consistent. Indeed, industry studies have found that older pipe typically has a longer life expectancy than pipe of more recent vintage because of the type of material used, manufacturing techniques, and other factors. In addition, technological advances in pipeline rehabilitation allow drinking water and wastewater utilities to extend the useful life of existing pipelines by installing special liners, injecting grout or epoxy, or using other techniques.

Finally, we found little or no relationship between the condition of utilities’ pipelines and the frequency with which the utilities had raised their user rates during the 10-year period from 1992 to 2001. Utilities with higher percentages of pipelines nearing the end of their useful life did not increase rates with any greater or lesser frequency than utilities with smaller percentages of such pipelines.

Rehabilitation and Replacement Activities

While no industry benchmark exists for the optimal pace of pipeline rehabilitation and replacement that is applicable to all utilities, our survey shows that nearly two-thirds of utilities have fallen short of their desired pace of rehabilitation and replacement.

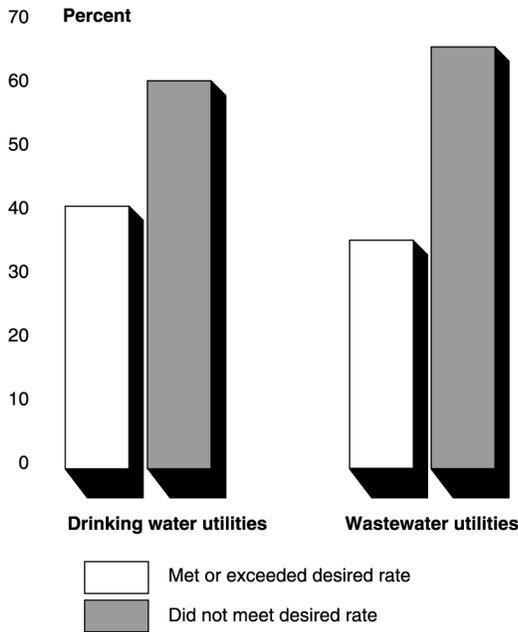
Little consensus exists among industry experts regarding what the appropriate rate of pipeline rehabilitation and replacement is for the average utility. Some experts have expressed concern that even though utilities may have kept up with the workload so far, the pace of pipeline upgrades will have to increase significantly because much of the existing pipeline is nearing the end of its useful life. For example, according to the industry report, *Dawn of the Replacement Era*, the United States is not so much faced with making up for an historical gap in the level of replacement funding, but it now has a compelling need to increase spending on pipeline replacement to prevent a serious funding gap from developing.¹⁰ The report also points out that as pipes age, they tend to break more frequently, and utilities will be experiencing an estimated three-fold increase in pipeline repair costs at the same time replacement costs are rising. On the other hand, some experts believe that utilities are already facing a backlog of work. As the Water Environment Research Foundation reported in 2000, “years of reactive maintenance and minimal expenditures on sewers have left a huge backlog of repair and renewal work.”¹¹

While we could not compare our data to an industry benchmark because the optimal pace of pipeline rehabilitation and replacement is best determined on a utility-by-utility basis, we did examine the extent to which utilities were achieving what they had determined to be appropriate for their own circumstances. We found that many of them were falling short of their goals. As shown in figure 2, for many drinking water and wastewater utilities, a significant disparity exists between utilities’ actual rehabilitation and replacement of pipelines and the rate at which they believe it should be occurring.

¹⁰*Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure*, pp. 13-14.

¹¹Water Environment Research Foundation, *New Pipes for Old: A Study of Recent Advances in Sewer Pipe Materials and Technology* (2000), p. 4-1.

Figure 2: Extent to Which Utilities' Actual Rate of Pipeline Rehabilitation and Replacement Met or Exceeded Their Desired Rate (on average, fiscal years 1998 through 2000)



Source: GAO's analysis of survey data.

Our survey indicates that roughly half of the utilities actually rehabilitated or replaced 1 percent or less of their pipelines annually, even though an estimated 89 percent of drinking water utilities and 76 percent of wastewater utilities believed that a higher level of rehabilitation and replacement should be occurring. More specifically, about 35 percent of drinking water utilities and 42 percent wastewater utilities believed that they should be annually rehabilitating or replacing more than 4 percent of their pipelines; yet, only an estimated 18 percent of these utilities were actually doing so. Table 5 shows in more detail how utilities' desired rates of rehabilitation and replacement compared with their average actual rates during recent fiscal years (1998 through 2000).

Chapter 3: Many Utilities Lacked Comprehensive Asset Management Plans, but Most Had Identified Future Capital Needs

Table 5: Desired and Actual Rehabilitation and Replacement Rates for Pipelines (on average, for fiscal years 1998 through 2000)

Desired rate	Rate at which rehabilitation/replacement actually occurred					Total
	0 to 1 percent	>1 to 2 percent	>2 to 3 percent	>3 to 4 percent	> 4 percent	
Drinking water utilities						
0 to 1 percent	87	8	2	1	2	100
>1 to 2 percent	64	23	5	1	6	100
>2 to 3 percent	42	33	17	1	8	100
>3 to 4 percent	32	45	4	14	6	100
>4 percent	35	14	5	5	41	100
Wastewater utilities						
0 to 1 percent	85	8	1	1	4	100
>1 to 2 percent	47	40	7	4	3	100
>2 to 3 percent	51	23	18	2	6	100
>3 to 4 percent	35	39	10	4	12	100
>4 percent	28	23	7	6	36	100

Notes: In seeking information on utilities' desired and actual rehabilitation and replacement rates, we asked the survey respondents to provide separate answers for the percentage of pipeline subject to rehabilitation and the percentage subject to replacement, to the extent possible. For the purposes of this analysis, we added the percentages together to get combined rehabilitation and replacement rates. Totals may not add to 100 due to rounding.

Legend: Numbers are percentage of utilities within each category of desired rehabilitation/replacement rate. Shaded areas denote cases in which utilities' actual rehabilitation and replacement of pipelines was less than the utilities' desired rate.

Source: GAO's analysis of survey data.

For replacement rates alone, we found that about 60 percent of the drinking water utilities and 77 percent of the wastewater utilities replaced 1 percent or less of their pipelines annually, on average, from fiscal years 1998 through 2000.¹² At these rates, the utilities would need at least 100 years to replace their entire inventory of pipelines. These results are consistent with a 2001 study by the American Water Works Association Research Foundation, which reported that at least 9 of the 15 North American utilities examined in the study replaced their water mains at an annual rate ranging from 0.1 percent to 1 percent.¹³ According to a

¹²As noted earlier, for wastewater utilities, the information on pipeline rehabilitation and replacement represents the information they reported for the sanitary sewer lines.

¹³American Water Works Association Research Foundation, *Financial and Economic Optimization of Water Main Replacement Programs* (Denver, Colo.: 2001), pp. 63–81. For some utilities, the actual replacement rate was unknown or not reported.

1994 Research Foundation study, an estimated 4,400 miles of pipeline, or 0.5 percent of the estimated 880,000 miles of existing pipeline, were being replaced annually.¹⁴ The study concluded that utilities would replace any given pipe only once every 200 years at the estimated replacement rate and noted that no pipe has a 200-year life expectancy.

We also took a closer look at utilities with large percentages of pipelines nearing the end of their useful life. Specifically, we examined whether these utilities were any more or less likely than utilities with small percentages of pipelines nearing the end of their useful life to (1) have a preventive rehabilitation and replacement program or (2) achieve their desired rehabilitation and replacement rate for their pipelines. We found the following:

- Utilities with a large percentage of pipelines nearing the end of their useful life were no more likely to have a preventive rehabilitation and replacement program than utilities with a small percentage of pipelines nearing the end of their useful life.
- Utilities with larger percentages of pipelines nearing the end of their useful life were somewhat less likely to have achieved their desired rehabilitation and replacement rate. More specifically, a larger proportion of utilities with 20 percent or more of their pipelines nearing the end of their useful life did not achieve their desired rates than those with less than 20 percent of pipelines nearing the end of their useful life (the estimates were about 80 percent and about 50 percent of utilities, respectively). When we compared those having 50 percent or more of their pipelines nearing the end of their useful life with those having less than 50 percent nearing the end of their useful life, we found a similar difference.

Many Utilities Deferred Maintenance, Capital Improvements, or Both

We asked the surveyed utilities whether, in their most recent fiscal year, they had deferred maintenance, minor capital improvements, and/or major capital improvements as a result of insufficient funding. We found that about one-third of the utilities deferred maintenance expenditures and similar percentages of utilities deferred expenditures in the other categories.

¹⁴American Water Works Association Research Foundation, *An Assessment of Water Distribution Systems and Associated Research Needs* (Denver, Colo.: 1994), p. xv.

By size and type of ownership, we found the following:

- With one exception, there were no statistically significant differences among utilities of different sizes. However, the smallest drinking water utilities (serving populations of 10,001 to 25,000) were more likely to defer maintenance and major capital projects than utilities serving populations of 25,001 to 50,000—an estimated 35 percent compared with 24 percent for maintenance and an estimated 47 percent compared with 33 percent for major capital projects.
- Public drinking water utilities were more likely than their privately owned counterparts to defer maintenance (an estimated 31 percent compared with 12 percent) and major capital projects (42 percent compared with 26 percent).

About 20 percent of utilities had deferred expenditures in all three categories. Although we found no statistical differences among these utilities based on population size, we found that public drinking water utilities were more likely to defer all three than privately owned drinking water utilities (an estimated 21 percent compared with 7 percent).

Utilities that deferred expenditures in all three categories because available funding was not sufficient might also be expected to have other indications of financial problems. However, we found no statistically significant differences in the percentage of utilities that were unable to cover their cost of providing service through local sources of revenue, whether or not they deferred maintenance and capital improvements. Similarly, we found only one significant difference when we compared the frequency of rate increases among the utilities that deferred expenditures: wastewater utilities that had deferred expenditures in all three categories were somewhat more likely to have had frequent rate increases (8 to 10 rate increases from 1992 to 2001) than no increases during this period (an estimated 25 percent were in the first category, compared with 11 percent in the latter).¹⁵

¹⁵For the latter two analyses, we also compared utilities that deferred expenditures in all three areas with the utilities that had not deferred expenditures in any of the categories. We found no statistical differences in their ability to cover their cost of providing service or the frequency of their rate increases.

Most Utilities Had Capital Improvement Plans, but Many Questioned Adequacy of Future Funding

According to our survey, the large majority—about 90 percent—of utilities had capital improvement plans to identify future capital needs, and most also had plans for financing the projects identified. However, almost half of the utilities anticipated that their projected funding would not be sufficient to cover future needs over the next 5 to 10 years.

Utilities prepare capital improvement plans to identify future needs for plant and equipment as a result of the rehabilitation and replacement of existing infrastructure, compliance with regulatory requirements, and growth. According to EPA and industry sources, such plans should contain detailed information on all needed capital projects, the reasons for each project, and their estimated cost, for a specified period of time. Experts also agree that capital improvement plans should be updated on a regular basis to reflect changes in existing circumstances. The projected financing for needed capital projects should be identified and detailed in the utility's capital improvement plan, a separate financing plan, or some other document, and ideally, should reflect several alternative scenarios and their impact on user rates.

Most Utilities Had Capital Improvement Plans

Overall, our survey results indicate that about 90 percent of drinking water and wastewater utilities had capital improvement plans to identify future capital needs. The smallest systems, serving 10,001 to 25,000 people, were slightly less likely than larger systems to have had such plans (an estimated 86 percent for drinking water utilities and 81 percent for wastewater utilities). Also, the survey results show that about 90 percent of utilities reviewed their needs annually—whether or not they had developed formal plans.

Experts familiar with capital planning in the utility industry recommend that capital improvement plans have a longer-term focus and cover a 5- to 10-year period, at a minimum. The industry handbook developed by the Association of Metropolitan Sewerage Agencies recommends that utilities also forecast system replacement and expansion needs for a much longer period of time—even 50 to 100 years, if possible.¹⁶ Our survey results indicate that about 95 percent of the utilities' capital improvement plans covered 5 years or more—with about 25 percent of drinking water

¹⁶*Managing Public Infrastructure Assets to Minimize Cost and Maximize Performance*, pp. 133-134.

utilities and about 20 percent of wastewater utilities covering 10 years or more. The remaining utilities had plans covering 4 years or less.

**Most Utilities Had Plans
for Financing Capital
Needs, but Many
Questioned Whether
Funds Would Be Adequate**

Most of the drinking water and wastewater utilities with capital improvement plans also had plans for financing the projects identified in their plans. According to our survey, 86 percent of the utilities had such plans, including virtually all of the largest utilities (those serving populations of over 100,000). Utilities with financing plans were somewhat more likely to dedicate a portion of their income to future capital needs. Specifically, our survey results indicate that about 73 percent of the drinking water utilities with plans considered future capital needs when developing their user rates by dedicating a portion of their income to future needs, while about 59 percent of the utilities without plans did so. In the case of wastewater utilities, an estimated 78 percent of the utilities with plans dedicated a portion of their income to future needs, while about 48 percent of those without plans did so.

According to our survey results, about 45 percent of the drinking water and wastewater utilities anticipated that their projected funding would not be sufficient to cover future needs over the next 5 to 10 years. The comprehensive industry handbook developed by the Association of Metropolitan Sewerage Agencies recommends that drinking water and wastewater utilities use a detailed financial planning window of at least 5 to 10 years to provide for future capital needs. However, the handbook notes that some utilities have a very narrow time line for financial planning; while such utilities may identify their future capital needs over a 5- to 10-year period, they only address detailed financial forecasting as part of their annual budget development process.

By utility size and type of ownership, we found the following:

- Drinking water utilities serving populations of 10,001 to 25,000 and 50,001 to 100,000 were more likely to believe that their projected revenues will be insufficient to cover anticipated future needs than the utilities serving over 100,000 people (an estimated 47 percent for the smaller population groups compared with 35 percent for the largest population group).
- There were no statistically significant differences among wastewater utilities of different sizes.
- Public drinking water utilities were somewhat more likely than privately owned systems to have concerns about future funding (an estimated 44 percent compared with 33 percent).

Chapter 3: Many Utilities Lacked Comprehensive Asset Management Plans, but Most Had Identified Future Capital Needs

We also looked at the relationship between the extent to which utilities anticipated that their projected funding will be adequate to meet future needs and a number of other key variables related to funding. As table 6 shows, we found that both drinking water and wastewater utilities that anticipated that future funding will be inadequate were significantly more likely to have deferred maintenance, minor capital expenditures, or major capital expenditures in recent years compared with utilities that anticipated adequate future funding.

Table 6: Relationship between Adequacy of Projected Funding to Meet Needs Over the Next 5 to 10 Years and Other Key Variables Related to Funding

Key variables (percentage of utilities reporting in each category)	Drinking water utilities		Wastewater utilities	
	Anticipated funding would not be adequate to meet future needs	Anticipated funding would be adequate to meet future needs	Anticipated funding would not be adequate to meet future needs	Anticipated funding would be adequate to meet future needs
Deferred maintenance in most recently completed fiscal year	49	15	47	14
Deferred minor capital improvements in most recently completed fiscal year	53	20	50	20
Deferred major capital improvements in most recently completed fiscal year	63	24	57	20
Increased rates 1-2 times or not at all from 1992 to 2001	53	51	54	50
Dedicated portion of income from user charges to future capital needs	66	71	65	76

Note: Numbers are estimated percentages of utilities that meet both row and column criteria.

Source: GAO's analysis of survey data.

Chapter 4: Profit Potential Is Key Factor in Private Companies' Decisions to Assume Operation or Ownership of Utilities

In making decisions to enter into privatization agreements with publicly owned utilities or the governmental entities they serve, the private companies we contacted primarily focus on a venture's potential to generate profits for the company. In assessing profit potential, the companies cited several specific criteria, such as the extent of opportunities to enhance operational efficiency, the utility's proximity to the companies' existing operations, and the potential for system growth. They also noted that state policies can influence privatization agreements. For example, two states that we contacted restrict the use of design-build-operate contracts, which give a single entity complete control over a project. Other states offer incentives to encourage the takeover of financially troubled public utilities.

Profit Potential Is Key Consideration for Private Companies

Privatization agreements range from contracts to operate and maintain drinking water or wastewater facilities to outright ownership by private entities. Regardless of the specific type of agreement, the companies we contacted all evaluate the potential for profits when considering entering into privatization agreements. Each of the five companies employs a somewhat different business strategy in its pursuit of privatization agreements, such as placing more emphasis on contract operations rather than on ownership of utilities or focusing on utilities of particular sizes or in particular locations. While none of the companies would consider entering into a privatization agreement without the potential to make a profit, differences in the companies' business strategies had some influence on the relative importance of the factors company officials cited as affecting profit potential.

Companies Engage in Different Types of Privatization Arrangements

Privatization can take different forms, ranging from contracting for specific services to selling the facilities to a private company. The most common form of privatization is contracting, which typically entails a competition among private bidders to perform certain activities. In the case of drinking water and wastewater utilities, such activities typically include operation and maintenance for a set period of time. When a municipality contracts with a private company for services, the government or public entity remains the financier and has management and policy control over the quality of services to be provided. According to an official at one of the largest companies we contacted, the most common type of public-private partnership in the field of drinking water and wastewater utilities has historically been operations and maintenance contracts covering from 1- to 5-year periods.

A variation of this type of contractual arrangement is called “design-build-operate,” in which a private company (or a team of companies) designs, builds, and operates a facility under one agreement. Under this model, the local government retains ownership of the utility once it has been constructed and the contractor is responsible for operation and maintenance over the life of the contract, often a long-term agreement of 10 to 20 years.

In some instances, privatization involves transferring the ownership of utility assets from a municipality to the private sector. Once the assets have been sold, the municipality generally has no role in their financial support, management, or oversight. Collectively, the companies we contacted are involved in all of these types of privatization agreements.

Companies Cite Several Criteria for Evaluating Ventures' Profit Potential

According to officials of the five companies, criteria important to assessing the profitability of a proposed agreement to privatize a utility include the potential to improve the efficiency of the utility's operations; the proximity to the company's other utility operations; the potential for system growth; the terms of a proposed contract; and the potential need for capital investments. The relative importance of the factors varies, depending on the companies' business strategies.

All five of the companies saw the opportunity to improve the efficiency of a utility's operations as a key factor in evaluating candidates for privatization because of its potential impact on the companies' ability to make a profit. For example, in two cases, company officials said that operating efficiency can be improved by either reworking resources already in place (e.g., training workers or correcting inefficient practices) or investing in cost-effective improvements (e.g., computerizing operations or installing energy-efficient equipment). Officials in two other companies commented that the potential for correcting operational inefficiencies exists because public utilities often lack the financial or technical capabilities of companies that are in the business of assuming the operation or ownership of drinking water and wastewater utilities.

Officials of one company said that they focus on three major cost areas in looking for ways to increase efficiency: employees, energy, and chemicals. The officials acknowledged that dealing with employees can be sensitive because of concerns about potential job losses; thus, the savings in this area typically come about as a result of attrition or retraining. Energy consumption is a target of operational improvements because it accounts for about one-third of the average utility's operating costs. Because

chemicals are also a major cost element, utilities can achieve significant savings through bulk purchases.

At drinking water utilities, another area with significant potential for cost savings is the reduction of “unaccounted for” water. This water represents the difference between the volume of water that leaves the treatment works and the volume that is “metered” (that is, used by customers according to their water meters). For example, utilities may experience leaks in their water distribution systems. According to an official of one of the largest companies we contacted, it is not uncommon for many communities to be unable to account for 25 percent or more of the water they produce.

The companies provided examples of the types of operational improvements that have resulted in cost savings or increased revenues:

- At a California drinking water utility, a company worked with state regulatory authorities to reduce the utility’s requirements to monitor water quality, thus achieving over \$200,000 savings in annual laboratory costs.
- At another utility, also in California, the company introduced improvements that reduced energy consumption by 13 percent and certain treatment costs by 22 percent.
- At a Georgia utility, the same company implemented a leak detection program that reduced unaccounted for water from 60 percent to 30 percent.
- Another company helped a Massachusetts wastewater utility to improve the treatment process and modify the utility’s incinerator, which reduced incineration costs by about 75 percent.
- At a Texas drinking water utility, a meter replacement program is projected to increase water revenues by \$1 million over 10 years.

Other criteria cited by the companies for evaluating profit potential of privatization opportunities include the following:

- **Proximity to the companies’ existing operations.** Four of the five companies we contacted consider the utilities’ proximity to their other operations when they decide whether or not to pursue a public-private partnership. In one case, company officials told us that their preference is to add new business in close proximity to existing operations because, among other things, the company’s technical experts can make site visits at a reasonable cost. Officials from the other companies indicated that proximity to existing operations allows them to take advantage of economies of scale. For example, certain commonly used products and

equipment such as chemicals, pipe, and meters can be purchased in bulk at lower costs and, with an expanded service area and customer base, the companies can spread the costs over more customers. An official from one of the companies commented that proximity is more of a consideration in the case of smaller utilities because they get more of a benefit than larger systems from sharing staff and other resources.

Increasing efficiency through economies of scale may be more difficult, however, in the case of relatively small and isolated utilities. According to an official of the National Association of Water Companies, a plan to consolidate several small, remote utilities probably would not be cost-effective where miles of pipelines were needed, for example, to connect the remote utilities. On the other hand, he noted that there are ways that privatization agreements with such utilities can be profitable. For example, private companies can bring in professional management expertise to oversee multiple utilities, use a limited number of system operators to run several small utilities that do not require full-time operators, and consolidate purchases of equipment and chemicals to get better prices.

- **Potential for system growth.** The projected growth in the population served by a utility—its customer base—was also mentioned as a factor by several companies. Officials from one company told us that projected population growth allows the company to increase its customer base and thus be assured of additional revenues. According to officials of another company, a utility's growth potential is more of a consideration when the privatization opportunity involves a smaller utility. The officials indicated that they examine this factor more closely at smaller utilities because these utilities may have to grow before they become profitable. According to an official of the National Rural Water Association, private companies generally consider public water systems serving rural, low-density populations an unattractive investment. Further, according to an official of the Kansas Rural Water Association, small towns often have relatively high water and sewer rates as well as a greater proportion of households with lower median incomes.¹

¹Testimony of Elmer Ronnebaum, General Manager of the Kansas Rural Water Association, before the Subcommittee on Fisheries, Wildlife, and Water, Senate Committee on Environment and Public Works, February 28, 2002.

- **Terms of operation and maintenance contracts.** Three of the companies told us that, in the case of operation and maintenance agreements, the length of time covered by a proposed contract is a key factor in their decisions. Generally, the longer the time period covered by the contract, the more time the company has to recoup its investment. According to an official at one of the largest companies we contacted, over the past 2 years the number of longer-term contracts has increased markedly, partly because of the increased use of design-build-operate contracts. The official also cited two examples of restrictive contract provisions that his company views as deal breakers. First, he said that some communities insist on unlimited liability guarantees from companies that bid on privatization contracts; however, responsible companies have to limit their liability. Second, restrictive maintenance provisions can impose a ceiling—typically \$10,000—on a contractor's responsibility for maintenance items. According to the company official, this kind of restriction limits a company's ability to offer comprehensive solutions, which could be more cost-effective over the long term.
- **The potential need for capital investment.** The extent to which companies foresee a need to invest their funds to repair, replace, or upgrade utilities' plant and equipment can affect whether they enter into an agreement or what type of agreement they enter. Officials from several companies indicated that the condition of a utility's infrastructure is not a deterrent as long as the amount and nature of any investment needs are accurately reflected in the contract and the company is fairly compensated. One official commented that it is difficult to operate a utility as a contractor when the company has no control over the level of capital investment—and the level has not been adequate. In these situations, his company has tried to become more involved in developing capital improvement plans for the utilities they manage and to assume more responsibility for capital investments in general. The same official also commented that even if the condition of a utility's infrastructure is adequate, company officials may determine that a substantial investment will be required just to make the utility more efficient.
- **Other factors.** For drinking water utilities, officials of two companies noted the importance of a reliable water source. For example, according to one of the companies, an unreliable source limits profit potential because it can be costly to purchase water from other systems or develop a new source. For wastewater utilities, two companies pointed out that the presence of large quantities of industrial waste in the influent (the water flowing into the treatment facilities) can be a deterrent to an agreement. For example, one company official noted that industrial waste can

increase treatment costs as well as pose a potential liability issue for the facility owner or operator.

States' Policies May Also Influence Companies' Decisions

In addition to identifying the site-specific factors they consider in evaluating privatization opportunities, representatives from all five of the companies we contacted also commented on state requirements or policies that can facilitate or impede privatization arrangements. We contacted officials of eight states identified by the five companies, EPA, and industry officials as having particular requirements or policies that affect privatization, either positively or negatively. Our contacts included representatives from the state agencies that oversee the drinking water and wastewater management programs and the public utility commissions, which regulate the rates and other activities of privately owned (and, in some cases, publicly owned) utilities. The state officials told us that their agencies are primarily interested in the delivery of adequate service to the public, whether the service is provided by publicly or privately owned utilities. However, the states have some requirements and policies that can affect companies' privatization decisions, including laws that address the acquisition of "troubled" utilities² and the use of design-build-operate contracts.

State regulators in Indiana and Pennsylvania have established programs that provide utilities in good standing with incentives to acquire or take over troubled utilities. For example, under Indiana's program, the acquiring utility is permitted to add an "acquisition adjustment" to its user rates as an incentive for taking over a troubled utility. Similarly, Pennsylvania's incentive program allows, under certain circumstances, the acquiring utility to increase the rate of return on its investment and thus, accelerate the recovery of costs incurred for needed system improvements. This program targets small utilities that lack the financial, managerial, and/or technical capacity to comply with applicable regulatory requirements. To encourage faster replacement of aging water distribution systems, Pennsylvania also established a special pipe surcharge program—the Distribution System Improvement Charge Program—in which companies make improvements to utilities' distribution systems. In return, the companies are allowed to raise rates by up to 5 percent without going through a formal hearing process.

²Under some state laws, either public or privately owned utilities may be the "acquiring utility; in other cases, state law specifies that the acquiring utility must be privately owned."

In addition to the incentive programs, four of the eight states we contacted—Connecticut, Indiana, New Jersey, and Pennsylvania—have enacted laws that give state regulators the authority to provide for qualified utilities to acquire or take over certain “troubled” utilities to resolve specific problems. For example, in New Jersey, the state may order the acquisition of small drinking water or wastewater utilities (with less than 1,000 connections) by a suitable public utility or a privately owned company if the small utilities fail to comply with an enforcement order. In New Jersey and the other states, the orders are directed at serious violations involving, for example, the availability, potability, or provision of water at adequate volume or pressure or the failure to remedy “severe deficiencies.” While these laws could affect companies’ privatization decisions by compelling the takeover of particular utilities, state officials indicated that the laws are rarely used.

Other state requirements or policies can affect the use of design-build-operate contracts, which couple the design and construction of new, expanded, or upgraded facilities with comprehensive agreements to operate and maintain the facilities. For example, Texas officials told us that professional services such as engineering design must be procured using a qualification-based selection while construction services must be procured using a bidding process. As a result, the design, construction, and operating services cannot be combined in a single procurement. The situation in Pennsylvania was similar; a state official told us that the state’s procurement regulations have not been updated to allow the kind of combined procurement contemplated in a design-build-operate contract. In other instances, state laws can also facilitate the use of design-build-operate contracts. For example, Georgia amended its official code in 2000 to specifically authorize local governments to enter into contracts with private entities “for the design, construction, repair, reconditioning, replacement, maintenance, and operation of the system, or any combination of such services” at drinking water or wastewater systems.

We also identified certain requirements that could affect companies’ privatization decisions and are specific to individual states. For example, New Jersey law requires that privatization proposals be approved by the applicable state agency. Among other things, state regulators assess the financial and technical capacity of the private company; the reasonableness of the contract terms; the extent to which the interests of utility customers are protected; and whether the particular contract terms, such as user charges and the status of current utility employees, are clearly spelled out. In addition, under California law, sales

**Chapter 4: Profit Potential Is Key Factor in
Private Companies' Decisions to Assume
Operation or Ownership of Utilities**

of drinking water and wastewater systems must be approved by voters in the affected community.

Appendix I: Survey of Drinking Water Utilities



United States General Accounting Office

Survey of Drinking Water Utilities

Introduction

The U.S. General Accounting Office (GAO) is an agency that assists the U.S. Congress in evaluating federal programs. In anticipation of analyzing a number of water infrastructure-related proposals this year, the Committee on Environment and Public Works, U. S. Senate, has asked GAO to collect information on user charges and infrastructure planning at both public and privately owned drinking water utilities.

Your utility has been randomly selected to receive this nationwide survey of drinking water utilities. As part of our study, we are asking for your help in completing this survey so that we can provide congressional decisionmakers with the information they need.

Part I of the survey collects general information on your utility. Part II collects information on funding from user charges and other sources. Part III collects information on your utility's infrastructure planning.

Instructions

When answering the questions in this questionnaire, please coordinate with the appropriate staff who have knowledge of your utility's user charges, other sources of funds, and capital improvement plans.

Please return your completed questionnaire in the enclosed, pre-addressed business reply envelope. If the envelope is misplaced, the return address is:

U.S. General Accounting Office
ATTN: Lisa Turner
441 G Street, NW – Room 2T23 A
Washington, DC 20548-0001

In testing this questionnaire, we found that it took some utilities less than an hour to complete and others about 2-3 hours.

If you have any questions about specific items in the questionnaire, call or e-mail your questions to:

- Lisa Turner at (202) 512-6559
(e-mail address: turnerl@gao.gov); or
- Terri Dee at (202) 512-9592
(e-mail address: deet@gao.gov).

Please provide the following information for the person we should contact if we have any follow-up questions:

Name: _____

Title: _____

Utility: _____

Phone #: (_____) _____

E-mail: _____

n = number of utilities that responded to our survey.

Appendix I: Survey of Drinking Water Utilities

Part I – General Information on the Utility

1. Does your utility have wholesale and/or resale customers (i.e., your utility bills other utilities for water or other services provided by you)? **Do not include customers purchasing water or other services on an emergency basis. (Please check one.)**
n = 810

- 1. Yes → *continue to question 2* **46.1%**
- 2. No → *skip to question 4* **53.9%**

2. What was the estimated population served by your utility's wholesale and/or resale customers for your most recently completed fiscal year? *(Please check one.)*
n = 386

- 1. 10,000 or fewer **44.5%**
- 2. 10,001 – 25,000 **24.4%**
- 3. 25,001 – 50,000 **10.0%**
- 4. 50,001 – 100,000 **9.7%**
- 5. 100,001 – 500,000 **6.4%**
- 6. 500,001 – 1,000,000 **1.2%**
- 7. Over 1,000,000 **1.4%**
- 8. Don't know **2.5%**

3. What is the number of wholesale or resale accounts that your utility served for your most recently completed fiscal year? *(Please insert number in the space provided.)*
n = 379

90.0% ≤ 30

4. Does your utility have retail customers (i.e., your utility bills residential, commercial, and/or industrial customers directly)?
n = 819

- 1. Yes → *continue to question 5* **98.7%**
- 2. No → *skip to question 7* **1.3%**

5. What was the estimated population served by your retail operations for your most recently completed fiscal year? *(Please check one.)*
n = 821

- 1. 10,000 or fewer **0.0%**
- 2. 10,001 – 25,000 **44.0%**
- 3. 25,001 – 50,000 **28.2%**
- 4. 50,001 – 100,000 **15.1%**
- 5. 100,001 – 500,000 **10.2%**
- 6. 500,001 – 1,000,000 **1.7%**
- 7. Over 1,000,000 **0.9%**
- 8. Don't know **0.0%**

6. What is the number of retail accounts that your utility served for your most recently completed fiscal year? *(Please indicate number in the space provided.)*
n = 787

90.0% ≤ 35,500

7. Which of the following services does your utility provide to its customers? *(Check all that apply.)*
n = 821

- 1. Source of supply **77.0%**
- 2. Treatment **78.1%**
- 3. Distribution and transmission (including storage tanks, booster stations, etc.) **97.9%**
- 4. Contract operations **23.0%**
- 5. Other *(Please explain.)* **5.5%**

Definition for question 7: Contract operations occur when one utility provides services to another utility. Such services could include treatment, distribution, billing, collection, etc.

Appendix I: Survey of Drinking Water Utilities

<p>8. What is the total length of the supply, transmission, and distribution lines owned by your utility for your most recently completed fiscal year? <i>(Please insert number in the space provided.)</i> n = 792</p> <p align="center">90.1% ≤ 725 miles</p> <p>9. What percentage (in physical terms – not cost) of your supply, transmission, and distribution lines were built in each of the following periods?</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 30%;">1. Pre 1900</td> <td>90.1% ≤ 10 percent n = 418</td> </tr> <tr> <td>2. 1900-24</td> <td>92.1% ≤ 25 percent n = 478</td> </tr> <tr> <td>3. 1925-49</td> <td>89.2.% ≤ 38 percent n = 577</td> </tr> <tr> <td>4. 1950-74</td> <td>90.8% ≤ 60 percent n = 701</td> </tr> <tr> <td>5. 1975-99</td> <td>90.3% ≤ 79 percent n = 733</td> </tr> <tr> <td>6. 2000-present</td> <td>91.3% ≤ 10 percent n = 686</td> </tr> </table> <p>10. Which one of the following best describes the ownership of your utility? <i>(Please check one.)</i></p> <p><u>Publicly owned by:</u></p> <p>1. <input type="checkbox"/> a municipal government 72.9% n = 821</p> <p>2. <input type="checkbox"/> a water district 11.4% n = 821</p> <p>3. <input type="checkbox"/> a water authority 8.3% n = 821</p> <p><u>Privately owned by:</u></p> <p>4. <input type="checkbox"/> a for profit organization (e.g., investor-owned company) 4.7% n = 821</p> <p>5. <input type="checkbox"/> a not for profit organization (e.g., homeowners association) 2.8% n = 803</p> <p><u>Other</u></p> <p>6. <input type="checkbox"/> other <i>(Please describe.)</i> 1.5% n = 821</p>	1. Pre 1900	90.1% ≤ 10 percent n = 418	2. 1900-24	92.1% ≤ 25 percent n = 478	3. 1925-49	89.2.% ≤ 38 percent n = 577	4. 1950-74	90.8% ≤ 60 percent n = 701	5. 1975-99	90.3% ≤ 79 percent n = 733	6. 2000-present	91.3% ≤ 10 percent n = 686	<p>11. Does your utility contract with a private entity to perform all or almost all services related to the management, operation, and maintenance of your drinking water system (i.e., the private entity provides full contract operations)? <i>(Please check one.)</i> n = 818</p> <p>1. <input type="checkbox"/> Yes 3.8%</p> <p>2. <input type="checkbox"/> No 96.3%</p> <p>12. Are any of your utility's activities regulated by a state utility commission? <i>(Please check one.)</i> n = 815</p> <p>1. <input type="checkbox"/> Yes → <i>continue to question 13</i> 25.3%</p> <p>2. <input type="checkbox"/> No 71.8%</p> <p>3. <input type="checkbox"/> Don't know 2.9% } → <i>skip to question 14</i></p> <p>13. Which of the following does your state utility commission regulate? <i>(Please check all that apply.)</i></p> <p>1. <input type="checkbox"/> User rates 52.4% n = 242</p> <p>2. <input type="checkbox"/> Billing practices 47.0% n = 241</p> <p>3. <input type="checkbox"/> Notifications to customers 71.9% n = 242</p> <p>4. <input type="checkbox"/> Other <i>(Please describe.)</i> 32.6% n = 241</p> <p>14. Does your utility also provide sewerage services? <i>(Please check one.)</i> n = 815</p> <p>1. <input type="checkbox"/> Yes 69.0%</p> <p>2. <input type="checkbox"/> No 31.0%</p>
1. Pre 1900	90.1% ≤ 10 percent n = 418												
2. 1900-24	92.1% ≤ 25 percent n = 478												
3. 1925-49	89.2.% ≤ 38 percent n = 577												
4. 1950-74	90.8% ≤ 60 percent n = 701												
5. 1975-99	90.3% ≤ 79 percent n = 733												
6. 2000-present	91.3% ≤ 10 percent n = 686												

Appendix I: Survey of Drinking Water Utilities

Part II – Funding Sources for Drinking Water Utilities

15. In your most recently completed fiscal year, what were your utility's sources of funds? *(Please check all that apply.)*

n = 821

Utility and community sources

- 1. User charges **97.9%**
- 2. Property taxes **7.5%**
- 3. Sales to other utilities (e.g., water and other services) **41.6%**
- 4. Special operating cost levies (revenues from a specific user or group of users for a specific operating purpose, e.g., a large seasonal user such as a cannery) **3.1%**
- 5. Interest earned **77.1%**
- 6. Assessments **14.0%**
- 7. Permit and inspection fees **40.7%**
- 8. Hook-up, connection, or tap fees **88.9%**
- 9. Reserves **34.6%**
- 10. Other (e.g., fire hydrant maintenance fees, communication antenna leases, developer contributions, etc.) **51.0%**

Grant sources

- 11. Federal grants **15.5%**
- 12. State grants **20.6%**
- 13. Other grant sources **3.5%**

Debt and equity sources

- 14. Federal loans **11.5%**
- 15. State loans **25.4%**
- 16. Commercial loans **8.9%**
- 17. Revenue bond proceeds **35.7%**
- 18. General obligation bond proceeds **19.0%**
- 19. Private activity bond proceeds **1.5%**
- 20. Sale of stock **2.2%**
- 21. Other short-term debt instruments **7.9%**
- 22. Other long-term debt instruments **7.0%**
- 23. Other debt and equity sources **2.3%**

Other sources

- 24. Other *(Please describe.)* **8.6%**

Appendix I: Survey of Drinking Water Utilities

16. This question refers to some of the funding sources that you may have checked in question 15. For your most recently completed fiscal year, approximately how much funding did your utility generate from user charges and other utility and community sources? *(Please insert the dollar amount in the space provided. If none, enter "0".)*

Funding source	Amount of funds generated
User charges (item 1 in question 15) n = 738	\$ _____
Utility and community sources, excluding user charges (items 2 through 10 in question 15) n = 658	\$ _____

17. Does your utility offer rate relief and/or some other type of subsidy for customers with lower incomes? *(Please check one.)*
n = 804
 1. Yes **13.1%**
 2. No **86.7%**

18. For your most recently completed fiscal year, approximately what were your utility's costs in the following categories? *(Please insert the dollar amount in the space provided. If none, enter "0".)*

- 1. Operations and maintenance \$ _____
n = 765
- 2. Capital expenditures \$ _____
n = 728
- 3. Debt service \$ _____
n = 714
- 4. Reserve payments \$ _____
n = 447
- 5. Depreciation expense \$ _____
n = 624
- 6. Total taxes \$ _____
n = 477
- 7. Other \$ _____
n = 312

Please describe other costs.

Definitions for question 18:

Operations and maintenance expenses are the day-to-day costs of providing your utility's services, including labor, board or council member fees, retirement system contributions, insurance premiums, energy, chemicals, supplies, replacement parts, repair services, fuel and other vehicle operating costs, communications services, any other utility service charges, permit fees, advertisements, public relations, travel and mileage expenses, training costs, reference materials, postage and delivery services, bad debt, legal services, engineering services, accounting services, laboratory services, etc.

Capital expenditures are costs of replacing capital assets that have reached the end of their useful lives, acquiring new assets that are intended to serve existing customers, and constructing new treatment plants and collection system components required to serve new areas or new users. Capital expenditures may include costs associated with materials, labor, architectural and/or engineering services, legal services, financial services, permit fees, etc.

Debt service expenses include the principal and interest paid on borrowed funds.

Reserve payments include revenues transferred to a reserve fund for paying future costs or as required by bond documents.

Depreciation expense is an amount deducted from revenue in determining income, based on an allocation of a long-lived asset's original cost over the years of its useful life.

Appendix I: Survey of Drinking Water Utilities

Definition for question 19:

End of useful life may be determined by age of the lines, the type of material used in the lines, inspection, and history of line leakage and breakage.

Rehabilitation extends the life of lines through technologies such as microtunneling, sliplining, pipebursting, and form-in-place.

19. Does your utility have a preventive replacement and rehabilitation program for lines that are coming to the end of their useful life? **We are referring to preventive replacement and rehabilitation rather than replacement due to breakage.** (Please check one.)
n = 807

- 1. Yes → *continue to question 20* 59.1%
- 2. No → *skip to question 21* 40.9%

20. In developing the current rates charged to users, did your utility include an amount to cover the cost of your utility's preventive replacement and rehabilitation program? **We are referring to preventive replacement and rehabilitation rather than replacement due to breakage.** (Please check one.)
n = 492

- 1. Yes 85.4%
- 2. No 12.8%
- 3. Not applicable, prohibited by public utility commission 1.9%

21. Approximately what percentage of your utility's supply, transmission, and distribution lines are nearing the end of their useful life? (Please indicate the percentage below. If none, enter "0".)
n = 766

89.8% ≤ 49 percent

22. For your last three fiscal years (FY 1998 through FY 2000), on average, approximately what percentages of your supply, transmission, and distribution lines were replaced and rehabilitated annually? (Please calculate the average percentages for fiscal years 1998 through 2000 and indicate the amounts below. If none, enter "0".)

- 1. 79.2% ≤ 2 percent replaced annually
n = 770
- 2. 88.5% ≤ 2 percent rehabilitated annually
n = 617

23. Given the age of your utility's supply, transmission, and distribution lines, approximately what does your utility believe the annual rates of replacement and rehabilitation should be? (Please enter percentage. If none, enter "0". If you cannot determine a separate rate for each, please provide a combined rate.)

- 1. 59.1% ≤ 2 percent replacement rate
n = 468
- 2. 79.7% ≤ 2 percent rehabilitation rate
n = 300
- or**
- 3. 63.0% ≤ 4 percent combined rate
n = 470

24. In developing the current rates charged to users, does your utility dedicate a portion of its income each year to provide for future capital needs? (Please check one.)
n = 807

- 1. Yes → *skip to question 26* 69.6%
- 2. No → *continue to question 25* 28.6%
- 3. Not applicable, prohibited by public utility commission → *continue to question 25* 1.8%

25. Does a state or local law or regulation prohibit your utility from accumulating funds to provide for future capital needs? *(Please check one.)*

- n = 243**
- 1. Yes **12.0%**
 - 2. No **75.2%**
 - 3. Don't know **12.8%**

26. If your utility generates revenues in excess of costs, what happens to the excess revenues? *(Check all that apply.)*

- n = 821**
- 1. Retained in total by the utility for future use **73.9%**
 - 2. Retained in part by the utility for future use **13.3%**
 - 3. Transferred in total to the local government for activities related to the utility's operations (such as personnel or legal services) **0.9%**
 - 4. Transferred in part to the local government for activities related to the utility's operations (such as personnel or legal services) **8.3%**
 - 5. Transferred in total to the local government for activities **not related** to the utility's operations (such as construction of schools or roads) **1.8%**
 - 6. Transferred in part to the local government for activities **not related** to the utility's operations (such as construction of schools or roads) **6.6%**
 - 7. Paid out to investors as dividends **2.9%**
 - 8. Refunded to customers when allowed rate of return is exceeded **1.3%**
 - 9. Other *(Please explain.)* **2.5%**

Part III – Infrastructure Planning

27. Does your utility have a plan for managing its existing capital assets? *(Please check one.)*

- n = 801**
- 1. Yes → skip to question 29 **69.4%**
 - 2. No **27.3%**
 - 3. Don't know **3.3%**
- } → continue to question 28

28. Is your utility currently developing a plan for managing its existing capital assets? *(Please check one.)*

- n = 217**
- 1. Yes **38.9%**
 - 2. No **50.1%**
 - 3. Don't know **11.0%**
- } → skip to question 30

Appendix I: Survey of Drinking Water Utilities

29. Do your utility's plans for managing existing capital assets include the following components? *(Please check one for each of the following items.)*

- a. A complete assessment of the physical condition of the utility's capital assets
n = 570
 - 1. Yes, for all capital assets **41.3%**
 - 2. Yes, for some capital assets **52.8%**
 - 3. No **5.9%**
- b. Descriptions of the criteria used to measure and report asset condition
n = 559
 - 1. Yes, for all capital assets **29.5%**
 - 2. Yes, for some capital assets **52.9%**
 - 3. No **17.6%**
- c. The condition level at which your utility intends to maintain the assets
n = 559
 - 1. Yes, for all capital assets **33.9%**
 - 2. Yes, for some capital assets **49.5%**
 - 3. No **16.6%**
- d. A comparison of the estimated and actual dollar amounts required to maintain the assets at the condition level established by your utility.
n = 560
 - 1. Yes, for all capital assets **27.7%**
 - 2. Yes, for some capital assets **40.3%**
 - 3. No **32.0%**

Definition for question 30:

Capital improvement plan contains detailed information on all needed capital projects, the reason for each project, and their costs, for a specified period of time.

30. Does your utility have a plan that identifies future capital needs (i.e., a capital improvement plan)? *(Please check one.)*
n = 810
- 1. Yes → *continue to question 31* **91.1%**
 - 2. No **7.7%**
 - 3. Don't know **1.2%**
- } *skip to question 33*

31. How many years does your utility's capital improvement plan cover? *(Please enter number of years in the space provided.)*
n = 740

93.7% ≥ 5 years

32. Does your utility have a plan for financing the capital projects identified in your capital improvement plan? *(Please check one.)*
n = 750

- 1. Yes **86.9%**
- 2. No **13.1%**

33. How often does your utility review its capital improvement needs? *(Please check one.)*

- 1. Annually **91.7%**
n = 803
- 2. Other *(Please indicate the time period in years.)* **8.3%**
n = 58

_____ years

Appendix I: Survey of Drinking Water Utilities

34. In which of the following years did your utility request rate increases? *(Please check all that apply.)*

- | | |
|--|---|
| 1. <input type="checkbox"/> 1992 21.5%
n = 814 | 6. <input type="checkbox"/> 1997 23.6%
n = 814 |
| 2. <input type="checkbox"/> 1993 22.4%
n = 814 | 7. <input type="checkbox"/> 1998 25.7%
n = 814 |
| 3. <input type="checkbox"/> 1994 22.6%
n = 814 | 8. <input type="checkbox"/> 1999 25.7%
n = 814 |
| 4. <input type="checkbox"/> 1995 22.4%
n = 814 | 9. <input type="checkbox"/> 2000 29.1%
n = 814 |
| 5. <input type="checkbox"/> 1996 24.9%
n = 814 | 10. <input type="checkbox"/> 2001 30.6%
n = 814 |
| 11. <input type="checkbox"/> No rate increases requested during this period 5.2%
n = 814 | |
| 12. <input type="checkbox"/> Not applicable; rate increases are not subject to external review and/or approval 17.6%
n = 815 | |

35. In which of the following years did your utility increase rates? *(Please check all that apply.)*

- | | |
|--|--|
| 1. <input type="checkbox"/> 1992 27.2% | 6. <input type="checkbox"/> 1997 30.8% |
| 2. <input type="checkbox"/> 1993 26.3% | 7. <input type="checkbox"/> 1998 34.0% |
| 3. <input type="checkbox"/> 1994 29.5% | 8. <input type="checkbox"/> 1999 30.7% |
| 4. <input type="checkbox"/> 1995 28.3% | 9. <input type="checkbox"/> 2000 35.1% |
| 5. <input type="checkbox"/> 1996 32.1% | 10. <input type="checkbox"/> 2001 38.3% |
| 11. <input type="checkbox"/> Did not increase rates during this period 6.0% | |

36. In your most recently completed fiscal year, did your utility defer any maintenance because available funding was not sufficient? *(Please check one.)*

- n = 813
1. Yes **30.0%**
2. No **70.0%**

37. In your most recently completed fiscal year, did your utility defer any minor capital improvements because available funding was not sufficient? *(Please check one.)*

- n = 814
1. Yes **34.1%**
2. No **65.9%**

38. In your most recently completed fiscal year, did your utility defer any major capital projects because available funding was not sufficient? *(Please check one.)*

- n = 810
1. Yes **40.6%**
2. No **59.4%**

39. Do you anticipate that, over the next 5 to 10 years, your utility's projected revenues and other funding will be sufficient to cover anticipated future needs? *(Please check one.)*

- n = 807
1. Yes **57.0%**
2. No **43.0%**

**Appendix I: Survey of Drinking Water
Utilities**

40. If you have any additional comments on matters discussed in this survey or related to drinking water and wastewater infrastructure planning and funding, please use the space below or attach additional pages, if needed.

n = 821

Thank you for your help!

Appendix II: Survey of Wastewater Utilities



United States General Accounting Office

Survey of Wastewater Utilities

Introduction

The U.S. General Accounting Office (GAO) is an agency that assists the U.S. Congress in evaluating federal programs. In anticipation of analyzing a number of water infrastructure related proposals this year, the Committee on Environment and Public Works, U. S. Senate, has asked GAO to collect information on user charges and infrastructure planning at both public and privately owned wastewater utilities.

Your utility has been selected to receive this nationwide survey of wastewater utilities. As part of our study, we are asking for your help in completing this survey so that we can provide congressional decisionmakers with the information they need.

Part I of the survey collects general information on your utility. Part II collects information on funding from user charges and other sources. Part III collects information on your utility's infrastructure planning.

Instructions

When answering the questions in this questionnaire, please coordinate with the appropriate staff who have knowledge of your utility's user charges, other sources of funds, and capital improvement plans.

Please return your completed questionnaire in the enclosed, pre-addressed business reply envelope. If the envelope is misplaced, the return address is:

U.S. General Accounting Office
ATTN: Lisa Turner
441 G Street, NW – Room 2T23 A
Washington, DC 20548-0001

In testing this questionnaire, we found that it took some utilities less than an hour to complete and others about 2-3 hours.

If you have any questions about specific items in the questionnaire, call or e-mail your questions to:

- Lisa Turner at (202) 512-6559
(e-mail address: turnerl@gao.gov); or
- Terri Dee at (202) 512-9592
(e-mail address: deet@gao.gov).

Please provide the following information for the person we should contact if we have any follow-up questions:

Name: _____

Title: _____

Utility: _____

Phone #: (_____) _____

E-mail: _____

n= number of utilities that responded to our survey.

Part I – General Information on the Utility

1. Does your utility have wholesale customers (i.e., your utility bills other utilities for services provided by you)? *(Please check one.)* **n = 1,104**

- 1. Yes → *continue to question 2* **40.3%**
- 2. No → *skip to question 4* **59.8%**

2. What was the estimated population served by your utility’s wholesale customers for your most recently completed fiscal year? *(Please check one.)* **n = 448**

- 1. 10,000 or fewer **42.2%**
- 2. 10,001 – 25,000 **20.6%**
- 3. 25,001 – 50,000 **11.6%**
- 4. 50,001 – 100,000 **14.5%**
- 5. 100,001 – 500,000 **7.5%**
- 6. 500,001 – 1,000,000 **1.4%**
- 7. Over 1,000,000 **1.1%**
- 8. Don’t know **1.1%**

3. What is the number of wholesale accounts that your utility served for your most recently completed fiscal year? *(Please insert number in the space provided.)* **n = 437**

90.3% ≤ 10

4. Does your utility have retail customers (i.e., your utility bills residential, commercial, and/or industrial customers directly)? *(Please check one.)* **n = 1,109**

- 1. Yes → *continue to question 5* **94.2%**
- 2. No → *skip to question 7* **5.8%**

5. What was the estimated population served by your retail operations for your most recently completed fiscal year? *(Please check one.)* **n = 1,113**

- 1. 10,000 or fewer **0.0%**
- 2. 10,001 – 25,000 **43.7%**
- 3. 25,001 – 50,000 **24.0%**
- 4. 50,001 – 100,000 **17.2%**
- 5. 100,001 – 500,000 **11.2%**
- 6. 500,001 – 1,000,000 **2.2%**
- 7. Over 1,000,000 **1.6%**
- 8. Don’t know **0.0%**

6. What is the number of retail accounts that your utility served for your most recently completed fiscal year? *(Please indicate number in the space provided.)* **n = 974**

90.0% ≤ 40,214

7. Which of the following services does your utility provide? *(Check all that apply.)* **n = 1,113**

- 1. Collection system (including pump stations) **82.3%**
- 2. Interceptor system (including pump stations) **70.9%**
- 3. Treatment (include biosolids disposal) **93.8%**
- 4. Reclaimed wastewater/effluent reuse **17.6%**
- 5. Contract operations **17.3%**
- 6. Other *(Please explain.)* **5.6%**

Definition for question 7: Contract operations occur when one utility provides services to another utility. Such services could include treatment, collection, billing, etc.

8. What is the total length of separate sanitary sewer lines owned by your utility for your most recently completed fiscal year? *(Please insert number in the space provided.)* n = 1,079

90.1% ≤ 500 miles

9. What percentage (in physical terms – not cost) of your separate sanitary sewer lines were built in each of the following periods? *(Please enter percentages in spaces provided.)*

- 1. Pre 1900 91.7% ≤ 10 percent
n = 567
- 2. 1900-24 90.9% ≤ 25 percent
n = 672
- 3. 1925-49 91.1% ≤ 40 percent
n = 794
- 4. 1950-74 91.1% ≤ 70 percent
n = 934
- 5. 1975-99 90.4% ≤ 75 percent
n = 970
- 6. 2000-present 90.2% ≤ 10 percent
n = 853

10. What is the total length of combined storm/sanitary sewer lines owned by your utility for your most recently completed fiscal year? *(Please insert number in the space provided.)* n = 1,053

90.1% ≤ 67 miles

11. What percentage (in physical terms – not cost) of your combined storm/sanitary sewer lines were built in each of the following periods? *(Please enter percentages in spaces provided.)*

- 1. Pre 1900 92.0% ≤ 30 percent
n = 214
- 2. 1900-24 89.7% ≤ 44 percent
n = 234
- 3. 1925-49 89.9% ≤ 60 percent
n = 239
- 4. 1950-74 91.2% ≤ 50 percent
n = 263
- 5. 1975-99 89.8% ≤ 36 percent
n = 251
- 6. 2000-present 90.2% ≤ 5 percent
n = 226

12. Which one of the following best describes the ownership of your utility? *(Please check one.)*

Publicly owned by:

- 1. a municipal government 76.8%
n = 1,113
- 2. a sewer district 10.7%
n = 1,113
- 3. a sewer authority 12.6%
n = 1,113

Privately owned by:

- 4. a for profit organization (e.g., investor-owned company) 0.1%
n = 1,113
- 5. a not for profit organization (e.g., homeowners association) 0.5%
n = 1,110

Other

- 6. other *(Please describe.)* 1.4%
n = 1,113

13. Does your utility contract with a private entity to perform all or almost all services related to the management, operation, and maintenance of your wastewater system (i.e., the private entity provides full contract operations)? *(Please check one.)*

n = 1,111

- 1. Yes **6.1%**
- 2. No **93.9%**

14. Are any of your utility's activities regulated by a state utility commission? *(Please check one.)*

n = 1,103

- 1. Yes → *continue to question 15* **13.6%**
 - 2. No **83.2%**
 - 3. Don't know **3.3%**
- } → *skip to question 16*

15. Which of the following does your state utility commission regulate? *(Please check all that apply.)*

- 1. User rates **32.2%**
n = 150
- 2. Billing practices **23.2%**
n = 150
- 3. Notifications to customers **48.7%**
n = 150
- 4. Other *(Please describe.)* **48.3%**
n = 152

16. Does your utility also provide drinking water services? *(Please check one.)* **n = 1,097**

- 1. Yes **58.8%**
- 2. No **41.2%**

Part II – Funding Sources for Wastewater Utilities

17. In your most recently completed fiscal year, what were your utility’s sources of funds? *(Please check all that apply.)* n = 1,113

Utility and community sources

- 1. User charges **96.9%**
- 2. Property taxes **10.3%**
- 3. Sales to other utilities (e.g., treatment and other services) **32.1%**
- 4. Product sales (e.g., reclaimed water, biosolids, fertilizer products, etc.) **12.3%**
- 5. Special operating cost levies (revenues from a specific user or group of users for a specific operating purpose, e.g., pretreatment charges for high strength waste) **38.6%**
- 6. Interest earned **78.2%**
- 7. Assessments **20.8%**
- 8. Permit and inspection fees **49.7%**
- 9. Hook-up or connection fees **77.8%**
- 10. Reserves **36.7%**
- 11. Other (e.g., developer contributions, etc.) **29.1%**

Grant sources

- 12. Federal grants **18.1%**
- 13. State grants **30.8%**
- 14. Other grant sources **3.5%**

Debt and equity sources

- 15. Federal loans **7.5%**
- 16. State loans **40.3%**
- 17. Commercial loans **6.4%**
- 18. Revenue bond proceeds **36.0%**
- 19. General obligation bond proceeds **22.6%**
- 20. Private activity bond proceeds **0.9%**
- 21. Sale of stock **0.0%**
- 22. Other short-term debt instruments **5.2%**
- 23. Other long-term debt instruments **3.1%**
- 24. Other debt and equity sources **1.4%**

Other sources

- 25. Other *(Please describe.)* **7.4%**

18. This question refers to some of the funding sources that you may have checked in question 17. For your most recently completed fiscal year, approximately how much funding did your utility generate from user charges and other utility and community sources? (Please insert the dollar amount in the space provided. If none, enter "0".)

Funding source	Amount of funds generated
User charges (item 1 in question 17) n = 1,001	\$ _____
Utility and community sources, excluding user charges (items 2 through 11 in question 17) n = 872	\$ _____

19. Does your utility offer rate relief and/or some other type of subsidy for customers with lower incomes? (Please check one.) n = 1,071

- 1. Yes 13.0%
- 2. No 87.0%

20. For your most recently completed fiscal year, approximately what were your utility's costs in the following categories? (Please insert the dollar amount in the space provided. If none, enter "0".)

- 1. Operations and maintenance \$ _____
n = 1,059
- 2. Capital expenditures \$ _____
n = 993
- 3. Debt service \$ _____
n = 983
- 4. Reserve payments \$ _____
n = 623
- 5. Depreciation expense \$ _____
n = 780
- 6. Total taxes \$ _____
n = 541
- 7. Other \$ _____
n = 435

Please describe other costs.

Definitions for question 20:

Operations and maintenance expenses are the day-to-day costs of providing your utility's services, including labor, board or council member fees, retirement system contributions, insurance premiums, energy, chemicals, supplies, replacement parts, repair services, fuel and other vehicle operating costs, communications services, any other utility service charges, permit fees, advertisements, public relations, travel and mileage expenses, training costs, reference materials, postage and delivery services, bad debt, legal services, engineering services, accounting services, laboratory services, etc.

Capital expenditures are costs of replacing capital assets that have reached the end of their useful lives, acquiring new assets that are intended to serve existing customers, and constructing new treatment plants and collection system components required to serve new areas or new users. Capital expenditures may include costs associated with materials, labor, architectural and/or engineering services, legal services, financial services, permit fees, etc.

Debt service expenses include the principal and interest paid on borrowed funds.

Reserve payments include revenues transferred to a reserve fund for paying future costs or as required by bond documents.

Depreciation expense is an amount deducted from revenue in determining income, based on an allocation of a long-lived asset's original cost over the years of its useful life.

Definition for question 21:

End of useful life may be determined by age of the lines, the type of material used in the lines, inspection, and history of line leakage and breakage.

Rehabilitation extends the life of lines through technologies such as microtunneling, sliplining, pipebursting, and form-in-place.

21. Does your utility have a preventive replacement and rehabilitation program for lines that are coming to the end of their useful life? **We are referring to preventive replacement and rehabilitation rather than replacement due to breakage.** (Please check one.)
n = 1,091

- 1. Yes → *continue to question 22* **56.2%**
- 2. No → *skip to question 23* **43.8%**

22. In developing the current rates charged to users, did your utility include an amount to cover the cost of your utility's preventive replacement and rehabilitation program? (Please check one.)
n = 613

- 1. Yes **85.4%**
- 2. No **14.0%**
- 3. Not applicable, prohibited by public utility commission **0.7%**

23. Approximately what percentages (in physical terms—not cost) of your utility's separate sanitary sewer lines and combined storm/sanitary sewer lines are nearing the end of their useful life? (Please indicate the percentage below. If none, enter "0".)

- 1. **89.0% ≤ 47 %** separate sanitary sewer lines
n = 980
- 2. **89.7% ≤ 65 %** combined storm/sanitary sewer lines **n = 312**

24. For your last three fiscal years (FY 1998 through FY 2000), on average, approximately what percentages (in physical terms—not cost) of your separate sanitary sewer lines and combined storm/sanitary sewer lines were replaced and rehabilitated annually? (Please calculate the average percentages for fiscal years 1998 through 2000 and indicate the amount below. If none, enter "0".)

3. Separate sanitary sewer lines:

- a. **86.0% ≤ 2** percent replaced annually
n = 974
- b. **81.6% ≤ 2** percent rehabilitated annually **n = 890**

4. Combined storm/sanitary sewer lines:

- a. **87.8% ≤ 2** percent replaced annually
n = 313
- b. **91.2% ≤ 2** percent rehabilitated annually
n = 307

25. Given the ages of your utility's separate sanitary sewer lines and combined storm/sanitary sewer lines, approximately what does your utility believe the annual rates (in physical terms—not cost) of replacement and rehabilitation should be? (Please enter percentage. If none, enter "0". If you cannot determine separate rates for replacement and rehabilitation, please provide a rate that combines both.)

a. Separate sanitary sewer lines:

a. 65.8% ≤ 2 percent replacement rate
n = 559

b. 56.3% ≤ 2 percent rehabilitation rate
n = 501
or

c. 64.8% ≤ 4 percent combined rate
n = 562

b. Combined storm/sanitary sewer lines:

a. 73.1% ≤ 2 percent replacement rate
n = 175

b. 77.5% ≤ 2 percent rehabilitation rate
n = 160

c. 66.3% ≤ 4 percent combined rate
n = 204

26. In developing the current rates charged to users, does your utility dedicate a portion of its income each year to provide for future capital needs? (Please check one.)
n = 1,076

1. Yes → skip to question 28 71.1%

2. No → continue to question 27 28.4%

3. Not applicable, prohibited by public utility commission → continue to question 27 0.5%

27. Does a state or local law or regulation prohibit your utility from accumulating funds to provide for future capital needs? (Please check one.)
n = 316

1. Yes 6.3%

2. No 76.6%

3. Don't know 17.1%

28. If your utility generates revenues in excess of costs, what happens to the excess revenues? (Check all that apply.)
n = 1,113

1. Retained in total by the utility for future use 75.3%

2. Retained in part by the utility for future use 11.1%

3. Transferred in total to the local government for activities related to the utility's operations (such as personnel or legal services) 1.4%

4. Transferred in part to the local government for activities related to the utility's operations (such as personnel or legal services) 10.0%

5. Transferred in total to the local government for activities not related to the utility's operations (such as construction of schools or roads) 1.1%

6. Transferred in part to the local government for activities not related to the utility's operations (such as construction of schools or roads) 4.8%

7. Paid out to investors as dividends 0.2%

8. Refunded to customers when allowed rate of return is exceeded 1.4%

9. Other (Please explain) 3.7%

Part III – Infrastructure Planning

29. Does your utility have a plan for managing its existing capital assets? *(Please check one.)*
n = 1,076

- 1. Yes → skip to question 31 65.4%
 - 2. No 30.8%
 - 3. Don't know 3.8%
- } → continue to question 30

30. Is your utility currently developing a plan for managing its existing capital assets? *(Please check one.)*
n = 378

- 1. Yes 47.4%
 - 2. No 42.2%
 - 3. Don't know 10.4%
- } → skip to question 32

31. Do your utility's plans for managing existing capital assets include the following components? *(Please check one for each of the following items.)*

- a. A complete assessment of the physical condition of the utility's capital assets
n = 694
 - 1. Yes, for all capital assets 38.3%
 - 2. Yes, for some capital assets 53.9%
 - 3. No 7.8%
- b. Descriptions of the criteria used to measure and report asset condition
n = 682
 - 1. Yes, for all capital assets 25.3%
 - 2. Yes, for some capital assets 51.3%
 - 3. No 23.3%
- c. The condition level at which your utility intends to maintain the assets
n = 685
 - 1. Yes, for all capital assets 25.1%
 - 2. Yes, for some capital assets 54.1%
 - 3. No 20.8%
- d. A comparison of the estimated and actual dollar amounts required to maintain the assets at the condition level established by your utility.
n = 679
 - 1. Yes, for all capital assets 22.2%
 - 2. Yes, for some capital assets 41.3%
 - 3. No 36.5%

Definition for question 32:

Capital improvement plan contains detailed information on all needed capital projects, the reason for each project, and their costs, for a specified period of time.

32. Does your utility have a plan that identifies future capital needs (i.e., a capital improvement plan)? *(Please check one.)*
n = 1,098
- 1. Yes → *continue to question 33* **87.5%**
 - 2. No **11.6%**
 - 3. Don't know **0.9%**
- } → *skip to question 35*

33. How many years does your utility's capital improvement plan cover? *(Please enter number of years in the space provided.)*
n = 943
- 95.4% ≥ 5 years**

34. Does your utility have a plan for financing the capital projects identified in your capital improvement plan? *(Please check one.)*
n = 949
- 1. Yes **86.5%**
 - 2. No **13.5%**

35. How often does your utility review its capital improvement needs? *(Please check one.)*
- 1. Annually **92.7%** **n = 1,078**
 - 2. Other *(Please indicate the time period in years.)* **7.3%** **n = 78**
 _____ years

36. In which of the following years did your utility request rate increases? *(Please check all that apply.)*

- | | |
|--|--|
| 1. <input type="checkbox"/> 1992 22.7%
n = 1,104 | 6. <input type="checkbox"/> 1997 23.7%
n = 1,104 |
| 2. <input type="checkbox"/> 1993 21.1%
n = 1,104 | 7. <input type="checkbox"/> 1998 25.6%
n = 1,104 |
| 3. <input type="checkbox"/> 1994 24.3%
n = 1,104 | 8. <input type="checkbox"/> 1999 26.3%
n = 1,104 |
| 4. <input type="checkbox"/> 1995 22.0%
n = 1,104 | 9. <input type="checkbox"/> 2000 28.6%
n = 1,104 |
| 5. <input type="checkbox"/> 1996 23.5%
n = 1,104 | 10. <input type="checkbox"/> 2001 31.6%
n = 1,104 |
| 11. <input type="checkbox"/> No rate increases requested during this period 8.1%
n = 1,104 | |
| 12. <input type="checkbox"/> Not applicable; rate increases are not subject to external review and/or approval 16.2% n = 1,105 | |

37. In which of the following years did your utility increase rates? *(Please check all that apply.)*
n = 1,112

- | | |
|--|--|
| 1. <input type="checkbox"/> 1992 27.4% | 6. <input type="checkbox"/> 1997 30.7% |
| 2. <input type="checkbox"/> 1993 26.8% | 7. <input type="checkbox"/> 1998 31.7% |
| 3. <input type="checkbox"/> 1994 29.8% | 8. <input type="checkbox"/> 1999 32.0% |
| 4. <input type="checkbox"/> 1995 27.0% | 9. <input type="checkbox"/> 2000 35.9% |
| 5. <input type="checkbox"/> 1996 29.8% | 10. <input type="checkbox"/> 2001 39.8% |
| 11. <input type="checkbox"/> Did not increase rates during this period 9.9% | |

38. In your most recently completed fiscal year, did your utility defer any maintenance because available funding was not sufficient? *(Please check one.)*
n = 1,098

- 1. Yes **28.6%**
- 2. No **71.4%**

39. In your most recently completed fiscal year, did your utility defer any minor capital improvements because available funding was not sufficient? *(Please check one.)*

n = 1,095

1. Yes **34.0%**

2. No **66.0%**

40. In your most recently completed fiscal year, did your utility defer any major capital projects because available funding was not sufficient? *(Please check one.)*

n = 1,099

1. Yes **36.3%**

2. No **63.7%**

41. Do you anticipate that, over the next 5 to 10 years, your utility's projected revenues and other funding will be sufficient to cover anticipated future needs? *(Please check one.)*

n = 1,085

1. Yes **56.1%**

2. No **43.9%**

42. If you have any additional comments on matters discussed in this survey or related to wastewater and drinking water infrastructure planning and funding, please use the space below or attach additional pages, if needed.

n = 1,113

Thank you for your help!

Appendix III: GAO Contacts and Staff Acknowledgments

GAO Contacts

Ellen Crocker, (617) 565-7469
Lisa Turner, (202) 512-6559

Acknowledgments

In addition to the individuals named above, Wendy Ahmed, Mark Connolly, Teresa Dee, Laura Greene, Jerry Laudermilk, Grant Mallie, and Laura Shumway made key contributions to this report. Important contributions were also made by Ulana Bihun, Stuart Kaufman, Karen Keegan, Jonathan McMurray, Mehrzad Nadji, Carol Herrnstadt Shulman, and the staff in GAO's Shared Services Center.

GAO's Mission

The General Accounting Office, the investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through the Internet. GAO's Web site (www.gao.gov) contains abstracts and full-text files of current reports and testimony and an expanding archive of older products. The Web site features a search engine to help you locate documents using key words and phrases. You can print these documents in their entirety, including charts and other graphics.

Each day, GAO issues a list of newly released reports, testimony, and correspondence. GAO posts this list, known as "Today's Reports," on its Web site daily. The list contains links to the full-text document files. To have GAO e-mail this list to you every afternoon, go to www.gao.gov and select "Subscribe to daily E-mail alert for newly released products" under the GAO Reports heading.

Order by Mail or Phone

The first copy of each printed report is free. Additional copies are \$2 each. A check or money order should be made out to the Superintendent of Documents. GAO also accepts VISA and Mastercard. Orders for 100 or more copies mailed to a single address are discounted 25 percent. Orders should be sent to:

U.S. General Accounting Office
441 G Street NW, Room LM
Washington, D.C. 20548

To order by Phone: Voice: (202) 512-6000
 TDD: (202) 512-2537
 Fax: (202) 512-6061

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm

E-mail: fraudnet@gao.gov

Automated answering system: (800) 424-5454 or (202) 512-7470

Public Affairs

Jeff Nelligan, managing director, NelliganJ@gao.gov (202) 512-4800
U.S. General Accounting Office, 441 G Street NW, Room 7149
Washington, D.C. 20548