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Water Infrastructure Needs and Investment: Review and Analysis of Key Issues

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Claudia Copeland
Specialist in Resources and Environmental Policy
Resources, Science, and Industry Division

Mary Tiemann
Specialist in Environmental Policy
Resources, Science, and Industry Division

Prepared for Members and
Committees of Congress

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Summary

Policymakers are giving increased attention to issues associated with financing and investing in the nation's drinking water and wastewater treatment systems, which take in water, treat it, and distribute it to households and other customers, and later collect, treat, and discharge water after use. The renewed attention is due to a combination of factors. These include financial impacts on communities of meeting existing and anticipated regulatory requirements, the need to repair and replace existing infrastructure, and concerns about paying for security-related projects.

The federal government has a long history of involvement with wastewater and drinking water systems, with the Environmental Protection Agency (EPA) having the most significant role, both in terms of regulation and funding. The U.S. Department of Agriculture also plays an important role in rural communities through its water and wastewater loan and grant programs. These programs have been popular; however, states, local communities, and others have asserted that various program gaps and limitations may be diminishing their potential effectiveness. They also point to the emergence of new infrastructure needs and issues.

A number of interest groups and coalitions have issued reports on infrastructure funding needs and related policy issues, as have EPA and the Congressional Budget Office (CBO). They present a range of estimates and scenarios of future investment costs and gaps between current spending and future costs. EPA and CBO, in particular, caution that projections of future costs are highly uncertain, and that funding gaps are not inevitable. Increased investment, sought by many stakeholders, is one way to shrink the spending gaps, but so, too, are other strategies such as asset management, more efficient pricing, and better technology.

Congressional interest in these issues has grown for some time and is continuing in the 110th Congress. In each of the past three Congresses, House and Senate committees acted on legislation to reauthorize and modify infrastructure financing programs in the Clean Water Act and Safe Drinking Water Act, but no bills were enacted. The Bush Administration has addressed water infrastructure in a number of general ways, but has not offered legislative proposals of its own. EPA's principal initiative has been to support strategies intended to ensure that infrastructure investment needs are met in an efficient, timely, and equitable manner.

This report identifies a number of issues that have received attention in connection with water infrastructure investment. It begins with a review of federal involvement, describes the debate about needs, and then examines key issues, including what is the nature of the problems to be solved; who will pay, and what is the federal role; and questions about mechanisms for delivering federal support, including state-by-state allotment of federal funds. Congressional and Administration activity on these issues from the 107th to the 109th Congresses also is reviewed.

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Introduction

Drinking water and wastewater treatment systems treat and safeguard the nation's water resources. Drinking water utilities have the task of supplying safe potable water to customers in both the proper quantity and quality. Wastewater utilities operate facilities that clean the flow of used water from a community. The federal government has had significant involvement with these systems for many years, both through setting standards to protect public health and the environment and through funding to assist them in meeting standards. While funding of water infrastructure programs has been addressed annually through the congressional appropriations process, authorizing legislation affecting policy and program issues was last enacted in 1996 (for drinking water infrastructure) and 1987 (for wastewater infrastructure).[1] However, water infrastructure issues have begun to receive increased attention by policymakers and legislators. The renewed attention is due to a combination of several factors.

- **Meeting Regulatory Requirements**. Financial impacts of meeting regulatory requirements — some new, some long-standing — are a continuing issue for many communities. In the case of drinking water systems, the most pressing rules are new, either recently issued or pending, as the result of standard-setting by the Environmental Protection Agency (EPA) to implement the Safe Drinking Water Act Amendments of 1996. (Many of these rulemakings were initiated under amendments passed in 1986.) These rules impose new or stricter drinking water limits on numerous contaminants, including arsenic, radioactive contaminants, and microbials and disinfection byproducts, among others. For wastewater systems, principal regulatory requirements mandated by the Clean Water Act have not changed since 1972, and the majority of communities have achieved or are in the process of achieving compliance. The newer issue for wastewater systems is the cost of controls and practices to manage what are termed wet weather pollution problems, such as urban stormwater runoff and overflows from municipal sewers. These requirements are old in the sense that most wastewater utilities have

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[1] This report focuses on drinking water systems that take in water, treat it, monitor it, and distribute it to households and other customers, and wastewater systems that collect, treat, and typically discharge water after use. It does not address infrastructure related to water supply systems that generally are part of larger multi-purpose projects for irrigation, flood control, power supply and recreation that typically are built or assisted by the Bureau of Reclamation and the U.S. Army Corps of Engineers.

not addressed long-standing wet weather problems, but they also are new because in many communities, specific measures are only now being identified.

- **Financing Infrastructure Repair or Replacement**. A more recent focus by stakeholders is on the need to repair and replace infrastructure that has been in place for decades and will soon fail, many believe. According to the American Water Works Association (AWWA), "We stand at the dawn of the replacement era ... replacement needs are large and on the way. There will be a growing conflict between the need to replace worn-out infrastructure and the need to invest in compliance with new regulatory standards."[2] Over the long term, these stakeholders say, a higher level of investment than is occurring today is required. For both wastewater and drinking water systems, a key concern is that EPA's funding programs, the largest sources of federal assistance, do not, in the main, support repair and replacement; their focus is upgrades and new construction needed to achieve wastewater and drinking water standards.

- **Security**. Beyond the traditional infrastructure needs related to regulatory compliance and system repair and expansion, the terrorist attacks of September 11, 2001, generated new investment needs for drinking water and wastewater systems. The national costs of addressing water and wastewater security needs have not been quantified; however, the AWWA has estimated that municipal water systems would have to spend more than $1.6 billion just to ensure control of access to critical water system assets.[3] This estimate does not include the capital costs of upgrades to address vulnerabilities that water system managers have identified in vulnerability assessments, or the costs facing wastewater systems and smaller drinking water systems. Although EPA has identified a range of security measures that are eligible for funding through the clean water and drinking water state revolving fund programs, competition already is severe for these funds, which are primarily used for projects needed to meet regulatory requirements.

- **Problems That Do Not Fit Existing Solutions**. For some, an interest in water infrastructure legislation derives from concern that traditional federal programs and financing approaches do not fit well with some current types of needs. Points at issue vary, but the common thread is that certain needs are not being well met by programmatic solutions that now exist. In some cases (metropolitan drinking water systems, for example), there is a perception that

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[2] American Water Works Association, *Dawn of the Replacement Era, Reinvesting in Drinking Water Infrastructure*, May 2001, p. 5. (Hereafter cited as AWWA Report.)

[3] American Water Works Association, *Protecting Our Water: Drinking Water Security in American After 9/11*, Executive Summary, 2003.

EPA's programs are more geared to aiding small systems than large ones. In other cases, the concern is how to fund types of projects that include mixed elements (e.g., developing new community water supplies and treating that water, especially in rural areas) that do not meet traditional program definitions, or are seemingly spread across jurisdictions of multiple federal agencies. Still others believe that expanding program eligibility to include water conservation projects could reduce overall needs for capital investment. Another concern arises in small, dispersed communities where on-site treatment systems may be preferable to centralized facilities; however on-site treatment generally is not eligible for federal aid. At issue for Congress is whether to modify existing programs to address such needs, or to address them in legislation individually and case-by-case.[4]

- **Other Legislative Models and Activity.** Legislative approaches for other types of infrastructure have suggested possible models for water infrastructure funding. The Transportation Equity Act for the 21st Century (TEA-21, P.L. 105-178) authorized federal highway, highway safety, and mass transit aid programs through FY2003, and established new budgetary treatment for core programs to better ensure that authorized funds are appropriated each year. In the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2005 (SAFETEA, P.L. 109-59), Congress reauthorized federal surface transportation programs through FY2009. Likewise, the Aviation and Investment Reform Act for the 21st Century (AIR21, P.L. 106-181) authorized programs that provide grants to airports for capital improvements. It was extended in the Century of Aviation Reauthorization Act, called Vision 100 (P.L. 108-176), in 2004. Supporters of the highway and aviation laws have sought to assure funding at fully authorized levels and to ensure to a greater degree than in the past that trust fund revenues from fees and taxes which support these programs would be fully spent on authorized activities. Some proponents of water infrastructure spending, concerned about a gap between needs and available funds, believe that a Water21-type initiative based on a federal water trust fund would conceptually be a logical follow-on to TEA-21 and AIR21. According to that view, passage of those measures could give momentum to enacting new budget authority for water infrastructure spending, as well. Still, differences are apparent, especially the fact that, unlike for surface transportation and aviation, there is no comparable dedicated trust fund for water infrastructure. While TEA-21 and AIR21 may offer momentum, they also may be imperfect models for water, unless dedicated revenue sources for a water trust fund can be identified.

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[4] For background, see CRS Report RL30478, *Federally Supported Water Supply and Wastewater Treatment Programs*. (Hereafter cited as CRS Report RL30478.)

- **Changed Dynamics at the Federal Level about "Who Should and Can Pay."** For many years, a focus on federal deficit reduction constrained the federal government from making major new investments in water infrastructure or other new programs. However, at the beginning of 2001, a more favorable projection of the budgetary situation (especially a $5.6 trillion 10-year surplus projected by the Congressional Budget Office (CBO) in January 2001) encouraged a variety of interests to advocate increasing the federal commitment to water infrastructure. Still, many acknowledged that, even in the best of budgetary circumstances, there would be competition among different interests, including Medicare and Social Security spending, education, national defense, and other priorities. CBO's estimate of the 10-year surplus declined later in 2001 to $3.4 trillion, as the economy appeared to be slowing and Congress enacted a $1.35 trillion tax cut law (P.L. 107-16). Following the terrorist attacks of September 11, 2001, which placed new demands — including fiscal — on the nation's resources, the overall economic and budgetary outlook changed dramatically. Compared with forecasts of surpluses before September 11, the nation's heightened priorities of defense and homeland security contributed to changing the budgetary forecast to one of large federal deficits. By the end of FY2006, CBO and others observed that the federal budgetary situation had improved in 2006 for the second consecutive year, yet the nation's fiscal environment continues to present enormous challenges for proponents of greater federal investment and larger federal expenditures in water infrastructure.

This report identifies a number of issues receiving attention in connection with water infrastructure. It begins with a brief review of federal involvement, describes the debate about funding needs, and then examines key issues, including what is the nature of the problems to be solved; who will pay, and what is the federal role; and questions about mechanisms for delivering federal support, including state-by-state allotment. Recent congressional and Administration activity on these issues also is reviewed.

Background: History of Federal Involvement

The federal government has a lengthy history of involvement with wastewater and drinking water systems. The history of financial assistance is longer for wastewater than for drinking water, however. EPA has the most significant role, both in terms of regulation and funding.

Wastewater

The Water Pollution Control Act of 1948 (P.L. 80-845) was the first comprehensive statement of federal interest in clean water programs. While it contained no federally required goals, limits, or even guidelines, it started the trickle of federal aid to municipal wastewater treatment authorities that grew in subsequent years. It established a grant program to assist localities with planning and design

work, and authorized loans for treatment plant construction, capped at $250,000 or one-third of construction costs, whichever was less. With each successive statute in the 1950s and 1960s, federal assistance to municipal treatment agencies increased. A construction grant program replaced the loan program; the amount of authorized funding went up; the percentage of total costs covered by federal funds was raised; and the types of project costs deemed grant-eligible were expanded.

In the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500, popularly known as the Clean Water Act, 33 U.S.C. 1251 *et seq*.), Congress totally revised the existing federal clean water law, including with regard to wastewater systems. At the time, there was widespread recognition of water quality problems nationwide and frustration over the slow pace of industrial and municipal cleanup efforts under existing programs. In the 1972 law, Congress strengthened the federal role in clean water and established national standards for treatment, mandating that all publicly owned treatment works achieve a minimum of secondary treatment (defined in EPA regulations as removing 85% of incoming wastes), or more stringent treatment where necessary to meet local water quality standards, and set a July 1, 1977, deadline for meeting secondary treatment. A number of new conditions were attached to projects constructed with grants. In exchange, federal funds increased dramatically. The federal share was raised from 55% to 75%, and annual authorizations were $5 billion in FY1973, $6 billion in FY1974, and $7 billion in FY1975.

In 1977, the grant program was reauthorized through FY1982; annual authorizations were $5 billion for each of the last four years covered by that act (P.L. 95-217). Some restrictions were imposed, including requirements that states set aside a portion of funds for innovative and alternative technology projects and for projects in rural areas. In addition, the types of eligible projects were limited in order to focus use of federal funds on projects with environmental benefits in preference to projects aiding community growth. When the program was again reauthorized in 1981 (P.L. 97-117), Congress and the Administration agreed to significant restrictions, out of concern that the program's wide scope was not properly focused on key goals. Budgetary pressures and a desire to reduce federal spending also were concerns. Annual authorizations under this act were $2.4 billion, the federal share was reduced to 55%, and project eligibilities were limited further.

The 1972 law required a "needs survey" every two years to adjust the statutory allotment formula by which grant funds were divided among the states. In this survey, EPA compiles state data to estimate capital costs for water quality projects and other activities eligible for support under the Clean Water Act. From an initial estimate of $63 billion in 1973, the survey figure went to a high of $342 billion in 1974, dropped to $96 billion in 1976, rose to $106 billion in 1978, $120 billion in 1980, declined to $80 billion in 1990, was assessed at $139.5 billion in 1996, and rose to $181.2 billion in 2000, the most recent survey. Inconsistencies and variations have been ascribed to several factors, including the lack of precision with which needs for some project categories could be assessed (especially in the early years) and the desire of state estimators to use the needs survey as a way of keeping their share

of the federal allotment as high as possible.[5] However, EPA believes that recent surveys produce credible data, because of the requirement that needs must be justified by project-specific documentation.

By the mid-1980s there was considerable policy debate between Congress and the Administration over the future of the construction grants program and, in particular, the appropriate federal role. Through FY1984, Congress had appropriated nearly $41 billion under this program, representing the largest nonmilitary public works programs since the Interstate Highway System. The grants program was a target of the Reagan Administration's budget cutters, who sought to redirect budget priorities and establish what they viewed as the appropriate governmental roles in a number of domestic policy areas, including water pollution control. Thus, for budgetary reasons and the belief that the backlog of wastewater projects identified in 1972 had largely been completed, the Reagan Administration sought a phase-out of the act's construction grants program by 1990. Many states and localities, which continued to support the act's water quality goals and programs, did support the idea of phasing out the grants program, since many were critical of what they viewed as burdensome rules and regulations that accompanied the receipt of federal grant money. However, they sought a longer transition and ample flexibility to set up long-term financing to promote state and local self-sufficiency.

Congress's response to this debate was contained in 1987 amendments to the act (P.L. 100-4). It authorized $18 billion over a nine-year period for sewage treatment plant construction, through a combination of the traditional grant program and a new State Water Pollution Control Revolving Funds (SRF) program. Under the new program, federal capitalization grants would be provided as seed money for state-administered loans to build sewage treatment plants and, eventually, other water quality projects. Cities, in turn, would repay loans to the state, enabling a phaseout of federal involvement while the state built up a source of capital for future investments. Allotment of the SRF capitalization grants among states continues to be governed by a statutory formula, which Congress revised in 1987 (see discussion below, "Allotment of Funds"). Under the amendments, the SRF program was phased in beginning in FY1989 and entirely replaced the previous grant program in FY1991. The intention was that states would have greater flexibility to set priorities and administer funding, while federal aid would end after FY1994.

Municipalities have made substantial progress towards meeting the goals and requirements of the act, yet state water quality reports continue to indicate that discharges from wastewater treatment plants are a significant source of water quality impairments nationwide. In the 2000 National Water Quality Inventory report, states reported that municipal wastewater treatment plants contribute to water quality impairments of rivers, streams and lakes and are the most widespread source of pollution affecting estuarine waters. The authorizations provided in the 1987 amendments expired in FY1994, but pressure to extend federal funding has continued, in part because estimated needs remain so high. Thus, Congress has continued to appropriate funds, and the anticipated shift to full state responsibility

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[5] For discussion of several of these factors, see Water Pollution Control Federation (now, the Water Environment Federation), *The Clean Water Act with Amendments*, 1982, p. 14.

has not yet occurred. Through FY2007, Congress has appropriated $77.6 billion in Clean Water Act assistance, including $25.5 billion in SRF capitalization grants.

Drinking Water

Public water systems are regulated under the Safe Drinking Water Act (SDWA) of 1974 (P.L. 93-523), as amended (42 U.S.C. 300f-300j). Congress enacted the SDWA after nationwide studies of community water systems revealed widespread water quality problems and health risks resulting from poor operating procedures, inadequate facilities, and uneven management of public water supplies in communities of all sizes. The 1974 law gave EPA substantial discretionary authority to regulate contaminants that occur in public drinking water supplies, and authorized EPA to delegate primary implementation and enforcement authority for the Public Water System Supervision program to the states.

SDWA drinking water regulations apply to more than 158,000 public water systems (both privately and publicly owned systems) that provide piped water for human consumption to at least 15 service connections or that regularly serve at least 25 people. Of these systems, 52,837 are community water systems (CWSs) that serve residential populations year-round. (Roughly 15% of community systems are investor-owned.) All federal regulations apply to these systems. More than 19,100 water systems are non-transient, non-community water systems (NTNCWSs), such as schools or factories, that have their own water supply and serve the same people for more than six months but not year-round. Most drinking water requirements apply to these systems.[6]

In contrast to the 40-plus years of federal support for financing municipal wastewater treatment facilities, Congress relatively recently, in 1996, established a program under SDWA to help public water systems finance projects needed to comply with federal drinking water regulations. Funding support for drinking water only occurred more recently for several reasons. Until the 1980s, the number of drinking water regulations was fairly small, and public water systems often did not need to make large investments in treatment technologies to meet those regulations. Relatedly, good quality drinking water traditionally had been available to many communities at relatively low cost. By comparison, essentially all communities have had to construct or upgrade sewage treatment facilities to meet the requirements of the 1972 Clean Water Act. In addition, when the SDWA was first enacted, few expected that the number of small, less economical water systems would continue to increase.

Over time, drinking water circumstances have changed as communities have grown, and commercial, industrial, agricultural, and residential land-uses have become more concentrated, thus resulting in more contaminants reaching drinking water sources. Moreover, as the number of federal drinking water standards and

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[6] Another 86,210 systems are transient non-community water systems (TNCWSs) (e.g., campgrounds and gas stations) that provide their own water to transitory customers. TNCWSs generally are required to comply only with regulations for contaminants that pose immediate health risks (such as microbial contaminants), with the proviso that systems that use surface water sources must also comply with filtration and disinfection regulations.

related monitoring requirements have increased, many communities have found that their water may not have been as good as once thought and that additional treatment was needed to meet the new standards and protect public health. From 1986 to 1996, for example, the number of regulated drinking water contaminants grew from 23 to 83. EPA and the states began expressing greater concern that many of the nation's community water systems (44,000, or 83% of all CWSs, of which were small) were likely to lack the financial capacity to meet the rising costs of complying with SDWA requirements.

Congress responded to these concerns with the 1996 SDWA Amendments (P.L. 104-182), which established a drinking water state revolving loan fund (DWSRF) program to help public water systems finance projects needed to comply with SDWA regulations and to further the public health protection objectives of the act. This program, patterned after the Clean Water Act SRF, authorizes EPA to make grants to states to capitalize DWSRFs, which states then use to make loans to water systems. States are required to match 20% of their federal capitalization grant, and must make available 15% of their grant for loan assistance to small systems. Communities repay loans into the fund, thus making resources available for projects in other communities. Eligible projects include installation and replacement of treatment facilities, distribution systems, and certain storage facilities. Projects to replace aging infrastructure are eligible if they are needed to maintain compliance or to further public health protection goals.

Public water systems eligible to receive DWSRF assistance include community water systems (whether publicly or privately owned) and not-for-profit noncommunity water systems. The law generally prohibits states from providing DWSRF assistance to systems that lack the capacity to comply with the act or that are in significant noncompliance with SDWA requirements, unless these systems meet certain conditions to return to compliance. (Although the law authorizes assistance to privately owned community water systems, some states have laws or policies that preclude privately owned utilities from receiving DWSRF assistance.)

Appropriations for the program were authorized at $599 million for FY1994, and $1 billion annually for FY1995 through FY2003. Although the funding authority for the DWSRF program has expired, Congress continues to appropriate funds. Through FY2007, Congress has provided $9.5 billion for this program.

Congress added several new features to the DWSRF program to reflect experience gained under the Clean Water Act program and differences between the drinking water and wastewater industries. A key difference in the DWSRF is that privately owned as well as publicly owned systems are eligible for funding. Another distinction is that states may use up to 30% of their DWSRF grant to provide additional assistance, such as forgiveness of loan principal or negative interest rate loans, to help economically disadvantaged communities.[7]

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[7] For more information, see CRS Report RS22037, *Drinking Water State Revolving Fund: Program Overview and Issues*, by Mary Tiemann.

Paralleling the Clean Water Act (CWA), the SDWA requires EPA to assess the capital improvement needs of eligible public water systems. Needs surveys must be prepared every four years. In contrast to the CWA, which includes a statutory allotment formula for SRF capitalization grants, EPA must distribute DWSRF funds among the states based on the results of the latest survey. Eligible systems include roughly 55,000 public and private community water systems and 21,400 not-for-profit noncommunity water systems. (See **Table 1** for a comparison of key features of the clean water and drinking water SRF programs.)

EPA conducted its third survey of capital improvement needs for public water systems in 2003.[8] Based on this survey, EPA estimates that systems need to invest $276.8 billion in drinking water infrastructure improvements over 20 years to comply with drinking water regulations and to ensure the provision of safe water. This amount exceeds the 2001 needs survey estimate of $150.9 billion ($165.5 billion in 2003 dollars) by more than 60%. EPA attributed this increase to several factors, such as the inclusion in the latest survey of $1 billion in security-related needs, as well as funds needed for compliance with several new and pending regulations. Also, water systems improved their assessment of needs for infrastructure rehabilitation and replacement in 2003, which EPA determined had been under-reported in the previous surveys. With the number of regulated drinking water contaminants now exceeding 90, and with more rules pending, these needs are expected to continue to grow. Consequently, stakeholders continue to press Congress to reauthorize and increase appropriations for this program.

Table 1. Key Features of the Clean Water and Drinking Water State Revolving Fund Programs

	Clean Water SRF	Drinking Water SRF
Year authorized	1987	1996
Authorization	$8.4 billion (FY1989-1994)	$9.4 billion (FY1994-2003)
Appropriations through FY2007	$25.5 billion	$9.5 billion
Cumulative assistance through 2005	$52.7 billion	$9.4 billion
Eligible uses of fund (types of assistance)	Loans, refinance, insurance, guarantee, purchase debt, security for leveraging, 4% grant for administration	Loans, refinance, insurance, guarantee, purchase debt, security for leveraging

[8] Environmental Protection Agency, *Drinking Water Infrastructure Needs Survey and Assessment: Third Report to Congress*, June 2005. EPA 816-R-05-001. Available online at [http://www.epa.gov/safewater/needs.html].

	Clean Water SRF	Drinking Water SRF
Loan terms	Interest between 0% and market rate; 20-year terms; longer terms allowed administratively in some states	Interest between 0% and market rate; 20-year terms; 30-year terms and subsidized loans (principal forgiveness) for economically disadvantaged systems
Eligible systems	Municipalities, intermunicipal, interstate, or state agency	Publicly and privately owned community and nonprofit, non-community drinking water systems
Eligible projects	Projects for wastewater treatment plants; qualified nonpoint source and estuary improvement projects	Projects to upgrade/replace drinking water source, treatment, storage, transmission and distribution
Ineligible projects	Operation and Maintenance (O&M)	Dams, reservoirs (unless for finished water), water rights (unless purchase through consolidation), O&M
Set-asides	No	Yes: up to 31% of grant (for administering DWSRF, public water system supervision, source water protection, capacity development, operator certification programs)
Disadvantaged assistance	No	Yes: up to 30% of grant (principal forgiveness), 30-year repayment
Transfers between SRFs[a]	Yes: up to 33% of clean water SRF capitalization grant amount	Yes: up to 33% of DWSRF capitalization grant amount

Source: Adapted from EPA Drinking Water State Revolving Fund Program Report to Congress, Office of Water, EPA 918-R-03-009, May 2003.

a. Although SDWA statutory provision expired in FY2001, Congress has approved transfers in subsequent appropriations laws.

USDA Assistance Programs

While EPA administers the largest federal water infrastructure assistance programs, the U.S. Department of Agriculture (USDA) also provides funding. It administers grant and loan programs available to communities with populations of 10,000 or less, thus benefitting small communities, many of which have had problems obtaining assistance through the CWA and SDWA loan programs. Many small towns have limited financial, technical and legal resources, and have encountered difficulties in qualifying for and repaying loans. They often lack opportunities for economies of scale or an industrial tax base, and thus face the prospect of high per capita user fees to repay a loan for the full cost of a sewage treatment or drinking water project.

USDA's grant and loan programs were authorized by the Rural Development Act of 1972 (P.L. 92-419, 7 U.S.C. 1926). The purpose of these USDA programs is

to provide basic amenities, alleviate health hazards, and promote the orderly growth of the nation's rural areas by meeting the need for new and improved rural water and waste disposal facilities. Loans and grants are made for projects needed to meet health or sanitary standards, including clean water standards and Safe Drinking Water Act requirements. In recent years, USDA officials have increased their coordination with state clean water and drinking water officials in administering their programs. They have done this both to better meet health and environmental goals and to minimize program redundancies and/or inconsistencies. For FY2007, Congress appropriated $527 million for USDA's water and waste disposal grant and loan programs, the same as in FY2006. (For information, see CRS Report RL30478, *Federally Supported Water Supply and Wastewater Treatment Programs.*)[9]

Context for the Water Infrastructure Debate: Investment Needs

Some of the factors that have led to increased attention to water infrastructure reflect long-standing concerns (for example, how cities will meet regulatory requirements), while others are more recent (such as, new analyses of broader funding needs, including maintenance and repair of older systems). A number of interest groups — many with long-standing involvement, as well as new groups and coalitions — have assisted in bringing attention to these issues. Among them are the Water Infrastructure Network (WIN), a coalition of 29 state, municipal, environmental, professional, and labor groups organized in 1999, and the H_2O Coalition, organized in 2001, consisting of the National Association of Water Companies, the Water and Wastewater Equipment Manufacturers Association, and the National Council for Public-Private Partnerships. Two WIN reports on funding needs and policy have received considerable attention, and the H_2O Coalition has responded to some issues in the WIN reports. In April 2000, WIN issued a report estimating a $24.7 billion average annual investment gap for the next 20 years for municipal wastewater and drinking water systems to address new problems and system deterioration.[10] Over the 20-year period, according to WIN's analysis, $940 billion is required for wastewater and drinking water investments, and more than $1 trillion in O&M spending is required. A second WIN report, issued in 2001, recommended a multibillion dollar investment program in water infrastructure.[11]

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[9] In addition to providing support through these EPA and USDA programs, Congress is increasingly being asked to provide direct authorizations for individual projects developed by the Department of the Interior's Bureau of Reclamation and the U.S. Army Corps of Engineers. A key practical difference between these *projects* and EPA and USDA *programs* is that with individual project authorizations, there is no predictable assistance, or assurance of funding once a project is authorized. (See CRS Report RL30478 for more discussion.)

[10] Water Infrastructure Network, *Clean & Safe Water for the 21st Century, A Renewed National Commitment to Water and Wastewater Infrastructure*, April 2000. (Published estimates used in this CRS report were adjusted by CRS to 2001 dollars.)

[11] Water Infrastructure Network, *Recommendations for Clean and Safe Water in the 21st Century*, February 2001. (Hereafter cited as WIN Recommendations)

EPA Needs Surveys. EPA's contribution to the debate over needs is primarily its wastewater and drinking water needs surveys. The Safe Drinking Water Act requires EPA to assess the capital improvement needs of eligible public water systems every four years thereafter. Concurrently, and in consultation with the Indian Health Service and Indian tribes, EPA must assess needs for drinking water treatment facilities to serve Indian tribes. Similarly, the Clean Water Act requires EPA, in cooperation with states, to report biennially to Congress on the cost of construction of all needed publicly owned wastewater treatment works in the United States (in reality, the clean water needs survey is done every four years).

The most recent drinking water needs survey, conducted in 2003 and issued in June 2005, covers the period from 2003 through 2023. As noted above, the survey indicates that systems need to invest $276.8 billion in drinking water infrastructure improvements over 20 years to comply with drinking water regulations and to ensure the provision of safe water. This amount exceeds the 2001 needs survey estimate of $165.5 billion (in 2003 dollars) by more than 60%. The 2003 survey includes funds needed for compliance with several recent regulations (including the revised arsenic and radium rules) and pending rules for radon and other contaminants. It also identified $1 billion in security-related needs. Also, water systems made efforts to improve reporting of needs for infrastructure rehabilitation and replacement, which EPA determined had been under-reported in the previous surveys.

Of the total national need of $276.8 billion, $160.5 billion (60%) is currently needed to ensure the provision of safe drinking water. EPA notes that a "current need" typically involves installing, upgrading, or replacing infrastructure to allow a system to continue to deliver safe drinking water and that systems with current needs are usually not in violation of a drinking water standard. EPA reports that, although all of the infrastructure projects in the needs assessment promote the health objectives of the act, $45.1 billion (16%) of the total is attributable to SDWA regulations, while $237 billion (84%) represents nonregulatory costs (e.g., routine replacement of basic infrastructure).[12]

The most recent wastewater survey, conducted in 2000 and issued in 2003, estimates that $185.5 billion is needed over the next 20 years for projects and activities eligible for Clean Water Act assistance, consisting of $171.4 billion for wastewater treatment projects and $14.1 billion for other eligible water quality projects (principally nonpoint source pollution control projects).[13] The total is 21% larger than needs reported in the previous survey, four years earlier. The change reflects, in part, improvements needed to meet increasingly stringent water quality standards, urban wet weather correction projects, and upkeep of existing infrastructure. Needs for small communities (under 10,000 population) represented about 9% of the total.

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[12] U.S. Environmental Protection Agency, *Drinking Water Infrastructure Needs Survey and Assessment: Third Report to Congress*, June 2005.

[13] U.S. Environmental Protection Agency, *Clean Watersheds Needs Survey 2000 Report to Congress*, August 2003, EPA 832-03-001, 1 vol. (Estimates in this report were adjusted by CRS to 2001 dollars for purposes of comparison.)

The clean water needs survey does not separately identify needs for Alaskan Native villages, and only a few states report needs for Indian tribes. More comprehensive estimates are made by the Indian Health Service (IHS) of the U.S. Department of Health and Human Services, which operates a Sanitation Facilities Construction program pursuant to the Indian Sanitation Facilities Act (P.L. 86-121). IHS estimated that, as of the end of FY2005, more than140,000 American Indian and Alaska Native (AI/AN) homes needed sanitation facilities, including over 36,000 homes that needed potable water. The total needing safe water improvements is about 12% of all AI/AN homes, compared with about 1% of all U.S. homes, according to IHS. The backlog of documented Indian sanitation facility projects as of the end of FY2005 totaled more than $2 billion, with those projects considered by the IHS to be economically and managerially feasible totaling $990 million.[14]

Expressed as average annual costs, the EPA needs surveys estimate $13.8 billion for drinking water systems and $9.3 billion for wastewater systems. EPA acknowledges that needs estimates generally have been conservatively biased. First, all reported needs in both surveys must be documented with project-specific information. Second, needs that are ineligible for SRF funding are not reflected; thus, in the drinking water survey, needs for fire flow, dams, and untreated reservoirs are omitted. Neither EPA survey explicitly accounts for infrastructure needs due to population increases, since growth-related projects are not eligible for EPA funding. Finally, neither survey accounts for financing costs associated with utility borrowing to pay for capital investment. Despite various challenges and limitations, needs estimates have improved with experience. For the most recent drinking water needs survey, for example, EPA reported that state and water system efforts to correct past problems with significant under-reporting of needs appear to have been successful.[15]

CBO's Report on Future Investment. A 2002 report by the Congressional Budget Office (CBO) also contributes to the discussion about investment needs.[16] In that report, CBO presented two scenarios of future needs for capital investment and O&M costs, a low-cost case and a high-cost case. The two scenarios span the most likely possibilities that could occur, according to CBO, and present a range of estimates for each, reflecting the limited information available about existing water infrastructure. For example, CBO said, there is no accessible inventory of the age and condition of pipes (which account for the majority of both drinking water and wastewater systems' assets). As such, a shortage of data compounds the general analytic problem of making 20-year estimates of what would happen under current and currently anticipated trends.

CBO estimated that for the years 2000 to 2019, annual costs for investment will range between $11.6 billion and $20.1 billion for drinking water systems, and

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[14] U.S. Department of Health and Human Services, Indian Health Service, "FY2007 Budget Requests, Justification of Estimates for Appropriations Committees; Sanitation Facilities Construction," February 2006, p. IHF-11.

[15] U.S. Environmental Protection Agency, *Drinking Water Infrastructure Needs Survey and Assessment: Third Report to Congress*, June 2005, p. 5.

[16] U.S. Congressional Budget Office, *Future Investment in Drinking Water and Wastewater Infrastructure*, November 2002, 58 p. (Hereafter cited as CBO 2002.)

between $13.0 billion and $20.9 billion for wastewater systems, or between $24.6 billion and $41.0 billion for water and wastewater combined (in 2001 dollars). Additionally, CBO estimated that annual costs over the period for O&M, which are not eligible for federal aid, will range between $25.7 billion and $31.8 billion for drinking water and $20.3 billion to $25.2 billion for wastewater systems, or between $46.0 and $57.0 billion for water and wastewater combined.

The principal differences in costs under CBO's two scenarios reflect different assumptions about several factors: (1) the rate at which drinking water pipes will be replaced, (2) savings that may be associated with improved efficiency (e.g., demand management to reduce peak usage, consolidation of systems to achieve economies of scale, labor productivity), (3) the costs to wastewater utilities for controlling combined sewer overflows, and (4) the repayment period on borrowed funds.[17]

CBO estimated that, for both types of systems, the difference between current capital spending (approximately $22 billion by all levels of government in 1999) and future costs — what some call an investment funding gap — would be $3.0 billion annually in the low-cost scenario and $19.4 billion in the high-cost case. Together, the future costs under the low-cost scenario (which CBO believes is reasonable, given the uncertainty about the condition of existing infrastructure, prospects for improved efficiency, and assumptions about borrowing) represent growth of 14% from 1999 levels, while under the high-cost case, the estimated increases represent growth of about 90%.

CBO also examined estimates in WIN's 2000 report, because of the public attention that it has received. CBO's analysis shows approximately an $18.6 billion difference between current spending and WIN's estimate of future annual costs, and is thus close to CBO's high-cost case. Investing at either the level in WIN's report or the CBO high-cost scenario would require nearly a doubling of current annual spending levels. WIN's single point estimate of annual investment needs for drinking water and wastewater ($40 billion) is similar to CBO's high-cost case estimate. In contrast, CBO's low-cost case estimate is $15.7 billion less than that in the WIN report (see **Table 2**), because of differences in assumptions concerning the timeline for replacing drinking water pipes, savings from efficiency, and borrowing terms.

Overall, in examining the 2000 WIN report, CBO was critical of a number of analytic aspects. In particular, while WIN includes financing costs in its analysis, WIN's estimates of total capital investment needs do not reflect "costs as financed." Costs as financed conveys the full costs of investments made out of funds on hand during the period analyzed and the debt service (principal and interest) paid in those years on new and prior investments that were financed through borrowing. Costs as financed are a kind of moving average that smooths out year-to-year changes in investment volume. In contrast, WIN's 2000 report includes total debt service on new investments from 2000 to 2019, regardless of when those payments occur, rather than the debt service actually paid during the period (on both pre-2000 and new investments). The difference is important, according to CBO, because utilities' past

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[17] Ibid., pp. 18-22.

investments financed from 1980 to 1999 and still being paid off from 2000 to 2019 are smaller than the investments projected to be financed during the latter period. WIN's approach to estimating investment needs (capital plus financing) results in approximately a 20% over-estimate, according to CBO.[18]

EPA's Gap Analysis Report. In addition to the needs surveys, in 2002 EPA issued a study, called the Gap Analysis, assessing the difference between current spending and total funding needs for drinking water and wastewater infrastructure.[19] Using data from the needs surveys and updated information, the Gap Analysis estimated total needs for drinking water and clean water (capital investment plus financing costs, and operation and maintenance (O&M)) from 2000-2019, as well as the projected gap between current spending and needs. This report examined a range of estimates, based on two scenarios: a low-end estimate assuming a 3% annual real growth in revenues (an increase in user rates and equivalent increase in customer growth) and a high-end estimate assuming no growth in water utility systems' revenues.[20]

Using these two scenarios, the Gap Analysis estimates a 20-year investment gap between current spending levels and capital investment needs for wastewater and drinking water combined between $66 billion and $224 billion (in 2001 dollars). In addition, it estimates a 20-year gap in spending for O&M between $10 billion and $409 billion. Under EPA's analysis, the estimated average annual gap between current spending and investment needs is between $1.6 billion and $23.1 billion, and the average annual O&M gap is between $0.3 billion and $36.3 billion, depending on the scenario. Compared with estimates of baseline expenditures, EPA's projections imply an average annual increase in costs over the 20-year period that ranges from 2.8% to 85.8% for capital investment and O&M combined.

A January 2003 CBO report examined estimates in the 2002 CBO report and in EPA's Gap Analysis.[21] As shown in **Table 2**, the differences between EPA's and CBO's projections of total investment costs are not especially significant: both EPA's and CBO's high-end estimates ($46.5 billion and $41 billion, respectively) reflect a near doubling of baseline investment costs through 2019. WIN's 2000 estimate ($40 billion) has a similar implication. EPA's and CBO's low-end investment estimates ($25 and $24.6 billion, respectively) reflect less than a 15% increase in costs through 2019. Differences between EPA's and CBO's investment estimates are explained by differences in assumptions, such as the potential for efficiency savings and different time profiles for replacement of drinking water pipes.

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[18] Ibid., p. 19.

[19] U.S. Environmental Protection Agency, *The Clean Water and Drinking Water Infrastructure Gap Analysis*, September 2002, EPA 816-R-02-020, 50 p.

[20] For each scenario in the Gap Analysis, EPA presents a range of estimates and a point estimate within each range. For simplification, CRS refers to these point estimates, but readers should consult the EPA report for full discussion.

[21] U.S. Congressional Budget Agency, *Future Spending on Water Infrastructure: A Comparison of Estimates from the Congressional Budget Office and the Environmental Protection Agency*, letter report, January 2003, 14 p.

For most factors, CBO believes that a strong case cannot be made for the choice of one agency's estimates over the other, so long as the differences are recognized.

Greater differences are apparent between CBO's and EPA's high-end scenario estimates for O&M ($57 billion and $82 billion, respectively). According to CBO, that difference stems from EPA's adopting the unrealistic assumption that drinking water infrastructure is replaced in large quantities early in the 20-year period, rather than being replaced more evenly throughout the span, with high O&M costs throughout the period as a by-product of the early increase in capital stock. In WIN's report, O&M annual cost estimates are closer to CBO's high-end scenario than to EPA's.

Table 2 summarizes estimates from the 2000 WIN report, the 2002 CBO report, and EPA's Gap Analysis on average annual costs for water infrastructure (wastewater and drinking water combined) and the potential average annual increase above current spending levels that would be required to achieve such expenditures.

Table 2. Estimated Costs for Water Infrastructure
(billions of dollars)

	WIN	CBO 2002		EPA gap analysis	
		Low-end	High-end	Low-end	High-end
Average annual cost 2000-2019					
— Investment	40.3[a]	24.6	41.0	25.0	46.5
— O&M	52.6	46.1	57.0	46.1	82.0
Average annual cost above baseline spending (gap) 2000-2019					
— Investment	18.6[a]	3.0	19.4	1.6	23.1
— O&M	11.8	7.1	18.1	0.3	36.3

a. The $40.3 billion and $18.3 billion in this table reflect CBO's re-estimate of investment needs in the WIN 2000 report. CBO re-estimated the WIN information to reflect investment costs as financed, in order to give comparability with CBO's and EPA's analyses.

Issues

While estimates of funding needs have become one focal point for discussion, some argue that trying to focus on precise needs estimates is not as important as recognizing the general need. For example, CBO's reports and EPA's Gap Analysis caution that projections of future costs associated with water infrastructure are highly uncertain and could lie outside of the ranges that they present. Different assumptions could increase or decrease the results. CBO explained this point in its 2003 report.[22]

> Because available data are limited, the agencies must use many assumptions to develop their projections, and the 20-year projection window provides ample opportunity for unforeseen developments to influence costs. Data limitations make it impossible for the agencies to know even baseline investment costs with certainty.

[22] Ibid., p. 1.

As is evident from their analyses of various investment scenarios, CBO and EPA believe that funding gaps are not inevitable, if other steps are taken. Both emphasize that funding gaps occur only if capital and O&M spending remains unchanged from present levels. Future spending and other measures that systems could adopt to reduce both types of costs, such as asset management processes,[23] could significantly alter estimates of future needs. How a gap would be filled raises a number of other issues. Whether water infrastructure needs over the next 20 years are $200 billion or $1 trillion, they are potentially very large, and the federal government is unlikely to provide 100% of the amount. Questions at issue include what is the precise problem to be solved; who will pay, and what is the federal role in that process; and how to deliver federal support.

Priorities: What Are the Problems to Be Solved?

Defining the scope of the water infrastructure problem is a key issue. As described previously, traditionally the CWA and SDWA have assisted projects needed to upgrade and improve wastewater and drinking water systems for compliance with federal standards. There still are significant needs for those core projects: for example, the 2003 clean water needs survey reports that more than one-half of the $171 billion in total treatment needs are for projects to correct overflows from municipal sewers, particularly sanitary sewer overflows (SSOs). (SSOs are releases of raw sewage from sanitary sewer collections systems before the wastewater reaches the treatment plant. These discharges are a major type of wet weather pollution.) The EPA estimates that of the $276.8 billion in drinking water needs, $45 billion (16%) is required for water systems to comply with regulations. However, these needs are expected to increase as the number of SDWA standards grows. Relatedly, $165 billion (60%) of total needs is for projects that water utilities consider a high priority for ensuring the continued delivery of safe drinking water.

Infrastructure Replacement. While not disregarding needs for compliance-related projects, stakeholders also are focusing on the problem of projects that have not traditionally been eligible under federal aid programs — major repair and replacement of existing systems. Currently, federal funds may be used for projects that involve minor system repairs (such as correcting leaky pipes that allow infiltration or inflow of groundwater into sewer lines) but may not be used for major rehabilitation, or extensive repair of existing sewers that are collapsing or are structurally unsound. In many cities, systems that currently meet standards and provide adequate service are, according to advocacy groups, reaching the end of their service-life and will require substantial investment in the near future. The American Water Works Association's 2001 report focused solely on the need to reinvest in aging drinking water infrastructure. It estimates that nationally over the next 30 years, $250 billion may be required to replace worn out facilities and systems.

The replacement problem is occurring not because of neglect or failure to do routine maintenance, AWWA and others say, but because water infrastructure facilities and pipes installed decades ago are now wearing out. Most pipes were

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[23] Asset management is a planning approach for conducting integrated assessments of future capital and operating needs to ensure that investments are made efficiently.

installed and paid for by past generations in response to population growth and economic development booms of the 1890s, World War I, 1920s, and post-World War II. The oldest cast iron pipes, dating from the late 1800s, have an average useful life of about 120 years, while pipes installed after World War II have an average life of 75 years. The useful life of pipe varies considerably, based on such factors as soil conditions, materials used, and character of the water flowing through it. Also, pipe deteriorates more rapidly later in the life cycle than initially. AWWA says, "Replacement of pipes installed from the late 1800s to the 1950s is now hard upon us, and replacement of pipes installed in the latter half of the 20th Century will dominate the remainder of the 21st century."[24] Treatment plant assets are more short-lived than pipes, with typical service lives of 15 to 50 years. Thus, many that were built in response to environmental standards in the 1970s and 1980s also will begin to be due for replacement in a few years.

This concern over infrastructure deterioration recalls an earlier period when infrastructure was a hotly debated topic. In the 1980s, there was much debate among policymakers about an infrastructure funding gap and the need for federal solutions to the perceived problem that America's public facilities were wearing out faster than they were being replaced. Some said that, because of declining public investment, America's infrastructure was in ruins. Analysts proposed strategies for planning, financing, and managing investments to address decay of the nation's public works infrastructure.[25] After a period of publicity and attention, debate about an "infrastructure crisis" waned. Congress did not enact legislation creating substantially new federal approaches to infrastructure but did reauthorize funding for several existing programs, including wastewater.

Today, analysts may differ over whether an infrastructure crisis did, in fact, exist then and whether local officials made choices sufficient to defer the issue for a later day. In the end, this earlier infrastructure debate resulted in little obvious action and without the breakdowns some had warned of. However, the current concerns may reflect a new situation: AWWA says that the replacement problem being debated today is not that utilities are faced with making up for a historical gap in the level of replacement funding. Rather, it is that utilities must ramp up budgets to prevent a replacement gap from developing in the near future, that is, to avoid getting behind.

Security. With the exception of the latest EPA drinking water needs survey, none of the investment needs reports discussed previously (WIN report, or those by CBO and EPA) accounts for increased security-related needs that utilities have begun to identify. In its 2002 report, CBO said:

> Because water systems are still developing estimates of the costs for increasing security in the wake of the September 11 attacks, the estimates do not include

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[24] AWWA Report, p. 11.

[25] See, for example, Pat Choate and Susan Walter, *America in Ruins*. Council of State Planning Agencies, 1981, 97 p., and Roger J. Vaughan and Robert Pollard, *Rebuilding America, Planning and Managing Public Works in the 1980s*,Council of State Planning Agencies,1984, Vol. 1, 182 p.

> those expenses — but preliminary reports suggest that security costs will be relatively small compared with the other costs for investment in infrastructure.[26]

One partial estimate for wastewater systems reported that, among large wastewater utilities, operators identified $135 million in security-related needs for the period 2002-2006, with approximately one-quarter of those reporting saying that their needs exceed $1 million.[27]

Although poorly quantified and potentially small relative to overall infrastructure needs, the costs of addressing security concerns for drinking water systems are expected to be significant. The Bioterrorism Preparedness Act of 2002 (P.L. 107-188) required all community water systems serving more than 3,300 persons to assess their vulnerabilities to terrorist attack or other intentional acts to disrupt the provision of safe and reliable drinking water supplies. Having done so, many of these systems now are taking, or planning to take, steps to improve the security of their facilities and to protect sources of drinking water. The AWWA has estimated that the roughly 8,400 community water systems covered by the Bioterrorism Act would have to spend more than $1.6 billion just to implement the most basic steps needed to improve security (such as better controlling access to facilities with fences, locks, perimeter lights, and alarms at critical locations). This estimate does not include the capital costs of upgrades to address vulnerabilities identified in vulnerability assessments, such as hardening pumping stations, chemical storage buildings, transmission mains, adding redundant infrastructure, or relocating pipelines of facilities. Efforts to estimate costs have been hampered by the fact that the security measures needed for utilities are very site-specific. However, the AWWA estimates that, nationwide, community water systems will need to invest billions of dollars to address identified vulnerabilities.[28]

The total security need estimated from the 2003 drinking water needs survey is $1 billion. According to EPA, the survey provides only a partial estimate of security needs, as it was done while water systems were expanding their security evaluation and planning efforts. Many water systems had completed vulnerability assessments and corrective action plans, but they frequently lacked cost estimates for making security improvements. EPA expects that such needs will be reported more thoroughly in future assessments.[29]

To cover the costs of making security improvements, some water utilities have imposed rate increases or reallocated existing resources. However, many others have been increasing rates to pay for projects needed to comply with new regulations, but

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[26] CBO 2002, p. x.

[27] Association of Metropolitan Sewerage Agencies, *The AMSA 2002 Financial Survey. 2003*, p. 79.

[28] Statement of Howard Neukrug on behalf of the American Water Works Association, in: U.S. House, Committee on Transportation and Infrastructure, Subcommittee on Water Resources and the Environment, *Aging Water Supply Infrastructure*, Hearing, 108th Congress, 2nd session, Apr. 28, 2004, (108-63), p. 61.

[29] U.S. Environmental Protection Agency, Drinking Water Infrastructure Needs Survey and Assessment: Third Report to Congress, June 2005, pp. 10-11.

had not contemplated the need for additional resources to address security concerns. Asserting that homeland security is primarily a federal responsibility, and that the needs are large, some individual communities and water associations have approached Congress in search of assistance.[30] In the Bioterrorism Preparedness Act, Congress authorized funding for FY2002 through FY2005 for EPA to provide financial assistance to drinking water systems for several purposes, including making basic security enhancements, but no funding was provided. EPA has identified numerous security improvements that are eligible for funding through the drinking water and clean water state revolving fund programs,[31] and infrastructure bills in the 108th and 109th Congresses specified that projects to improve security were eligible for assistance under the clean water and drinking water state revolving funds. However, these funds are used primarily to comply with Safe Drinking Water Act and Clean Water Act requirements, and it is uncertain how readily these funds might become available for security measures.[32]

Funding Other Priorities. Wastewater SRF funding is used for construction of publicly owned municipal wastewater treatment plants, implementing state nonpoint pollution management programs, and developing and implementing management plans under the National Estuary Program (CWA, Section 320).[33] Drinking water SRFs may provide assistance for expenditures that will facilitate compliance with national drinking water regulations or that will "significantly further the health protection objectives" of the Safe Drinking Water Act. There are many proposals for expanding the scope of activities eligible for SRF funding, in addition to meeting major replacement and security-related needs, raising numerous tradeoff questions for policymakers.

Past legislative proposals (such as S. 1400 in the 109th Congress, and S. 2550 and H.R. 1560 in the 108th Congress) would have added a number of new types of projects to those already eligible for SRF assistance: water conservation; water reuse, reclamation, or recycling; measures to increase facility security; and implementation of source water protection plans, for example. The rationale for using federal assistance is that investments in some of these approaches could reduce overall needs for capital investment. All, arguably, could benefit water quality protection and improvement, as do traditional infrastructure investments, and supporting them through the popular mechanism of SRFs would help ensure comparatively secure

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[30] Ibid.

[31] See U.S. Environmental Protection Agency, "Use of the Clean Water State Revolving Fund to Implement Security Measures at Publicly Owned Treatment Works" [http://www.epa.gov/owm/cwfinance/cwsrf/security.pdf] and "Use of the Drinking Water State Revolving Fund (DWSRF) to Implement Security Measures at Public Water Systems," EPA-816-F-02-040 [http://www.epa.gov/safewater/dwsrf/pdfs/security-fs.pdf].

[32] For more information on drinking water security issues and funding, see CRS Report RL31294, *Safeguarding the Nation's Drinking Water: EPA and Congressional Actions*, by Mary Tiemann. Also see CRS Report RL32189, *Terrorism and Security Issues Facing the Water Infrastructure Sector*, by Claudia Copeland.

[33] According to EPA, 37 clean water SRF programs have funded more than 6,100 nonpoint source pollution control projects, providing $2.1 billion in SRF funding since 1990. No estuary projects have been funded through the SRF.

funding. But expanding the scope of eligibility also arguably dilutes the current focus of these programs, at a time when traditional needs remain high. This tension already exists with the wide range of set-asides authorized under the drinking water SRF, where, in addition to funding infrastructure projects, states may reserve up to 31% of their federal capitalization grant for a range of other purposes. For example, states may use up to 10% of their grant to implement wellhead protection programs and another 10% to fund local source water protection initiatives. (See discussion below of set-asides, under "Delivering Federal Support.")

Many argue that greater investment in managing nonpoint sources of water pollution would especially benefit public health and water quality. According to state data compiled by EPA, polluted runoff is the major source of water quality problems in the United States. Water quality survey data indicate that 40% of surveyed U.S. waterbodies are impaired by pollution (meaning that waters fail to meet applicable standards) and that surface runoff from diffuse areas such as farm and ranch land, construction sites, and mining and timber operations is the chief cause of impairments, while municipal point sources contribute a much smaller percentage of water quality impairments to most waters.[34] The possible cost of practices and measures to address the nonpoint pollution problems has not been comprehensively documented. Nevertheless, it is conceivable that investments in nonpoint pollution abatement (e.g., grants for nonpoint pollution management projects under the Clean Water Act, technical and financial assistance to farmers through USDA, Safe Drinking Water Act grants to protect sources of drinking water) could have equal or greater environmental benefit than investments in water infrastructure. For example, New York City is funding an extensive watershed protection program, including areas far from the metropolitan area, in an effort to avoid the need to build a filtration plant that would cost the city several billion dollars.

Growing populations in many areas of the country are placing increasing demands on water supplies and wastewater treatment facilities. Yet, even without new growth, many people in existing small and rural communities do not have access to public sewers or water supply and, thus, are using alternative systems to help them comply with environmental laws and to solve public health problems. Local officials face a challenge of striking a balance between ensuring that water and wastewater services are affordable, but also providing sufficient revenue for system needs. To deliver these services, they often face challenges arising from economic, geographic, and technological impediments. Outside of EPA's and USDA's traditional programs, it appears that Congress is increasingly being asked to authorize direct financial and technical assistance for developing or treating water, including rural water supply projects to be built and largely funded by the Bureau of Reclamation of the Department of the Interior, water recycling projects built and partially funded by the Bureau, and pilot programs for water supply and wastewater treatment projects funded by the U.S. Army Corps of Engineers. To yet another group of stakeholders, these, too, reflect priority problems in need of legislative attention and federal solutions. Indeed, the 109th Congress passed legislation (S. 895, P.L. 109-451)

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[34] U.S. Environmental Protection Agency, Office of Water, *National Water Quality Inventory, 2000 Report*, August 2002, EPA 841-R-02-001, 207 p.

authorizing the Bureau of Reclamation to establish a program for design and construction of rural water supply projects in 13 Reclamation states in the West.

Policymakers face decisions about priorities and tradeoffs, since spending decisions often are essentially a zero-sum game: that is, what priority should be given to traditional infrastructure projects needed to comply with standards, versus the emerging problem of infrastructure replacement, versus nonpoint pollution management or other competing activities also having environmental benefits? Since not all can be supported, do some have greater priority than others? What should the federal government support? Should eligibility for SRF funding be expanded to include less traditional activities? Is there clearly a federal role for some or all activities, or is a larger federal role justified for some than for others?

The Federal Role

Many stakeholders are seeking substantially increased federal spending on water infrastructure for reasons described in this report. Among groups involved in water infrastructure (states, cities, equipment manufacturers, the construction industry), a long-standing issue is the gap between funding needs and available resources from federal, state, and local sources.

Data compiled by EPA demonstrate that federal capitalization grants are the largest, but not the only, source of monies in the SRFs. For example, cumulatively from 1996 through 2005, drinking water SRFs have had $11.3 billion in funds available for projects. Of the total, $6.6 billion was provided by capitalization grants, while the remainder — more than $5 billion — came from state match contributions, leveraged bonds, principal repayments, and interest earnings. Likewise, cumulatively from 1988 through 2006, clean water SRFs have had $53 billion in funds available. Slightly less than half ($24 billion) has come from federal capitalization grants, while the remainder similarly derived from state matching funds, leveraged bonds, principal repayments, and interest earnings. In addition, state assistance outside of the SRF programs is an important source of total funds available for water infrastructure. For example, from FY1991 through FY2000, states made about $13.5 billion available for drinking water and wastewater projects under state-sponsored grant and loan programs and by selling general obligation and revenue bonds.[35]

Local government officials estimate that, on average, ratepayers currently pay about 90% of the total cost to build their drinking water and wastewater systems (through direct local financing or loan repayments to SRFs); federal funds provide the remainder.[36] (Small rural systems depend more on government aid than do large systems.) According to the National League of Cities, these capital costs, plus operations and maintenance for which localities also are responsible, total about $60

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[35] U.S. Government Accountability Office, *Water Infrastructure: Information on Federal and State Financial Assistance,* November 2001, GAO-02-134, p. 18. (formerly the General Accounting Office)

[36] U.S. House, Committee on Transportation and Infrastructure, Subcommittee on Water Resources and Environment, *Meeting Clean Water and Drinking Water Infrastructure Needs,* Hearing, 105th Congress, 1st session, Apr. 23, 1997, (105-18). p. 307.

billion annually for drinking water and wastewater systems.[37] Cities also say that they have been raising water and sewer rates to accommodate increases in operating and maintenance costs, which have risen 6% above inflation annually.[38] Municipal officials contend that increased local fees and taxes alone cannot solve all funding problems. This is true, they say, both with respect to costs of meeting future needs (e.g., new treatment requirements) and costs of reinvesting in aging infrastructure. Water and wastewater officials acknowledge that they will continue to cover the majority of water infrastructure needs, but believe that doing so presents a significant challenge in keeping water affordable. This is especially true in small cities, rural areas, and cities with shrinking populations and/or local economies where a possible doubling or tripling of water and sewer rates to meet all needs could be required. If some such cities are unable to finance replacement or improvement of their water infrastructure, declining service levels, violations of water quality requirements, and threats to public health and the environment could occur, officials say.[39]

Assertions about financial impacts and affordability are at the heart of many stakeholders' efforts seeking greater federal support. The Water Infrastructure Network, for example, says that local sources alone cannot be expected to meet the challenge of large water and sewer needs, and that the benefits of federal help accrue to the nation as a whole, since water moves across political boundaries. Moreover, WIN argues that clean and safe water is no less a national priority than are national defense, an adequate system of interstate highways, or a safe and efficient aviation system. Highways and aviation currently "enjoy sustainable, long-term federal grant programs," supported by trust fund revenues, while water infrastructure does not.[40] In its 2001 report, WIN recommended a five-year, $57 billion authorization above current funding for loans, grants, loan subsidies and credit assistance to capitalize state-administered grant and loan programs which it believes would cover about one-half of the estimated five-year capital funding shortfall. WIN estimated that, even with that additional investment, average household water and sewer rates would increase over the next 20 years, but in WIN's projections, average rate increases would be 100%, compared with 123% without such a boost in federal support.[41]

Some analysts dispute the view that federal funding solutions are essential to meeting future investment needs. According to this view, funding problems are in many cases due to the failure of local communities to assign a high priority to water and wastewater services and result in failure to set local water rates and other user charges at levels that cover capital and operating expenditures. This is especially true

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[37] Statement of Bruce Tobey on behalf of the National League of Cities on Water and Wastewater Infrastructure Needs in: U.S. House,Committee on Transportation and Infrastructure, Subcommittee on Water Resources and the Environment, *Water Infrastructure Needs*, Hearing, 107th Congress, 1st session, Mar. 28, 2001 (107-8), p. 131.

[38] Ibid., p. 132.

[39] Water Infrastructure Network, "Commonly Asked Questions and Answers about the WIN Report *Water Infrastructure Now*," May 5, 2001, p. 5. (Hereafter cited as WIN Questions and Answers)

[40] WIN Recommendations, p. 3.

[41] WIN Questions and Answers, p. 3.

in the case of municipally or publicly owned utility systems which, unlike investor-owned systems, often do not support the full cost of service through rates. Publicly owned systems predominate in the wastewater industry (constituting more than 95%). In the drinking water industry, approximately 33% of public water systems are privately owned; however, most of these systems are small, serving roughly 15% of the U.S. population. The H_2O Coalition, another group in the water infrastructure debate, believes that it is not possible to state with any confidence what is unaffordable to customers and therefore what the magnitude of government support should be, because few utilities have done detailed long-term needs projections and analyzed ways of addressing these needs through rates.[42] "Rate shocks" which result from large rate increases can be managed to a degree, analysts say, by financing, ratemaking, and conservation strategies. They argue that if water services continue to be subsidized by federal funds, subsidies should not reward utilities' inefficiency, but should be used strategically and equitably.[43] Some advocate using needs-based subsidies to help low-income households by providing direct payment assistance or funding a lifeline rate.

CBO has repeatedly argued that federal spending programs to support water infrastructure (direct project grants and SRF capitalization grants, as well as credit subsidies in the form of loans, loan guarantees, and tax preferences) can have a number of unintended consequences. In a February 2005 report (one of a regular biennial series) on the budgetary implications of policy choices, one of the policy options that CBO presents is a phaseout of federal capitalization grants for SRFs over a three-year transition period. CBO cites several economic rationales for doing so. For example, grants may encourage inefficient decisions about water infrastructure by allowing states to lend money at below-market interest rates, in turn reducing incentives for local governments to find less costly ways to control water pollution and provide safe drinking water. Also, federal contributions may not result in increased total investment if they are merely replacing funding that state and local sources would otherwise have provided.[44]

In its 2001 report, WIN recommended initially doubling federal support for water infrastructure, and increasing it by 500% after five years. Others, including the H_2O Coalition, doubt that increased federal support of that magnitude is necessary or appropriate. Even if policymakers agree that there is a federal role, significant questions remain about defining that role and agreeing on priorities.

Delivering Federal Support

The question of how federal financial support is delivered to water infrastructure projects involves several issues, including the state-level mechanism for

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[42] "Comparison of Recommendations of the WIN and the H_2O Coalition," Feb. 16, 2001, see [http://www.nawc.org/issues/issues-h.html].

[43] Statement of Janice Beecher on behalf of the National Association of Water Companies, in: U.S. House, Committee on Transportation and Infrastructure, Subcommittee on Water Resources and the Environment, *Water Infrastructure Needs*, Hearing, 107th Congress, 1st session, Mar. 28, 2001 (107-8), p. 55.

[44] U.S. Congressional Budget Office, *Budget Options*, February 2005, p. 104.

administering funding, composition of aid (loans and grants), and assistance for private as well as public entities. Related issues are impacts of other federal requirements, use of set-asides, and how funds are allotted to states.

Administrative Entity. Financial aid provided through the clean water and drinking water SRFs is administered by state-level agencies designated in agreements signed by EPA and individual states. Many evolved from the agencies that previously administered the Clean Water Act construction grant program that preceded the SRF program. In many states, SRFs are managed by the state environmental agency or branches of that agency responsible for implementing the CWA and the SDWA. In other states, they are managed by separate financing authorities or offices. About 30 states currently administer the two SRF programs jointly; the remainder administer parallel SRF programs. State officials say that, where administration of the two is not joined, there are good reasons for maintaining the separation. Section 302 of the 1996 SDWA amendments included a provision allowing states to transfer a portion (up to 33%) of a capitalization grant between the two programs to give states funding flexibility. That original authority expired in FY2001, but Congress has continued to extend it through annual appropriations acts since FY2002. Since 1999, 13 states and Puerto Rico have used this provision to transfer funds between their clean water and drinking water SRF programs.

In its 2001 report, WIN recommended that the SRF concept be replaced with an alternative mechanism called State Water and Wastewater Infrastructure Financing Authorities which would work with state clean water and drinking water programs but would handle the infrastructure banking aspects for both. WIN says that this would be highly efficient, enabling a single state agency to determine priorities and appropriate financial assistance instruments. Most state officials now involved with the two SRF programs object to this proposal, believing that it would de-construct what exists and is working well now. It would also substitute a new organizational entity for that which individual states have determined works best for them, including the 20 states that prefer separate SRF programs. Also, by giving decisionmaking authority to a new entity, the WIN concept would shift authority from existing state agencies. WIN supporters believe that differences between their proposal and the views of state program officials are not vast, but many state officials disagree.

The Type of Assistance Provided: Grants and Loans. One issue that divides the stakeholder groups is whether to provide assistance through grants, as well as loans, with cities and the WIN group favoring a significant place for grants, and most states and the H_2O Coalition favoring loans in preference to grants.

Both SRF programs authorize states to make loans at or below market interest rates, including zero interest loans. However, for several years, both small and large cities have urged Congress to explicitly authorize water infrastructure grants, in addition to loans, to provide flexible assistance best suited for particular community and state needs. Thus, the drinking water SRF, enacted nine years after the clean water SRF program, allows up to 30% of capitalization grants to be used to provide loan subsidies to disadvantaged communities. Grants that do not require repayment obviously are preferred by communities. For example, some small communities that lack an industrial tax base or means to benefit from economies of scale find it difficult to repay a loan for 100% of the cost of water infrastructure projects. Some

larger cities also seek grants, on the basis that water infrastructure is just one of numerous costly capital needs that they must meet, and a partial subsidy in the form of a grant would help make those costs more affordable for ratepayers.

Small and disadvantaged communities' financing problems also have been addressed by permitting a longer loan repayment period. By spreading out repayment, communities can reduce the amounts due on an annual basis, thus lessening the amount of rate increases needed to finance the repayment (although total financing costs over the life of the loan may be higher). Under both SRF programs, annual principal and interest repayments begin one year after project completion and are to be fully amortized 20 years after project completion. Under the drinking water SRF, however, states may allow economically disadvantaged communities up to 30 years to repay loans. The Clean Water Act does not currently permit 30-year repayments, but House Appropriations Committee report language accompanying EPA's FY1998 appropriations bill (P.L. 105-175) encouraged EPA to allow states to issue bonds allowing for clean water SRFs with repayment terms of greater than 20 years. Consequently, EPA has allowed a few states (e.g., Massachusetts, West Virginia, Maryland) to issue 30-year clean water SRF loans.

Many state officials are reluctant to use a portion of the SRF to award grants, principally because, to the extent that part of the SRF is used for making grants, the corpus of the loan fund and its ability to be a self-sustained long-term source of funding are diminished. States acknowledge that a loan "buy down," in the form of granting forgiveness of a portion of the SRF loan principal, can be a useful option for dealing with disadvantaged communities. However, many states prefer to limit the use of grants as much as possible and would oppose being obliged to make grants. State water quality officials who previously administered the Clean Water Act's construction grant program and others (including CBO) believe that grants can undermine efficient investments by leading to substitution of federal funds for state and local funds, rather than augmenting state and local investment, and distort decisions about preventive maintenance, treatment technology, and excess capacity. According to EPA, states are being conservative in using the principal forgiveness authority under the drinking water SRF: since 1996, only 16 states have done so, and assistance provided with principal forgiveness has totaled less than 3% of all drinking water SRF assistance since that time.

Members of the H_2O Coalition favor limited and targeted federal assistance, so that utilities are encouraged to attain and maintain business-like operations. If federal assistance is provided, the Coalition, like many state officials, advocates that it should be primarily in the form of low-interest or zero-interest loans. The Coalition supports assistance for low-income families to supplement their water and sewer bills, where necessary, either paid to the low-income families or directly to the utility. Some loan forgiveness (as under the drinking water SRF) or grants (with at least 50% local cost share) are options that the Coalition supports in rare cases, and only so long as assistance produces long-term solutions and ensures that federal monies are used cost-effectively. Except in cases where virtually all of a utility's customers are impoverished, assistance for low-income households should be favored over grants, this group says. According to the Coalition, grants or loans with substantial

forgiveness subsidize all customers' rates, even those that are able to afford the full cost of service, and therefore are not an efficient use of scarce federal assistance.[45]

Federal Funds for Private Infrastructure Systems. Currently under the drinking water SRF program, eligible loan recipients include community water systems, both publicly and privately owned, and not-for-profit noncommunity water systems (e.g., schools with their own water supply). Eligible loan recipients for wastewater SRFs are any municipality, intermunicipal, interstate or state agency, but not privately owned utilities. A number of stakeholders advocate that SRF funds be made available to privately owned wastewater systems, as well. This would "level the playing field" between the two programs, it is argued, and also would encourage public-private partnerships and privatization.

Another issue involving the private sector concerns the Internal Revenue Code. Under federal tax law, certain activities financed by the issuance of state and local bonds have a special status because the interest earned is exempt from federal income taxation. Tax-exempt financing enables state and local governments to borrow at a lower interest rate than either private business or the federal government must pay on taxable debt. In general, tax-exempt status applies to activities broadly defined as having public purpose. Some specific activities considered to have both public and private purposes are eligible for tax-exempt financing. However, these public/private activities are subject to a cap that limits the volume of private activity bonds (PABs) state and local governments may issue annually. PABs for water infrastructure are subject to the volume cap, and tax-exempt financing can be done if the project is able to secure an allocation from the volume cap.

Because private water bonds compete under this cap with other private bond uses such as housing, industrial development, and student loans, some groups favor legislation that would exempt all PABs for water and sewage facilities from the volume cap. A bill to authorize such a change (H.R. 1708) was introduced in the 109th Congress, but was not enacted. Similar legislation has been introduced in the past (e.g., H.R. 3042 in the 108th Congress). Current law provides such an exemption for government-owned and operated solid waste disposal facilities. Opponents argue that restrictions on tax-exempt financing should be maintained, because of the costs to the federal government, in terms of income tax revenues foregone. Similarly, some opponents say that the bonds represent an inefficient allocation of capital, favoring some projects over others, and increase the cost of financing traditional governmental activities. In the 109th Congress, S. 157 and H.R. 2378 were introduced to permit interest on federally guaranteed USDA water, wastewater, and essential community facilities loans to be tax exempt. No further action occurred on either bill. (For more information, see CRS Report RL31457, *Private Activity Bonds: An Introduction*, by Steven Maguire.) The President's FY2008 budget request, presented in March 2007, included a proposal to exempt PABs used to finance drinking water and wastewater infrastructure from the PAB unified state volume cap, in order to provide states and communities greater access to PABs to help finance water infrastructure needs.

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[45] H_2O Coalition, "What is the Water Infrastructure Problem and What are the Solutions?" Issue Paper, Feb. 26, 2001, pp. 7-11.

Other Federal Tax Issues. A second federal tax issue related to the Internal Revenue Code concerns arbitrage. If proceeds of tax-exempt bonds issued by state and local governments in connection with SRF programs are invested in securities that pay a higher yield than the yield on the bonds, the earnings are termed arbitrage profits. Unchecked, state and local governments could substitute arbitrage earnings for a substantial portion of their own citizens' tax effort. Thus, Congress has decided that such arbitrage should be limited, and that tax-exempt bond proceeds must be used quickly to pay contractors for the construction of the capital facilities for which the bonds were issued. Federal tax law requires that bond proceeds be spent out during a specified period; if not, the arbitrage earnings must be rebated to the U.S. Treasury. (For information, see CRS Report RL30638, *Tax-Exempt Bonds: A Description of State and Local Government Debt*, by Steven Maguire.)

The Internal Revenue Service (IRS) places arbitrage restrictions on SRF reserves. In the case of the SRFs, this issue can arise when governments use SRF monies to borrow funds at tax-exempt rates in order to issue municipal bonds and then invest the funds received from the issues in higher earning taxable securities. The process of using federal capitalization grants and state matching funds as collateral to borrow in the public bond market so as to increase the pool of available funds for project lending is termed *leveraging*. It is used by more than one-half of states, according to EPA. EPA's Environmental Finance Advisory Board has expressed concern that the interpretation of the IRS arbitrage limitations reduces the amount of funds potentially available for infrastructure projects because it requires the yield on invested reserves to be no greater than the bond maturity rate, and it has urged EPA to support amending the Internal Revenue Code to provide that monies contributed to SRFs be freed from arbitrage earnings restrictions.[46]

Many states urge that amounts used as reserves to secure bonds for SRF projects be exempted from the arbitrage rebate rules so that any interest earnings could be used for additional investment in water infrastructure projects. The Council of Infrastructure Financing Authorities, which represents most of the SRF organizations, has estimated that if arbitrage restrictions were lifted, SRFs could earn an additional $100 to $200 million annually on their funds. If these earnings were used as reserves to secure additional bonds, they could provide an additional $200 to $400 million annual investment in infrastructure projects. However, others respond that without the existing arbitrage rule, state and local governments could issue tax-exempt bonds solely for the purpose of gaining arbitrage profits, at the expense of greater revenue losses to the federal government and ultimately higher interest rates on bonds whose proceeds actually are used for the acquisition or construction of capital facilities.[47]

The 109th Congress considered this issue. In P.L. 109-115 (providing FY2006 appropriations for the Treasury Department), Congress directed the Secretary of the Treasury to submit a report to the House and Senate Committees on Appropriations

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[46] U.S. Environmental Protection Agency, Environmental Finance Advisory Board, "Arbitrage Relief Would Increase Funds Available to Meet Critical Water and Sewer Funding Needs," May 7, 2006, 3 p.

[47] U.S. Environmental Protection Agency, *The Drinking Water State Revolving Fund Program, Report to Congress*, EPA 918-R-03-009, May 2003, p. 95.

providing a legal basis for applying arbitrage bond regulations to the reserve funds held by the clean water and drinking water SRFs, which generally contain replacement proceeds (from loan repayments) but not bond proceeds.[48]

Federal Cross-Cutting Requirements. Under both SRF programs, a number of federal authorities, executive orders, and government-wide policies apply to projects and activities receiving federal financial assistance, independent of program-specific statutory requirements, and many stakeholders favor repealing their applicability to water infrastructure projects. These include environmental laws (e.g., Clean Air Act, Endangered Species Act), social legislation (e.g., Age Discrimination Act, Civil Rights Act), and economic and miscellaneous laws (Davis-Bacon Act, Uniform Relocation and Real Property Acquisition Policy Act of 1970, and procurement prohibitions under environmental laws and Executive Order 11738). These federal cross-cutting requirements apply only to projects funded directly by the federal capitalization grants, but not to SRF activity made from loan repayments, interest earned, or other state monies contained in the SRF.

In addition, the clean water SRF attaches 16 specific statutory requirements to activities funded directly by federal capitalization grants that are carryover ("equivalency") requirements from the prior construction grant program (e.g., specific project evaluation requirements).

Under both SRF programs, projects financed with funds directly made available by federal capitalization grants are subject to Environmental Impact Statement requirements of the National Environmental Policy Act. Projects funded by other monies in the SRF also must undergo an environmental review; however, a state may select its own method for conducting environmental reviews, if approved by EPA.

Many stakeholders believe that these other federal cross-cutting requirements are burdensome and costly and, in many cases, only ancillary to benefits of water infrastructure projects. One particularly contentious issue is compliance with the Davis-Bacon Act which requires, among other things, that not less than the locally prevailing wage be paid to workers employed, under contract, on federal construction work "to which the United States or the District of Columbia is a party." Critics of Davis-Bacon say that it unnecessarily increases public construction costs and hampers competition (with respect to small and minority-owned businesses). Supporters say that the law helps stabilize the local construction industry by preventing competition from firms that could undercut local wages, and perhaps working conditions, and thus compete unfairly with local contractors. Congress has added Davis-Bacon prevailing wage provisions to more than 50 separate program statutes, including the Clean Water Act and generally to the Safe Drinking Water Act. However, the applicability of Davis-Bacon to the clean water SRF expired in FY1994, when the authorizations in P.L. 100-4 expired. Further, since the drinking water SRF program was established in 1996, EPA has interpreted the SDWA to not require applicability of the Davis-Bacon Act to all construction projects supported

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[48] Conference Report to accompany H.R. 3058, Making Appropriations for the Departments of Transportation, Treasury, and Housing and Urban Development, the Judiciary, District of Columbia, and Independent Agencies for the Fiscal Year Ending September 30, 2006, H.Rept. 109-307, November 18, 2005, p. 207.

by SRFs. (For information, see CRS Report RL31491, *Davis-Bacon Act Coverage and the State Revolving Fund Program Under the Clean Water Act*, by Edward Rappaport.) Inclusion of its requirements in the CWA and SDWA SRF programs has been controversial, and that controversy was a prominent reason that no water infrastructure financing legislation was enacted in the 107th, 108th, or 109th Congresses.

Set-Asides. The utility of set-asides that allow for using a portion of SRF capitalization grants for program purposes other than directly constructing infrastructure is likely to be debated. Under the clean water SRF, a state must reserve the greater of 1% of its capitalization grant or $100,000 each year to carry out specified planning requirements under the CWA. Under the drinking water SRF, a state may use up to 31% of its capitalization grant for specified SDWA programs including supervision of public water systems, operator certification, compliance capacity development, and state and local source water protection initiatives (some uses require a 50% state match).

Reserving a large amount of funds, even for related implementation activities, necessarily limits the funds available to the state for assisting infrastructure projects. Also, several of the set-aside activities have their own funding authority; thus, a concern for states is that Congress may rely on the SRF to fund other SDWA requirements instead of providing the authorized appropriations, and the overall funding for drinking water activities may be diminished. Drinking water program officials acknowledge this problem, but many believe that set-asides are a useful means of ensuring that monies will be available for activities that might otherwise not have a secure source of funds. Because states have some flexibility, in fact, few are using the full amount that could be reserved under the set-asides. According to EPA, only a few states have used the full 31% that the law allows, and the average amount reserved by all states since 1996 is 16%.

Many state clean water program officials have a different view of mandatory set-asides, based on experience administering the previous construction grant program which for a time required states to reserve a portion of federal funds for specified types of projects. Because of problems in spending those set-aside funds (e.g., finding beneficial projects on which to spend all the required reserved funds) and extensive oversight by EPA, many of them now oppose the reservation of core funds (especially mandatory set-asides), except for covering SRF administrative costs.

A separate issue relates to set-asides for administration. Under both the CWA and SDWA programs, states may reserve up to 4% of their federal capitalization grants annually for the reasonable costs of administering the SRF. As the SRFs have developed and loan portfolios have grown, many states argue that an amount equal to 4% of the allotment is insufficient for administering the program. This problem is exacerbated by the fact that congressional appropriations of capitalization grants generally have remained steady (and for the clean water SRF, actually have been reduced nearly 50% since FY2004). Many states impose fees on borrowers, which has the effect of increasing costs for the borrower. Thus, an issue of concern to many is increasing the amount that states are allowed to reserve for administrative purposes.

Allotment of Funds and Congressionally Directed Project Grants. Another issue of interest is how federal funds are allocated among the states. Capitalization grants for clean water SRFs are allotted according to a state-by-state formula in the Clean Water Act. It is a complex formulation consisting basically of two elements, state population and capital needs for wastewater projects. Because the allocation formula has not been revised since 1987, yet needs and population have changed, the issue of state-by-state distribution of federal funds is likely to be an important topic when legislation is considered. In contrast, capitalization grants for drinking water SRFs are allotted by EPA based on the proportional share of each state's needs identified in the most recent national drinking water needs survey, not according to a statutory allotment formula. (For information, see CRS Report RL31073, *Allocation of Wastewater Treatment Assistance: Formula and Other Changes*, by Claudia Copeland.) Among the questions likely to be discussed are, should a single formula apply to both programs? Should allocation follow from a statutory or administrative formula? Do EPA's needs surveys provide an accurate basis for state-by-state distribution? If programs are expanded to include eligibility for new activities, such as pollution prevention and watershed protection, how should they be reflected in state-by-state allocations? Crafting an allotment formula has been one of the most controversial issues debated during past reauthorizations of the Clean Water Act. The dollars involved are significant, and considerations of "winner" and "loser" states bear heavily on discussions of alternative formulations.

A related issue is whether a portion of federal water infrastructure funds will continue to be allocated in the form of congressionally directed appropriations for specified communities' projects, which have become increasingly prominent and are often referred to as earmarks. In recent years, congressional appropriators have dedicated a significant portion of annual water infrastructure assistance as grants for specific communities, both small and large. The federal share of costs under these grants is 55%. For example, for FY2006 (P.L. 109-54), Congress appropriated $887 million for clean water SRF capitalization grants, $838 million for drinking water SRF grants, and $281 million in earmarked grants for 259 listed projects. Appropriations directed by Congress for identified projects enable legislators to assist communities otherwise unable to fully qualify for state-administered programs, or those seeking a grant rather than a loan that must be repaid. State officials that administer the SRF programs oppose these types of grants because such congressional actions deny states the ability to determine priority for project funding. (For information, see CRS Report RL32201, *Water Infrastructure Projects Designated in EPA Appropriations: Trends and Policy Implications*, by Claudia Copeland.)

Research on New Technologies

The basic technologies used by communities to meet wastewater and drinking water needs have changed little for several decades, in part because utility officials often favor using conventional, familiar systems and technologies. This is particularly the case in the wastewater sector where regulatory requirements have been relatively static for years. Although this has long been true in the drinking water sector as well, the situation is changing as new regulations are requiring many public water systems to apply new technologies.

EPA's revised drinking water standard for arsenic has drawn particular attention to the need for research on treatment technologies that are affordable and suitable for small water systems. In the conference report for the Consolidated Appropriations Act for FY2005 (P.L. 108-447), Congress expressed concern that many small communities, especially rural communities in the West, will not be able to afford to comply with the arsenic rule and that it could pose a large financial hardship on these communities.[49] Congress has provided funding specifically for research on cost-effective arsenic removal technologies for small systems.

However, overall federal support for research and development (R&D) of new drinking water and wastewater technologies is limited. While much of EPA's drinking water research is focused on health effects studies, the identification of feasible treatment technologies is a central component of EPA's drinking water standard setting process, and technology research has received support. However, EPA's water research budget often has fallen short of its regulatory needs, and consequently, competition for available funding has been considerable.[50]

According to the Water Infrastructure Network, technology R&D is supported at the federal level mainly by programs of EPA's Office of Research and Development and EPA's Environmental Technology Verification (ETV) Program. Also, Congress has directed that EPA provide appropriated funds to nonprofit research foundations including the Water Environment Research Foundation ($3 million in FY2006 and $3.9 million in FY2005) and the American Water Works Association Research Foundation ($1 million in FY2006 and $4.9 million in FY2005). The ETV Program began in 1995 to verify the performance of innovative technology developed by the private sector and to accelerate the entrance of new technologies in all media. In the water and drinking water areas, technologies have been verified for a number of packaged drinking water systems especially needed for small community water supplies. Pilots also are underway to evaluate source water protection technologies and urban wet weather flow control technologies. In its 2001 report, WIN recommended that Congress authorize $250 million annually for a new Institute of Technology and Management Excellence to support the development and use of innovative technologies that would reduce the cost of meeting drinking water and clean water requirements and replacing water infrastructure.[51]

The CBO also has noted that one option to increase federal support for water infrastructure would be increased federal spending on R&D that could reduce water systems' costs and improve efficiency, such as technical R&D into new pipe materials, construction and maintenance methods, and treatment technologies. Economic principles suggest that federal involvement may be appropriate to increase cost-effectiveness when other entities, such as private firms and state governments that may fund R&D for water systems, do not have adequate incentive to consider the spillover benefits that would accrue from a national perspective as a result of research

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[49] H.Rept. 108-972, to accompany H.R. 4818, p. 1567.

[50] See, for example, the GAO report, *Drinking Water Research: Better Planning Needed to Link Needs and Resources*, GAO/RCED-99-273, September 1999, 30 p.

[51] Water Infrastructure Network, *Recommendations for Clean and Safe Water in the 21st Century*, pp. 11-12.

investments. Increased federal support of technical R&D could take the form of additional research projects managed by EPA, larger federal grants to private organizations, or both.[52]

In the past, Congress has attempted to advance new and innovative technologies in other ways, in addition to R&D activities. Beginning with the 1977 amendments to the Clean Water Act, Congress authorized specific incentives for such technologies, in particular by increasing the federal share under the construction grant program for innovative and alternative technology projects that reuse or recycle wastewater and sludge, reduce costs, or save energy consumption. The act also provided for 100% modification or replacement of innovative or alternative systems in the event of technological failure or significantly increased operating costs, as a safety measure to reduce the potential uncertainty of using risky or unproven wastewater treatment technologies.

The federal funding bonus and the potential for full replacement if a wastewater system failed were seen by states and cities as significant incentives for using technologies other than conventional treatment systems. However, these incentives were funded as set-asides from construction grants. These set-asides were not universally popular among state officials at the time, and they were not extended when the clean water SRF program was created. In 1989, EPA estimated that, compared with conventional treatment processes, for every dollar invested in designing and constructing an innovative project, 40 cents was saved over the life of the facility. Many now believe, however, that under the clean water SRF program, without the incentive of bonus funds or 100% replacement grants, few communities are constructing projects that utilize unproven or unfamiliar technology.

The Safe Drinking Water Act has no such incentives, but regulatory pressures and population growth are forcing both water and wastewater utilities to assess the potential of alternative treatment technologies. In this regard, issues for congressional consideration could include possible financial incentives or regulatory incentives (such as allowing some additional compliance flexibility) for use of innovative technology, as well as increased federal support for technology R&D.

Congressional and Administration Activity, 107th to 109th Congresses

Momentum in Congress to consider the issues discussed in this report has grown since the 107th Congress, partly in response to urgings of stakeholder groups. House and Senate committees held oversight hearings on water infrastructure financing issues during the first session of the 107th Congress, and in the second session, the House Transportation and Infrastructure Committee approved H.R. 3930, a bill authorizing $20 billion in clean water SRF assistance for five years. No committee report was filed. The Senate Environment and Public Works Committee reported legislation authorizing $35 billion in funding over five years for both the clean water and drinking water SRF programs (S. 1961, S.Rept. 107-228). No further action occurred on either bill, in large part due to controversies over provisions in both bills

[52] CBO 2002, pp. 33-34.

to apply requirements of the Davis-Bacon Act to SRF-funded water infrastructure projects (discussed above) and also over CWA grant allocation formulas in the two measures.

Attention to these issues resumed in the 108th Congress. First, in July 2003, the House Transportation and Infrastructure Subcommittee on Water Resources and Environment approved H.R. 1560, legislation similar to H.R. 3930, the bill approved by that committee in 2002. H.R. 1560 would have authorized $20 billion for the clean water SRF program for FY2004-FY2008. It included several provisions intended to benefit economically disadvantaged and small communities, such as allowing extended loan repayments (30 years, rather than 20) and additional subsidies, including principal forgiveness and negative interest loans, for communities that meet a state's affordability criteria. It also included provisions to require communities to plan for capital replacement needs and to develop and implement an asset management plan for the repair and maintenance of infrastructure that is being financed. The Water Resources and Environment Subcommittee continued to examine infrastructure issues and, in April 2004, held a hearing on aging water supply infrastructure.[53]

In October 2004, the Senate Environment and Public Works Committee reported S. 2550 (S.Rept. 108-386), authorizing $41.25 billion over five years, including $20 billion for the clean water SRF program and $15 billion for the drinking water SRF program. The bill included a new formula for state-by-state allocation of clean water SRF grants, and expansion of the types of projects and activities eligible for clean water SRF grants. It would have directed states to reserve a portion of their annual clean water and drinking water SRF capitalization grants for making grants to eligible communities, and further would have required EPA to establish a grant program to help small water systems comply with drinking water regulations. (For discussion, see CRS Report RL32503, *Water Infrastructure Financing Legislation: Comparison of S. 2550 and H.R. 1560*, by Claudia Copeland and Mary Tiemann.) No further action occurred on either bill. Once again, the issue of the applicability of the prevailing wage requirements of the Davis-Bacon Act to SRF-funded projects affected consideration of the legislation, but criticism also included objection by some states to funding allocation formulas in the bills and opposition by the Administration to funding levels.

During the 109th Congress, the Senate Environment and Public Works Committee reported a water infrastructure financing bill, S. 1400 (S. Rept 109-186). Similar to S. 2550 in the 108th Congress, this bill would have extended both SRF programs (authorizing $20 billion over five years for the clean water SRF program and $15 billion drinking water SRF). It would have revised and updated the CWA formula for state-by-state allocation of SRF monies and would have specified that the prevailing wage requirements of the Davis-Bacon Act would apply to all projects financed from an SRF. It also would have directed the EPA to establish grant programs for small or economically disadvantaged communities for critical drinking water and water quality projects; authorized loans to small systems for

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[53] U.S. House, Committee on Transportation and Infrastructure, Subcommittee on Water Resources and the Environment, *Aging Water Supply Infrastructure*, Hearing, 108th Congress, 2nd session, Apr. 28, 2004 (108-63), p. 78.

preconstruction, short-term, and small-project costs; and directed the EPA to establish a demonstration program to promote new technologies and approaches to water quality and water supply management. No further action occurred on this bill.[54]

Throughout this period, the Bush Administration has addressed water infrastructure in a number of general ways, but has not offered legislative proposals of its own. The Administration opposed the SRF authorization levels proposed in bills in the 107th and 108th Congresses, saying that those levels exceed the Administration's targets for federal investment in water infrastructure and do not support the President's priorities of defense and homeland security. The debate has been joined in the presentation of the President's annual budget request, where the Administration has identified a federal capitalization target of $6.8 billion for the clean water SRF program for 2004 through 2011, supported by annual appropriations of $730 million. The Administration also has said that it supports annual appropriations of $850 million for the drinking water SRF program through FY2018.[55] That amount of total funding, EPA officials have said, combined with state matching, loan repayments, and other resources, would enable the clean water SRF to eventually revolve at $3.4 billion annually and the drinking water SRF to revolve at $1.2 billion annually and be self-sustaining in the long run.[56]

The Bush Administration has argued that funding needs are not solely the responsibility of the federal government, and that actions on the part of local governments are also required to help close the gap. Stakeholder groups concur, at least to the extent of agreeing that the problem is not solely the responsibility of any single level of government or entity, and that all must act to find solutions. But many stakeholders have argued that the level of federal investment endorsed by the Administration is insufficient to maintain investment levels in water infrastructure that are needed to achieve the nation's goals for safe and healthy water.

While saying that federal and state funding can help water utilities meet future needs, EPA's principal water infrastructure initiative has been to support other types of responses to help ensure that investment needs are met in an efficient, timely, and

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[54] For discussion of legislative activity in the 110th Congress, see CRS Report RL33800, *Water Quality Issues in the 110th Congress: Oversight and Implementation*, by Claudia Copeland.

[55] In FY2005, the President requested $850 million each for clean water and drinking water SRF capitalization grants; Congress appropriated $1.1 billion and $843 million, respectively. In FY2006, the President's budget requested $730 million for clean water SRF grants and $850 million for drinking water SRF grants; Congress appropriated $887 million and $838 million for the two programs, respectively. For additional information, see CRS Report 96-647, *Water Infrastructure Financing: History of EPA Appropriations*, by Claudia Copeland.

[56] U.S. Environmental Protection Agency, *FY2006 Justification of Appropriations, Estimates for the Committee on Appropriations*, February 2005, p. STAG-68; *FY2004 Justification of Appropriations*, February 2003, p. SA-37.

equitable manner. In particular, since 2003 EPA has promoted strategies that it terms the Four Pillars of Sustainable Infrastructure.[57] The Four Pillars are:

- Better Management. EPA believes that better management practices like asset management, environmental management systems, consolidation, and public-private partnerships can offer significant savings for water utilities. Asset management is an inventory-based approach to planning, based on condition and risk, to assess future capital and operating needs. Regionalization or consolidation can in some cases enable utilities to achieve savings (and compliance) by combining physical and institutional assets and/or managerial and technical support.

- Full-Cost Pricing. Ensuring that sufficient revenues are in place to support the costs of doing business is key to constructing, operating, and maintaining infrastructure and can encourage efficient water use.

- Efficient Water Use. The need for costly infrastructure can be reduced by better managing uses of water. Options include metering, water reuse, water-saving appliances, water-saving landscaping techniques, and public education.

- Watershed Approaches to Protection. This pillar centers on the concept that, in addressing infrastructure needs for water supply and water quality, it is important to look more broadly at water resources in a coordinated way, to ensure that actions achieve the greatest benefit on a watershed-wide basis.

EPA is pursuing a Sustainable Infrastructure Leadership Initiative in partnership with water utilities to promote the Four Pillars. The purpose of the initiative is to identify new and better ways of doing business in the water and wastewater industries and promote them widely, and thus ensure sustainability of water systems. For example, EPA is working to encourage utility rate structures that lead to full cost pricing and will support water metering and other conservation measures. EPA also is encouraging consumers to use water-efficient products (e.g., residential bathroom products), with the intent of reducing national water and wastewater infrastructure needs by reducing projected water demand and wastewater flow, thus allowing deferral or downsizing of capital projects.

Conclusions

The preceding discussion identifies a number of issues that Congress, the Administration, and stakeholders continue to debate regarding water infrastructure needs and concerns. Many of the issues already are the subject of advocates' recommendations and policy positions. Only recently, however, have some begun to address the long term challenge of actually paying for the larger financial

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[57] U.S. Environmental Protection Agency, *Sustainable Water Infrastructure for the 21st Century*. See [http://www.epa.gov/waterinfrastructure].

commitment that many of them seek and, in particular, of identifying alternatives to finance a larger, sustained federal role. Some may wish to fund a larger amount of federal spending for water infrastructure entirely out of general revenues in the U.S. Treasury, but that faces substantial hurdles and competition with many other government priorities. Thus, several questions arise: if a substantial financing gap exists that cannot be met by improved efficiencies or local revenue enhancement, and if a larger federal financial role is determined to be appropriate, where would that money come from? Are there alternative revenue sources that could be identified to support increased federal involvement?

Some analytic work has already been done on these questions, including research by academics and interest groups.[58] EPA has contributed analysis in various ways, including a study requested by Congress in the mid-1990s that examined financial mechanisms to enhance the capability of governments to fund mandated environmental goals.[59] In addition, the EPA's Environmental Finance Advisory Board has developed various publications, including *A Guidebook of Financial Tools*, which provides a comprehensive review of financing mechanisms, and related tools that may help communities pay for environmental projects and lower compliance costs.[60]

Environmental advocates generally are less engaged in debates about water infrastructure than groups representing states, cities, and those involved in building facilities. However, some now argue that increased federal investment is needed to fix water quality problems caused by discharges of untreated and inadequately treated sewage and that "the federal government should greatly increase its contribution to water infrastructure needs through a clean water trust fund," which they call the best long-term source of sewage treatment funding.[61]

Among the options under discussion are various types of water-related fees that could be dedicated to water infrastructure and other water quality projects, including one based on water withdrawals or use, permit fees, effluent fees, chemical feedstock fees, and environmentally "green" product fees. Each such option has economic and equity impacts, spillover effects, and questions about administration that need thorough assessment. In June 2005, a House Transportation and Infrastructure subcommittee held hearings on alternative means to fund water infrastructure projects in the future. At one hearing, witnesses discussed creating a national clean water trust fund that would conceptually be similar to trust funds that exist for highway and aviation projects. Witnesses and subcommittee members discussed

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[58] For example, see Clean Water Council, *America's Environmental Infrastructure: A Water and Wastewater Investment Study*, 1990, 46 p.

[59] U.S. Environmental Protection Agency, *Alternative Funding Study: Water Quality Fees and Debt Financing Issues, Final Report to Congress*, June 1996, 99 p.

[60] Environmental Financial Advisory Board and Environmental Finance Center Network, *A Guidebook of Financial Tools: Paying for Sustainable Environmental Systems*, April 1999 revision. This and other publications by the Environmental Finance Advisory Board are available online at [http://www.epa.gov/efinpage].

[61] Natural Resources Defense Council and Environmental Integrity Project, *Swimming in Sewage*, February 2004, pp. 57-58.

difficulties in identifying potential revenue sources for such a trust fund that would be deemed fair and equitable. A second hearing addressed other financing options, such as expanded use of tax-exempt private activity bonds, and more efficient management techniques, such as asset management programs and sustainable infrastructure initiatives. In December 2005, legislation was introduced to establish a $7.5 billion federal trust fund for wastewater infrastructure improvements. This bill, H.R. 4560, contemplated a system of user fees to create the fund, but the source of revenue was not specified. Finding consensus on the revenues to support such a large spending increase is a challenge that has eluded proponents so far. No further action occurred on this bill.

Beyond discussion of trust funds or similar mechanisms, increased public/private partnerships are advocated by some, and other options also may merit exploration. As difficult as it may be for policymakers to resolve the many infrastructure financing issues, such as those discussed in this report, resolving how to pay for water infrastructure is no less a challenge.