Drinking Water Infrastructure Needs Survey and Assessment
Third Report to Congress

EPA 816-R-05-001, June 2005 Office of Water (4606M)

EXECUTIVE SUMMARY

In 2003, the U.S. Environmental Protection Agency conducted its third assessment[1] of the nation's public water system infrastructure needs. The total national need for drinking water investment is $276.8 billion over the next 20 years. The 2003 Needs Assessment documents the continued need to install, upgrade, and replace the infrastructure on which the public relies for safe drinking water.

The U.S. Environmental Protection Agency's (EPA's or "the Agency's") third national assessment of public water system infrastructure needs shows total investment needs of $276.8 billion over the next 20 years. This document, the *Third Report to Congress*, conveys the results of the 2003 Drinking Water Infrastructure Needs Survey and Assessment and covers the 20-year period from January 1, 2003, through December 31, 2022.

The national total comprises the infrastructure investment needs of the nation's approximately 53,000 community water systems[2] and 21,400 not-for-profit noncommunity water systems[3] found in all 50 states, Puerto Rico, the Virgin Islands, the Pacific island territories, and the District of Columbia. American Indian and Alaska native village water systems are also included in the total need. Among the needs reported in the 2003 Needs Assessment are projects to protect public health, to preserve the physical integrity of water systems, to convey treated water to homes and commercial and industrial establishments, and to ensure continued compliance with specific Safe Drinking Water Act (SDWA or "the Act") regulations.

Public water systems continually install, upgrade, and replace the infrastructure on which the public depends for safe drinking water. Projects reported in the 2003 Needs Assessment range from replacement of short sections of deteriorated water mains to construction of large-scale, state-of-the-art treatment plants that produce drinking water from sea water. Many projects were identified as current needs; many more projects will arise over the next 20 years as existing infrastructure reaches the end of its useful life.

The cost of infrastructure investment is borne primarily by water system customers in the form of water rates. However, general revenues from federal, state, and local governments may supplement revenues from users. For major capital improvements, long-term financing is often critical; it allows communities to spread out the cost of improvements over the expected life of a project, thereby allocating the costs to those customers who

Sections 1452(h) and 1452(i)(4) of the Safe Drinking Water Act direct EPA to conduct an assessment of drinking water infrastructure needs every 4 years. The results are used to allocate Drinking Water State Revolving Fund monies to the states and tribes. In partnership with the states, EPA undertakes a survey of drinking water utilities as a basis for the Agency's assessment. EPA conducted prior surveys in 1995 and 1999.

[1] EPA's previous assessments of infrastructure need in 1995 and 1999 were called "Needs Surveys" because the assessment relied primarily on survey methods. In 2003, EPA relied in part on surveys but also on analysis of previous survey data. Accordingly, the term "assessment" is more appropriate. Hereinafter, these studies will be referred to as "Needs Assessments."

[2] A community water system is a public water system that serves at least 15 connections used by year-round residents or that regularly serves at least 25 residents year-round. Cities, towns, and even small communities such as retirement homes are examples of community water systems.

[3] A noncommunity water system is a public water system that is not a community water system and that serves a nonresidential population of at least 25 individuals or 15 service connections daily for at least 60 days of the year. Schools and churches are examples of noncommunity water systems.

benefit from the improvements. Despite the importance of these projects for protecting public health, some utilities may encounter difficulties in obtaining affordable financing for such improvements.

The Drinking Water State Revolving Fund (DWSRF) was established by Congress in the 1996 SDWA Amendments to help public water systems obtain financing for improvements necessary to protect public health and comply with drinking water regulations. Between FY1997 and FY2004, Congress appropriated $6.96 billion for the DWSRF. The DWSRF is one of many local, state, and federal programs that water systems can use to supplement user fees and help finance large-scale capital investments. Appendix A provides a more detailed discussion of financing for water system improvements in the context of sustainable infrastructure.

Between FY1997 and FY2004, Congress appropriated more than $6.96 billion for the DWSRF program. Through June 30, 2004, states had received $5.7 billion in capitalization grants, which, when combined with state match, bond proceeds, loan repayments, and other funds, made for a total of $9.7 billion in funds available for loans. As of that date, states had made close to 3,700 loans totaling $8.0 billion, leaving $1.7 billion, which had not yet been allocated to loans. The total assistance provided represented 166 percent of the awarded federal grants or 83 percent of the total funds available.

As mandated by the SDWA, EPA uses the results of the most recent infrastructure needs assessment to allocate DWSRF funds to the states based on their share of the total national need, with each state receiving at least 1 percent of the available DWSRF funds. For example, the 1999 Needs Assessment found 22 states and the District of Columbia each had less than 1 percent of the total national need (in aggregate, 11.3 percent of the total national need). However, from 2002 to 2005, each of these states were eligible for 1 percent of the annual DWSRF allotments (or, in aggregate, 23 percent of the total DWSRF allotment). The discrepancy may be due, in part, to a number of these states participating in the needs assessments effort to a lesser degree than the other states.

Eligible projects are funded according to each state's priority system, consistent with public health criteria specified in the SDWA. EPA also uses the assessment results to allocate the tribal set-aside (up to 1.5 percent of the DWSRF annual appropriation) for American Indian and Alaska native village water systems.

Methods for the Assessment

The approach for the 2003 Needs Assessment was developed by EPA in consultation with a workgroup consisting of representatives of the states and EPA Regions. The state/EPA workgroup refined the methods used for medium and large water systems in 1995 and 1999 based on lessons learned from these assessments and options made available from technological advancements in the Internet. To account for the needs of small community water systems, EPA adjusted the 1999 Needs Assessment findings to January 2003 dollars and reallocated the needs to states based on the current inventory of small systems. The needs for not-for-profit noncommunity water systems, American Indian water systems, and Alaska native village water systems were based on the 1999 Needs Assessment findings adjusted to January 2003 dollars.

Methods Used to Assess State Needs

Medium and Large Systems. EPA used questionnaires to collect data on infrastructure needs from medium and large water systems (see Appendix B for a discussion of different system size categories). EPA sent questionnaires to all of the nation's 1,041 large water systems (those that serve

over 50,000 people) and all 301 of the medium systems that serve between 40,001 and 50,000 people. This census included 1,342 systems. Questionnaires were also sent to a random sample of 2,553 of the 7,337 systems serving 3,301 to 40,000 people. Approximately 96 percent of all questionnaires were completed and returned.

Questionnaires for most systems were returned by systems to their state contacts, who reviewed the information for completeness and then added projects or improved documentation of projects as needed. In some cases, states completed the questionnaires for the systems. States then forwarded their amended questionnaires to EPA for review and tabulation. EPA reviewed all 128,600 projects submitted to ensure that each met strict documentation requirements and were allowable DWSRF projects. This individual project review resulted in removal of 23,600 projects due to ineligibility or inadequate documentation. States were given the opportunity, through an interactive Web site, to provide additional information on projects for EPA consideration.

Small Systems. Small systems serving populations of 3,300 or fewer have often lacked the staff and planning documents needed to respond to the questionnaire. Therefore, for the 1999 Needs Assessment, EPA conducted site visits to identify and document their infrastructure needs. Site visits were conducted at 599 of the approximately 45,000 small community water systems and at 100 of the approximately 21,400 not-for-profit noncommunity systems.

Because these data were collected on site by EPA using consistent and comprehensive system interview tools, there was a high level of confidence in the findings. In addition, the small system need from the 1995 Needs Assessment, also collected using EPA site visits, was comparable to the findings in the 1999 Needs Assessment, indicating that the need was properly identified and did not decrease over time.

Alaska Department of Environmental Conservation

This man in a native village in Alaska fills several containers from this watering point to get drinking water for his family.

For these reasons, EPA used the 1999 data to estimate small system need. The Agency determined an average cost per system for each of several strata (based on population and source type) from the 1999 data. The Agency then adjusted this cost to 2003 dollars and reallocated the small system need to each state based on the number of small systems active at the time of the 2003 Needs Assessment.

Methods Used to Assess American Indian and Alaska Native Village Water System Needs

For many of the same reasons that apply to other small systems, the 1999 questionnaires for small American Indian systems were completed during on-site visits with information provided by EPA and the Indian Health Service (IHS). All 19 American Indian systems serving more than 3,300 people completed a questionnaire and were provided technical support upon request. EPA estimated Alaska native village water system needs by census, using key personnel and data resources made available by representatives of the Alaska Native Health Consortia, the IHS, and Village Safe Water. Because of the high level of confidence in the 1999 findings, EPA adjusted the need from the 1999 Needs Assessment for American Indian and Alaska native village systems from 1999 dollars to 2003 dollars, and used that estimate for this 2003 Needs Assessment.

Examples of Cost Modeling

When modeling the cost of construction of a complete conventional water treatment plant, items included are:

- Coagulation, flocculation, sedimentation, filtration, waste handling, and the building;
- All raw and finished water pumps;
- The finished water clearwell and disinfection;
- Tanks;
- Process control system and building; and
- Engineering design and contingencies.

When modeling the cost of replacement of distribution mains, components included are:

- Pipe cost, trenching, bedding, backfill, hydrants, valves, road repair, easements, and service leads from the main to the curb stop; and
- Engineering design and contingencies.

When modeling the cost of construction of a storage tank, items included are:

- Tank;
- All appurtenances including piping, water level controls, and valves; and
- Engineering design and contingencies.

Models for Assigning Costs to Projects Without Costs

During the 1999 Needs Assessment, EPA invested considerable effort in obtaining project cost information from data submitted by systems. With this cost information, models were developed for nearly all types of projects included in the assessment. For 2003, most of those project costs were not expected to change beyond typical adjustments for inflation, except for automated meter reading devices for domestic water meters and the cost of pipe installation and rehabilitation. The workgroup determined that efforts for 2003 should focus on other areas of the assessment, and that most of the 1999 cost models could be adjusted to 2003 dollars. The "cost modeling" text box discusses the components of three types of cost models. Appendix B provides more detail on the cost models used for the assessment.

EPA did develop new cost models for automated meter reading projects and for transmission and distribution pipe installation and rehabilitation using 2003 project data. The new pipe models were developed using the same method as those used for the 1999 Needs Assessment. The 2003 meter model reflects the expected increase in cost to accommodate new, more efficient technology.

Total National Need

The 2003 Needs Assessment found that the nation's water systems need to invest $276.8 billion over the next 20 years in order to continue to provide clean and safe drinking water to their consumers. The need includes installation of new infrastructure as well as rehabilitation or replacement of deteriorated or undersized infrastructure. It also includes the need to address aging infrastructure that is adequate now but will require replacement or significant rehabilitation over the next 20 years.

Most of the needs are not related to violations of any SDWA regulations. Instead, they are ongoing investments that systems need to make to continue to deliver water to their customers, as well as to remain in compliance with regulations.

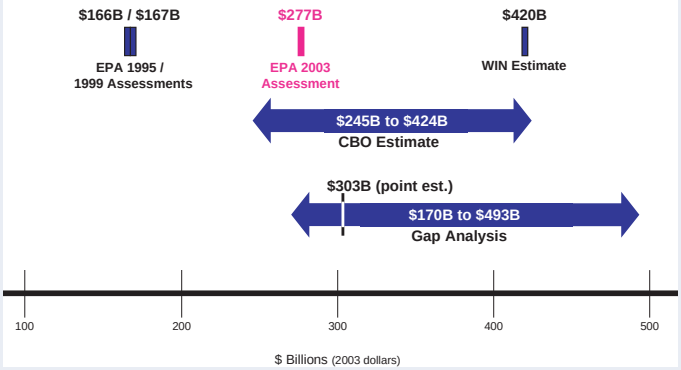
Total Need Compared to Previous Needs Assessments

The 1995 and 1999 Needs Assessments estimated the total national need at $167.4 and $165.5 billion respectively.[4] The findings of this assessment estimate a need of $276.8 billion, exceeding the previous assessments' national need by more than 60 percent.

The methods used to collect and evaluate needs in EPA's 2003 Needs Assessment remained largely unchanged from those used in 1995 and 1999, except for an emphasis on capturing previously underreported needs for infrastructure rehabilitation and replacement.[5] EPA recognized the necessity to more accurately capture these infrastructure needs. This objective is consistent with EPA's initiative for "sustainable infrastructure," (See Appendix A) which emphasizes improved management of assets, including collection of better data on infrastructure condition, and long-term planning for rehabilitation and replacement. For the 2003 Needs Assessment, it is likely that a more systematic approach to asset identification and evaluation led some systems and states to consider and report a larger number of replacement and rehabilitation projects. EPA has some anecdotal evidence that states began to investigate the backlog of projects that had been deferred in the past.

Systems' and states' efforts to correct underreporting appear to have been successful. States reported many more projects (covering all types of need) in

While the 2003 Needs Assessment estimate represents a substantial increase in need from the previous assessments, it is still within the range identified in other reports.



- EPA's "Clean Water and Drinking Water Infrastructure Gap Analysis" estimated drinking water systems' 20-year capital needs within a range of $170 to $493 billion, with a point estimate of $303 billion.[6]
- The Congressional Budget Office (CBO) report "Future Investment in Drinking Water and Wastewater Infrastructure," estimates annual water system needs of $12.2 to $21.2 billion, which would extrapolate to a 20-year total need in the range of $245 to $424 billion.[7]
- The Water Infrastructure Network's (WIN's) "Clean and Safe Water for the 21st Century - A Renewed National Commitment to Water and Wastewater Infrastructure," estimates water system needs of $21 billion annually, which extrapolates to $420 billion over 20 years.[8]

[4] The 1995 and 1999 total needs have been converted to January 2003 dollars for comparison purposes. The 1995 need in 1995 dollars was $138.4 billion. The 1999 need in 1999 dollars was $150.9 billion.

[5] In the 1999 Needs Assessment, EPA noted the problem of underreporting. Quality assurance reviews of data from 1995 confirmed this. For a comparison of the 1999 EPA Needs Assessment with other estimates, see Congressional Budget Office, op. cit., Chapter 2.

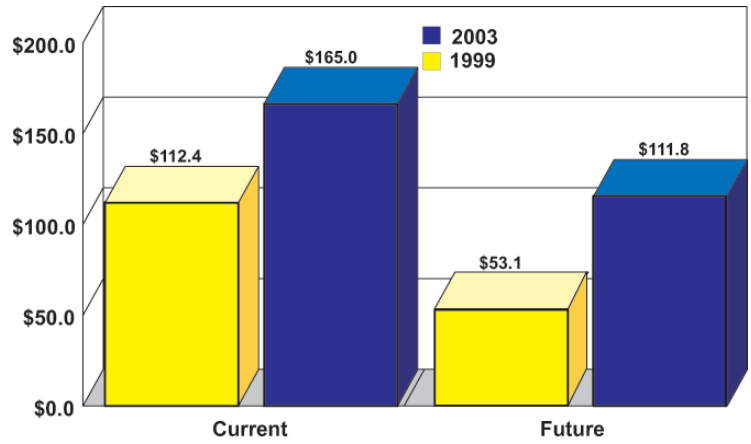
[6] U.S. Environmental Protection Agency, "Clean Water and Drinking Water Infrastructure Gap Analysis," (September 2002), p. 5. Needs were assumed to be in 1999 dollars based on the date of the report and planning period used. Needs have been adjusted to 2003 dollars for comparison purposes.

[7] Congressional Budget Office, "Future Investment in Drinking Water and Wastewater Infrastructure," (November 2002), p. ix. Needs were reported in 2001 dollars and have been adjusted to 2003 dollars for comparison purposes.

[8] Water Infrastructure Network, "Clean and Safe Water for the 21st Century - A Renewed National Commitment to Water and Wastewater Infrastructure," (undated), p. 3-1. Needs were assumed to be in 1999 dollars based on the planning period and data used. Needs have been adjusted to 2003 dollars for comparison purposes.

2003 than in the previous assessments. In the 1999 Needs Assessment, there were 61,400 projects for all large and medium systems. In the 2003 Needs Assessment, there were 128,600 projects for all large and medium systems. Equally important, the largest increase in 2003 (both in dollars and in percentage) compared to previous assessments came in future needs. Current needs increased by about 50 percent, but future needs rose by over 100 percent as shown in Exhibit ES-1.

Exhibit ES-1: 1999 versus 2003 Current and Future Need (in billions of January 2003 dollars)



For this comparison, the 1999 Needs Assessment results have been adjusted to January 2003 dollars.

This increase suggests the 2003 Needs Assessment was more complete in capturing the longer term needs to address aging infrastructure that is currently adequate, but will require replacement or significant rehabilitation over the next 20 years. While EPA cannot confirm that systems reported all of their 20-year needs, the increase in both the number of projects and the total need indicates much of the underreporting was eliminated.

The Agency's objective to better capture the true 20-year need did not outweigh the primary imperative to maintain the credibility of the assessment and determine the need of individual states. EPA made a considerable effort to ensure that the 2003 Needs Assessment retained the stringent documentation and eligibility requirements of both of the previous assessments. In addition, the 2003 Needs Assessment incorporated further quality assurance measures to prevent over-reporting of needs.

Total Need: System Size and Type

As shown in Exhibit ES-2, the nation's 1,041 largest community water systems (those serving populations more than 50,000 people) account for $122.9 billion, or 44 percent, of the total national need. Medium and small community water systems also have substantial needs of $103.0 billion and $34.2 billion, respectively. These figures include the needs for small, medium, and large systems in the Pacific island territories and Virgin Islands, which are $509.1 million and $172.6 million, respectively. Not-for-profit noncommunity water systems have infrastructure needs of $3.4 billion. American Indian water systems need $1.3 billion in infrastructure improvements, while Alaska native village systems need $1.2 billion.[9]

Total Need: Current and Future

The 2003 Needs Assessment differentiates "current needs" from "future needs;" the definitions of these two types of needs, as well as examples, are described below. About 60 percent of the total needs, $165.0 billion, are identified as current needs. In Appendix D, Summary of Findings, Exhibits D-2 and D-7 present a breakdown of current needs by project type. Although current needs have increased in dollars from previous assessments, they are a smaller percentage of the total need in 2003 (60 percent, compared with 68 percent in 1999). As discussed

[9] These estimates slightly exceed the total $2.4 billion American Indian and Alaska native village system need because of rounding.

above, this is evidence of successful efforts to more accurately capture "future needs."

Current Needs. Current needs are projects that a system considers a high priority for near-term implementation to enable a water system to continue to deliver safe drinking water. For instance, a system may have had numerous leaks and breaks in a section of main that should be replaced before a major main break occurs and inhibits the delivery of safe drinking water.

A system with current needs is not necessarily in violation of any health-based drinking water standard or in the midst of responding to an emergency. For example, a surface water treatment plant may currently produce safe drinking water, but the plant's filters may require replacement because of their declining effectiveness. By replacing the filters the plant would be able to continue providing safe water and avoid emergency situations.

Future Needs. Future needs are projects that water systems do not currently need, but would expect to address in the next 20 years as part of routine rehabilitation or replacement of infrastructure because of predictable events, e.g., reaching the end of a facility's service-life. Approximately 40 percent of the total need, $111.8 billion, is reported as future needs.

Growth-Related Needs. To be consistent with the eligibility requirements for the DWSRF, the 2003 Needs Assessment did not include projects that would be undertaken solely to accommodate future growth (e.g. extension of service lines to new housing developments). However, for both current and future needs, the 2003 Needs Assessment did include DWSRF-eligible projects that had reasonable accommodation for expansion of capacity that is consistent with the design life of the infrastructure (e.g., replacing deteriorated 6-inch pipe with new, and larger capacity, 12-inch pipe).

Total Need: Project Type

Every project in the 2003 Needs Assessment belongs to one of five categories of need: transmission and distribution, treatment, source, storage, or "other."

Exhibit ES-2: Total 20-Year Need (in billions of January 2003 dollars)

System Size and Type	Need
Large Community Water Systems (serving over 50,000 people)[1]	$122.9
Medium Community Water Systems (serving 3,301 to 50,000 people)[1]	$103.0
Small Community Water Systems (serving 3,300 and fewer people)[1, 2]	$34.2
Costs Associated with the Recently Promulgated Arsenic Rule[3]	$0.9
Not-for-profit Noncommunity Water Systems[4]	$3.4
American Indian and Alaska Native Village Water Systems[4, 5]	$2.4
Subtotal National Need	**$266.9**
Costs Associated with Proposed and Recently Promulgated Regulations (Taken from EPA Economic Analyses)	$9.9
Total National Need	**$276.8**

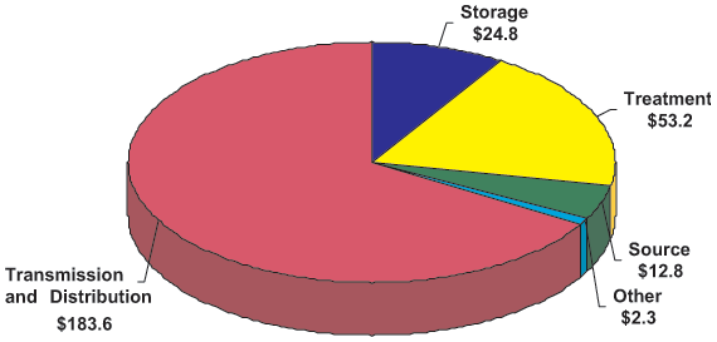
Note: Numbers may not total due to rounding.

[1] Does not include the costs associated with the recently promulgated Arsenic Rule and proposed or recently promulgated SDWA regulations; these costs are included on a separate line in this table.
[2] 1999 Needs Assessment findings adjusted to January 2003 dollars and reallocated based on 2003 inventory of small systems.
[3] Does not include costs for American Indian and Alaska native village water systems to comply with the recently promulgated Arsenic Rule; these costs are incorporated in the estimate for American Indian and Alaska native village water systems.
[4] 1999 Needs Assessment findings adjusted to January 2003 dollars.
[5] Includes cost for compliance with the recently promulgated Arsenic Rule.

Exhibit ES-3 illustrates the total 20-year need by category based on project type.

- **Transmission and Distribution.** With $183.6 billion needed over the next 20 years, transmission and distribution projects constitute the largest category of need, accounting for almost two-thirds of the total need. Little of this category of need is related to any federal mandate. Instead, utilities need to install and maintain distribution systems to provide potable water to their customers while preventing contamination of that water prior to delivery. Although treatment plants or elevated storage tanks are usually the most visible components of a water system, most of a system's infrastructure is underground in the form of transmission and distribution mains. Failure of transmission and distribution mains can interrupt the delivery of water leading to a loss of pressure, possibly allowing a backflow of contaminated water into the system. Broken transmission lines also can disrupt the treatment process. The transmission and distribution category also comprised the largest proportion of the total need in the 1995 and 1999 Needs Assessments. Its increased share of the total in 2003 reflects EPA's emphasis on fully capturing previously underreported rehabilitation and replacement needs, most of which were in this category. The underreporting in the 1995 and 1999 Needs Assessments was due in part to the limitations of planning documents. The transmission and distribution category includes the installation and rehabilitation of raw and finished water transmission mains and distribution mains and replacement of lead service lines, flushing hydrants, valves, meters, and backflow prevention devices.

Exhibit ES-3: Total 20-Year Need by Project Type (in billions of January 2003 dollars)



Note: Numbers may not total due to rounding.

- **Treatment.** Treatment projects represent the second largest category of need, $53.2 billion, nearly one-fifth of total need, over the next 20 years. This category consists of projects needed to reduce contaminants through treatment processes such as filtration, disinfection, corrosion control, and aeration. The installation, upgrade, or rehabilitation of treatment infrastructure also enables removal of contaminants that can cause chronic health effects or taste, odor, and other aesthetic problems.

- **Storage.** The total 20-year need for storage projects is $24.8 billion. This category includes projects to construct new or rehabilitate existing finished water storage tanks. Construction of new tanks is necessary if the system cannot provide adequate flows and pressure during peak demand periods. Many projects in this category involve rehabilitating existing tanks to prevent structural failures or sanitary defects that can allow microbiological contamination.

- **Source.** The source category includes projects that are necessary to obtain safe supplies of surface water or ground water. The infrastructure needs in this category include the installation and rehabilitation of drilled wells and surface water intakes. The total 20-year needs for source water projects are $12.8 billion.

- **Other.** Other needs account for an estimated $2.3 billion. This category captures needs that cannot be assigned to one of the prior categories. Examples include emergency power generators not associated with a specific system component, computer and automation equipment, and projects for system security.

The Regulatory Need

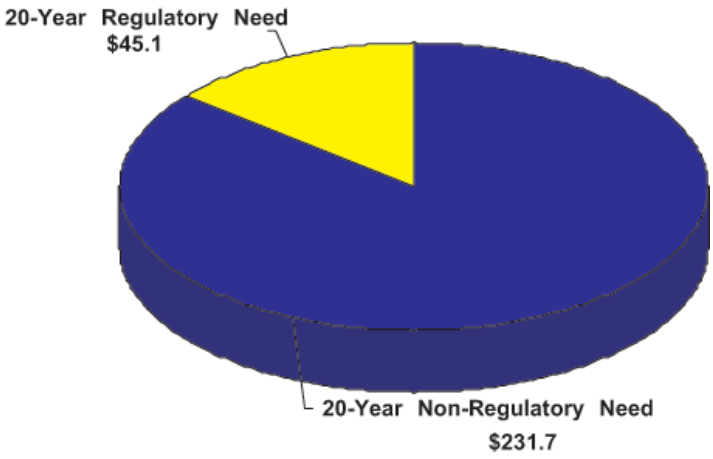
The SDWA requires that public water systems meet national standards to protect consumers from the harmful effects of contaminated drinking water. Although all of the infrastructure projects included in the 2003 Needs Assessment promote the SDWA's public health objectives, most are driven by the need to provide an essential service to the utility's customers. However, some of the projects are directly attributable to specific SDWA regulations. This report refers to these needs collectively as the "regulatory need." The total regulatory need is divided into two broad categories: the need associated with existing SDWA regulations, and the need associated with recently promulgated and proposed regulations. The second category accounts for new or proposed regulations that may impact systems in the near future, even though systems have not yet determined the extent to which they will need capital investment to achieve compliance. As shown in Exhibit ES-4, the total regulatory need is $45.1 billion, or only 16 percent of the total national need.

While most of the total need is not driven by compliance with a particular regulation, properly maintaining a system's infrastructure is not only economical in the long run, but also is protective of public health. These nonregulatory costs include routine installation, upgrade, and replacement of basic infrastructure and are borne by the system regardless of regulations.

Existing SDWA Regulations. The estimated needs directly associated with existing SDWA regulations (including the recently promulgated Arsenic Rule that will be effective in January 2006) are $35.2 billion. The total capital cost of compliance with the recently promulgated Arsenic Rule (from the Economic Analysis for the final rule) was included in this category because state-specific occurrence data were available, allowing EPA to allocate costs to states. Exhibit ES-5 displays the regulatory need by existing regulation and differentiates between current and future needs.

Microbial Contaminants. Projects that address microbiological contamination comprise 86 percent, or $30.2 billion, of the total existing regulatory need. Under the SDWA, the Surface Water Treatment Rule (SWTR), the Interim Enhanced Surface Water Treatment Rule (IESWTR), and the Total Coliform Rule (TCR) are designed to remove or inactivate microbial contaminants in drinking water. Microbial contaminants, such as *Giardia* and *E. coli*, can cause acute gastrointestinal illness and, in extreme cases, death. The installation of a treatment plant to filter a surface water source or the replacement of an aging disinfection system are examples of needs in this category.

Exhibit ES-4: 20-Year Regulatory and Non-Regulatory Need (in billions of January 2003 dollars)



Note: Numbers may not total due to rounding.

Chemical Contaminants. Projects designed to protect the public health from chemical contaminants comprise $5.0 billion, or 14 percent, of the total existing regulatory need. This category includes projects necessary for compliance with the existing Nitrate/Nitrite Standard, the Lead and Copper Rule, the Total Trihalomethanes Standard, and the recently promulgated Arsenic Rule, as well as other regulations that set maximum allowable limits for organic and inorganic contaminants. Examples of projects in this category include aeration facilities to remove volatile organic compounds or projects to add corrosion control to reduce the leaching of lead from pipes.

Exhibit ES-5: 20-Year Regulatory Need (in millions of January 2003 dollars)

Regulations	Current Need	Future Need	Total Need
Existing SDWA Regulations			
Interim Enhanced Surface Water Treatment Rule and Surface Water Treatment Rule[1]	$16,463.1	$11,063.0	**$27,526.2**
Total Coliform Rule[1]	$1,283.5	$1,349.1	**$2,632.6**
Nitrate/Nitrite Standard[1]	$404.1	$97.2	**$501.4**
Costs Associated with the Recently Promulgated Arsenic Rule		$962.1	**$962.1**
Lead and Copper Rule	$1,633.5	$371.9	**$2,005.4**
Total Trihalomethanes Standard	$123.5	$75.2	**$198.7**
Other Regulations[2]	$1,075.2	$255.4	**$1,330.6**
Subtotal National Need	**$20,982.9**	**$14,174.0**	**$35,156.9**
Costs Associated with Proposed and Recently Promulgated Regulations (Taken from EPA Economic Analyses)[3]		$9,927.4	**$9,927.4**
Total National Need	**$20,982.9**	**$24,104.4**	**$45,084.3**

Note: Numbers may not total due to rounding.

[1] Regulations for contaminants that cause acute health effects.
[2] Includes regulated Volatile Organic Chemicals (VOCs), Synthetic Organic Chemicals (SOCs), Inorganic Chemicals (IOCs), and Radionuclides.
[3] Includes regulations for contaminants that cause acute and/or chronic health effects. In the Economic Analyses, the compliance costs with some regulations are given as a range. In calculating the $9.9 billion need, the 2003 Needs Assessment used EPA's lead option, unless one was not available, in which case the 2003 Needs Assessment used the higher estimate. These estimates include only the capital costs (i.e., excludes operation and maintenance costs). Costs for the recently promulgated Arsenic Rule are not included in this row.

Proposed or Recently Promulgated Regulations. The total need associated with proposed and recently promulgated regulations is $9.9 billion. Of this total, $3.2 billion is for the regulation of acute contaminants under the Long Term I and/or the Proposed Long Term 2 Enhanced Surface Water Treatment Rules (LT1ESWTR and/or LT2ESWTR), the Proposed Ground Water Rule, and the Filter Backwash Recycling Rule. The remaining $6.7 billion is for chronic contaminants regulated under the Stage 1 and/or the Proposed Stage 2 Disinfectants/Disinfection Byproducts Rules (Stage 1 and Stage 2 DBPR), the proposed Radon Rule, and the recently promulgated Radionuclides Rule. The 2003 Needs Assessment obtained the costs for this category from the Economic Analysis published for each rule; they are not estimates from respondents to the 2003 Needs Assessment questionnaire. These costs are added to the total national need for this assessment, but do not affect individual states' total need or allocation because the Economic Analysis relies on regional data only.

Security Needs

Water systems have long included protections against vandalism and natural disasters as part of their water system improvement programs. However, systems have only recently begun to address more robust security needs to identify and protect the system from terrorist-type activities. Because the 2003 Needs

Assessment was concurrent with this expanded security evaluation and planning process, many systems may not have adequately captured these specific needs for the 2003 Needs Assessment. Systems with completed vulnerability assessments and corrective action plans often did not have documented costs for those improvements. These were not the types of costs that EPA was prepared to model. It is anticipated that these needs will be more completely reported in future assessments. The total security need estimated from the 2003 Needs Assessment is $1.0 billion.

Needs for Small Water Systems

Approximately 45,000 of the nation's 53,000 community water systems serve 3,300 or fewer people. Small water systems' 20-year infrastructure need is estimated to be $34.2 billion. The total is based on findings from the 1999 Needs Assessment, adjusted to 2003 dollars and applied to the 2003 inventory of small systems. Small water systems face many unique challenges in providing safe drinking water to consumers. The substantial capital investments required to rehabilitate, upgrade, or install infrastructure, without the economies of scale available to larger systems, represent one challenge. Although the total small system need is modest compared to the need of larger systems, the costs borne on a per-household basis by small systems are significantly higher than those of larger systems.

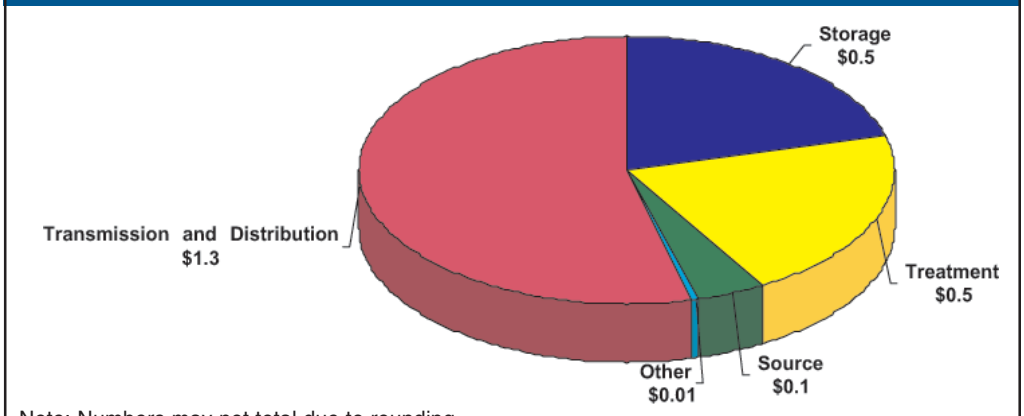
Needs of American Indian and Alaska Native Village Water Systems

The total need for American Indian and Alaska native village systems is $2.4 billion over 20 years. The total is also based on findings from the 1999 Needs Assessment, adjusted to 2003 dollars, and the portion of the total capital cost of compliance with the recently promulgated Arsenic Rule attributed to these systems. Exhibit ES-6 presents the total need by project type for these systems. The total 20-year need for American Indian systems is $1.3 billion, and for Alaska native village systems is $1.2 billion.

Challenges for Future Assessments

All assessments that include surveys impose a data collection burden on respondents. EPA has considered options to reduce respondent burden in each of the assessments (1995, 1999, and 2003). These efforts must be renewed in planning for the next assessment. EPA will pay particular attention to the number of projects to be considered in a 20-year planning effort, the comprehensiveness of the data collection goal, and documentation requirements for each project. All of these factors create a burden for participating water systems, state agencies, and EPA. While the data obtained through the survey and assessments are extremely valuable for many applications, the approach used to collect the data is regularly reviewed by EPA to determine more efficient and effective ways to capture the full need.

Exhibit ES-6: Total 20-Year American Indian and Alaska Native Village Water System Need by Project Type (in billions of January 2003 dollars)



Note: Numbers may not total due to rounding.

EPA is addressing two additional issues for future assessments: engineering assumptions of life cycles for future rehabilitation and replacement projects, and encouraging greater response rates from systems in states receiving the minimum 1-percent DWSRF capitalization grants.

With respect to life cycle assumptions, more explicit nationally applicable guidelines would facilitate consistency from the outset of the assessment. This would streamline quality control efforts and eliminate the need to identify assumptions used in projections of infrastructure replacement and rehabilitation needs (and reject projects where assumptions are inconsistent with industry practice). Regarding response rates, states that are near or below 1 percent of the total national need have little incentive to promote responses from systems in their jurisdictions. This can lead to underestimates of the needs in these states.

In the estimation of total national needs, these two issues may partially offset each other. (Inconsistent engineering assumptions may drive needs up, but low response rates in states receiving minimum capitalization grants may drive needs down.) Yet, these issues can affect the relative distribution of needs among states receiving more than 1 percent of the DWSRF appropriation. Without more complete participation in states receiving minimum capitalization grants, questions may be raised about the appropriateness of the current statutory approach.

EPA realizes these issues should be discussed with stakeholders before data collection begins on the next assessment. Stakeholders on this issue include states, their Governors and Legislators, the water supply industry and its associations, and researchers, particularly those who have specialized in empirical research on the useful life of pipe. As the Congressional Budget Office noted in 2002, methods of estimation and assumptions about requirements for rehabilitation and replacement typically drive national estimates of infrastructure needs.[10] The Agency recognizes that reaching agreement on the approach to this issue in future assessments will improve the credibility of the estimates that are submitted to Congress.

Finally, EPA recognizes that assessment methods result in uncertainty in the estimated needs. The sampling plan for medium and large systems was designed to produce estimates of the total need for each state with 95 percent confidence intervals that are ± 10 percent. However, sampling error is only one source of uncertainty. The assessment also involves statistical cost models and economic analyses of regulations. Each of these creates additional uncertainty. While the 2003 Needs Assessment does not include a comprehensive quantitative analysis of uncertainty, EPA plans to continue efforts to more accurately characterize these in future assessments.

Conclusions

The 2003 Drinking Water Infrastructure Needs Survey and Assessment, the third such national effort by EPA, estimates that the nation's public water systems need to invest $276.8 billion over the next 20 years to ensure the continued provision of safe drinking water to consumers.

The findings of the previous assessments, conducted by EPA in 1995 and 1999, indicated that the need was most likely underreported because of limitations of water system planning documents. EPA believes that changes made to the assessment to address underreporting resulted in a more complete assessment of the 20-year need.

The need to rehabilitate and replace infrastructure is expected to increase as systems age, particularly if funding constraints limit the systems' ability to meet these needs. The needs summarized in this report highlight the challenges facing water systems as they cope with aging infrastructure in the 21st century.

[10] Congressional Budget Office, op. cit., pp. 13-17.