Replacing the Nation’s Deteriorating Water Infrastructure While Maintaining Affordable Water Rates

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Much of the nation’s drinking water and wastewater infrastructure is at or near the end of its useful life. The expense of replacing the water infrastructure is contributing to a rapid increase in the cost of water service that is of concern for older, lower-income consumers, who pay a larger share of their income for utility services than other consumers. With water rates increasing at a much faster pace than inflation, finding ways to ensure that the necessary infrastructure repairs take place while supporting affordable water rates for consumers should be an important concern for policy makers.

Introduction

Water and wastewater systems are vital to the nation’s public health, protecting the environment, and supporting economic activities. However, much of the nation’s drinking water and wastewater infrastructure is at or near the end of its useful life. Thus, it is necessary to replace and upgrade the deteriorating water infrastructure. In this paper, water infrastructure and water system refer to both the drinking water and wastewater systems.

Environmental Protection Agency (EPA) and Congressional Budget Office (CBO) studies analyzing the 20-year cost of the infrastructure work forecast the expense to be significant. The continuing costs associated with this work are a major factor in the rapid increase in water rates paid by consumers. As the work to upgrade the water infrastructure progresses, experts predict water rates will continue to increase. The EPA notes that without continued increases in water rates, a substantial gap between these costs and the ability of utilities to pay them will result.

Keeping water rates affordable for consumers is an important issue, as water rates are increasing much faster than inflation or other utility rates. This is a particular hardship for those with low incomes or on fixed incomes, as the percentage of their income needed to pay their water bill increases. As a result, policy makers and regulators are seeking ways to keep water rates affordable while ensuring that water utilities have sufficient funds to replace and upgrade the water infrastructure.

Background

Clean drinking water systems prevent waterborne contaminants from entering drinking water and thereby avoid the spread of waterborne illnesses. Wastewater systems prevent the discharge of pollutants into rivers, lakes, and coastlines. This infrastructure helps preserve key waterways that serve as drinking water sources and support recreational and economic activities such as fishing and manufacturing. Maintaining these water systems is vital to the nation’s health and well-being.
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The EPA estimates that there are approximately 54,000 community water systems operating in the United States. However, a small number of systems (8 percent or 4,132 systems) serve 82 percent of households. The majority of these systems are publicly owned, with approximately 16 percent of all community water systems owned by private water companies.

The Water Infrastructure Is Deteriorating

Water systems face challenges owing to the deteriorating infrastructure. The 2009 infrastructure report card by the American Society of Civil Engineers (ASCE) gave the nation’s wastewater and drinking water systems a grade of D-. The low grade is the result of a lack of investment by water utilities in plants, equipment, and other capital improvements, despite the fact that many of these systems have reached the end of their useful design lives.

Deterioration of the water infrastructure has a number of adverse consequences. For example, the ASCE estimates that 7 billion gallons of clean drinking water are lost each day due to leaky pipes owned by water utilities. One study suggests that the annual cost of these leaks is $3 billion in lost revenue for water utilities. Additionally, according to the EPA, shortcomings in wastewater systems result in an annual discharge of 850 billion gallons of untreated water into the nation’s surface waters each year. These discharges reduce the quality of water sources across the nation.

Consequently, it is important that repairs to deteriorating water systems accelerate in the coming years.

The Cost of Replacing Water Infrastructure Is Substantial

A number of organizations have studied the cost of upgrading the nation’s water systems. Figure 1, based on the EPA gap analysis and CBO estimates projecting the 20-year cost of infrastructure repairs, illustrates the substantial cost involved.

Despite substantially increasing water rates in an effort to cover the expense of infrastructure repairs, there is concern that water utilities will not have sufficient funds to make the necessary repairs. This may create a gap between the amount of money needed and the amount that utilities actually spend on infrastructure repairs.

For example, the 2009 ASCE analysis estimates the total five-year investment needs for water system infrastructure to be $255 billion but projects spending of only $146.4 billion. This would result in a projected shortfall of $108.6 billion in water infrastructure investment between 2009 and 2014.

Consumer Expenditures on Water Are Rapidly Rising

Consumer costs for water service are rising at a rate well above inflation and faster than other utility rates (figure 2). This creates a particular hardship for those with lower incomes or on a fixed income. Analysis of the 2009 Consumer Expenditure Survey finds that consumers age 50 and older spend a greater

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**Figure 1**

Projected 20-Year Cost of Infrastructure Repairs

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percentage of their average annual expenditures on utilities than younger consumers do. This is especially true for older consumers with incomes below 300 percent of the federal poverty level (figure 3).

Further, expenditures on water service comprise a greater portion of utility expenditures for consumers age 65+ than for younger consumers (figure 4).

Finding ways to keep water rates affordable while maintaining safe and reliable water service is a key concern for older consumers.

Existing Sources of Funding for Water Utilities

Bill payments by utility customers are the primary source of funding for utilities.15 These funds provide revenue to cover the operating and maintenance costs of the utility as well as help to pay for infrastructure upgrades. Traditionally, many utilities also utilize private capital and municipal bond markets as a source of funding for major infrastructure projects. However, the high cost of infrastructure projects and the declining fiscal condition of local governments are making these sources more difficult to access.

The federal government currently operates several programs to assist utilities in gaining access to low-cost funds for infrastructure projects.

State Revolving Funds

State revolving funds (SRFs) are the largest source of dedicated federal funding for water infrastructure projects.16 SRFs provide low-cost loans to publicly owned utilities for use in replacing and upgrading existing water infrastructure. Because many smaller and rural communities have privately owned water companies, they are not eligible for SRFs.17 Funding for the SRFs is though

Figure 2

Water Rates Are Rising Much Faster than CPI and Other Utility Rates

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Figure 3
Consumers Age 50+ Spend a Greater Percentage of Their Average Annual Expenditures on Utilities than Consumers under Age 50

<table>
<thead>
<tr>
<th>Percent of Average Annual Expenditures</th>
<th>&lt;50</th>
<th>50-64</th>
<th>65+</th>
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<tbody>
<tr>
<td>&lt; Poverty</td>
<td>9.8</td>
<td>11.6</td>
<td>11.8</td>
</tr>
<tr>
<td>100-199% Poverty</td>
<td>9.4</td>
<td>10.9</td>
<td>11.1</td>
</tr>
<tr>
<td>200-299% Poverty</td>
<td>8.7</td>
<td>9.7</td>
<td>9.9</td>
</tr>
<tr>
<td>300%+ Poverty</td>
<td>6.1</td>
<td>6.4</td>
<td>7.3</td>
</tr>
</tbody>
</table>


Figure 4
Expenditures on Water Service Comprise a Greater Percentage of Utility Expenditures for Consumers Age 65+ than for Younger Households

<table>
<thead>
<tr>
<th>Percent of Utility Expenditures</th>
<th>&lt;50</th>
<th>50-64</th>
<th>65+</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100% Poverty</td>
<td>8.9</td>
<td>9.4</td>
<td>9.8</td>
</tr>
<tr>
<td>100-199% Poverty</td>
<td>8.9</td>
<td>9.8</td>
<td>9.8</td>
</tr>
<tr>
<td>200-299% Poverty</td>
<td>9.2</td>
<td>9.9</td>
<td>9.9</td>
</tr>
<tr>
<td>300%+ Poverty</td>
<td>10.1</td>
<td>9.6</td>
<td>9.7</td>
</tr>
<tr>
<td>All Income</td>
<td>10.2</td>
<td>9.7</td>
<td>9.7</td>
</tr>
</tbody>
</table>

Source: AARP Public Policy Institute analysis of 2009 Consumer Expenditure Data
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the EPA, which distributes federal grants to individual states. States must provide 20 percent matching funds and use these monies to provide low-interest loans to public utilities.

Despite the increasing need for SRFs, federal funding levels for SRFs are likely to decline as federal and state governments look to cut spending. For example, the EPA’s fiscal year (FY) 2012 proposed budget calls for $2.5 billion in SRFs, a $947 million decrease from the FY 2010 budget. Further, budget cuts may make it difficult for states to produce the required matching funds under current SRF rules.

There are two types of SRFs: the Drinking Water State Revolving Fund (DWSRF) for improvements to drinking water infrastructure, and the Clean Water State Revolving Fund (CWSRF) for improvements to wastewater infrastructure. As utilities pay back the loans, this money goes back into the state SRF fund and becomes available for other water infrastructure projects.

There are limits to the types of projects that SRFs support. For example, SRFs are not available for projects to expand current water systems in response to population growth or geographic shifts in populations. Nor are SRFs available to provide loan forgiveness for utilities struggling to pay back loans.

USDA Rural Development Program

The U.S. Department of Agriculture (USDA) offers direct loans and partial grants to rural water systems through its Water Environment Program. In recent years, the amount of money provided through grants has decreased substantially. Communities deemed economically distressed are eligible for grants up to 75 percent of funding amounts, yet they have typically received grants for only 20 to 25 percent of funding amounts. This requires some communities to take on loans that may be difficult to repay because of a small customer base or customers’ inability to afford higher water rates.

In addition, applications for funding through the USDA Water Environment Program can take years to process owing to an extensive backlog of applications. Smaller communities unable to procure affordable funding will likely have to defer making the necessary upgrades.

Other Federal Programs

Both the Department of Housing and Urban Development (HUD) and Department of Commerce (DOC) have programs to fund some water infrastructure projects. The HUD Community Development Block Grant provides funds that can support water infrastructure projects. These funds require the community to match 5 to 10 percent of the fund amount. DOC’s Public Works Program makes funds available for a variety of projects, including water infrastructure.

Addressing the Infrastructure Challenge

While replacing the water infrastructure is an issue faced by communities throughout the nation, there is no national strategy for accomplishing the work. This has led to calls for federal leadership to create a national vision for resolving the infrastructure challenge. Such a national vision would be expected to create a master plan to help develop a framework for guiding infrastructure repairs over the coming decades. A national plan would also provide high-level recognition of the importance of addressing the nation’s deteriorating infrastructure.

Another difficulty with addressing the water infrastructure problem is the lack of water utility reliability standards. Reliability standards are necessary for
utilities to make informed decisions about what infrastructure projects should have priority.26 Because water infrastructure elements of the same age and type can fail at different rates, utilities need to develop guidelines to assist in prioritizing their efforts to upgrade water infrastructure systems.27

Defining appropriate service levels and acceptable risk of pipeline failures allows utilities to make better decisions about which infrastructure elements to upgrade first. By developing criteria to prioritize infrastructure projects, utilities can focus on higher-priority projects and defer the expense of lower-priority projects.

The greatest challenge in addressing water infrastructure upgrades is closing the gap between utility expenditures and utility revenues. There are a number of proposed solutions to address this problem.

**Full-Cost Pricing**

One suggested solution is the use of full-cost pricing. This requires utilities to become financially self-sustaining by increasing water rates until their revenues are sufficient to fund ongoing operations and maintenance needs while also meeting infrastructure upgrade costs. The EPA suggests increasing water rates at the rate of inflation plus 3 percent per year to eliminate any funding gap.28

However, this approach creates concerns about water utility rates becoming unaffordable for low-income and fixed-income households. It also assumes that construction costs rise at the same rate as general inflation and that utilities are using their funds in a cost-effective manner. There is also concern that many smaller water systems have an insufficient ratepayer base to support the cost of these repairs without raising rates to unaffordable levels.29

**Increase Funding Levels for Existing Water Infrastructure Programs and Expand Their Eligibility**

Another possible solution is to increase the amount of federal funding going to existing programs such as SRFs and community development programs—particularly grants for smaller, low-income communities. In addition, changing SRF rules could make private water systems eligible to receive SRFs for their infrastructure projects.

However, current federal budget considerations make it unlikely that funding for these programs will increase in the next several years. Instead, the existing programs are likely to see reductions in their budgets.

**National Infrastructure Bank**

Creating a national infrastructure bank (NIB) would serve as a means to fund a variety of infrastructure projects, including water system repairs. The NIB concept has proven effective in Europe, where the European Investment Bank makes available loans for a variety of missions, including infrastructure projects deemed cost-effective by a team of experts.30

Legislators have introduced several bills proposing the creation of a NIB in the past few years.31 A NIB could reduce the cost of funding water infrastructure projects by lowering the interest rate on funds borrowed by water utilities.

There are a number of possible ways to set up a NIB:

- As a new government corporation
- As a government-sponsored enterprise
- As the responsibility of an existing federal agency

Other key considerations are where the initial capital for the bank would come
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from and whether the NIB would be self-sustaining or require continued federal appropriations.

Further, there are a number of alternatives for how the NIB operates:

- Making direct loans to water systems
- Using the funds to augment SRFs or other existing mechanisms to distribute funds
- Issuing tax-exempt bonds
- Providing loan guarantees for approved projects

By providing access to low-cost funding, a NIB has the potential to help water utilities keep water costs affordable for ratepayers.

**Water Trust Fund**

A water trust fund would provide funds to water utilities that could finance infrastructure projects or provide ratepayer assistance to offset rising water rates. In the past, infrastructure trust funds provided vital support for major projects such as highways, coastal wetland restoration projects, and airports.

A number of questions surround how a water trust fund would operate:

- Who would administer the program?
- Would the distribution of the funds occur through the SRFs or other existing mechanisms, or be a separate program?
- Should the trust offer loans, grants, or a combination of both?
- What is the source of the funds?

Typically, funds for trusts come from federal excise taxes on specific goods and services. There are a number of potential targets for such a tax, such as manufacturers that use a lot of water (e.g., soda makers), or manufacturers whose products create wastewater issues (e.g., fertilizer and pesticide manufacturers). Another option would be a corporate income tax or water use tax.

- What projects are eligible for the funds? Would funds only be for rehabilitating existing systems, or would they also be available for expanding existing systems?

The water trust fund could help create a dedicated source of federal funding for water infrastructure projects. However, creating new taxes to fund the trust would be likely to generate opposition from industries that would be subject to any new tax and may not be politically feasible.

**Government-Sponsored Enterprise**

Another option to fund water infrastructure projects is for Congress to create a private company with a public purpose. A government-sponsored enterprise (GSE) would seek to increase liquidity in the secondary market by increasing demand for securities in that market. This would help promote the flow of private capital to fund water infrastructure projects. The sale of stocks could initially fund the GSE, as could an initial capitalization through federal appropriations. A GSE works by guaranteeing that investors receive interest and principal payments on time. This lowers the level of risk for private investors and would help water utilities obtain loans with lower interest rates.

However, the recent failure of the two housing GSEs may make creating a water GSE politically untenable, although there is less likelihood of an implicit guarantee requiring a bailout. It is also unknown whether a sufficient untapped secondary market exists for these securities, and whether the GSE could achieve a sufficient yield spread to produce profits for investors.
Public/Private Partnerships

For publicly owned water systems, the use of a public/private partnership (PPP) can provide access to private financing for infrastructure projects. While publicly owned systems have used PPPs for operations and maintenance for several decades, the use of PPPs for water infrastructure development is less common.

To finance infrastructure repairs, a municipality and a private company could enter into a “design-build-finance-operate” agreement. Under such a partnership, the private company is responsible for designing, constructing, and financing the infrastructure work. The private company also operates and maintains the infrastructure for the contracted period and receives ratepayer payments to recover the costs of building and operating the system.

A PPP has the potential to provide a number of benefits for municipally owned water systems:

- Provide access to financing for municipalities that are unable to find traditional sources of financing (SRFs or the municipal bond market).
- Complete the infrastructure upgrades faster than through public procurement.
- Create economies of scale among different systems operated by the same private company by allowing the purchase of supplies (such as chemicals) in bulk and sharing of labor among smaller systems.

There are also a number of challenges to the use of PPPs:

- Private financing can be more costly because of higher interest rates than funding obtained through SRFs or the tax-exempt bond market. This could result in higher water rates for customers.
- Creating PPP contracts is complex and can be costly for municipalities unfamiliar with how the process works.
- PPPs may run into opposition from residents stemming from concerns about the potential for higher water rates, loss of control of the system (water quality and rate setting), and loss of municipal jobs.
- Often a PPP will have long-term contracts (20 years or more), which may not provide incentives for the private company to keep water rates affordable. In addition, there are concerns that these contracts do not make the private companies accountable to the public if they fail to provide adequate levels of service.

Consequently, the potential use of PPPs requires municipalities to address a number of important concerns, particularly the PPP’s accountability to the public, before entering into such an agreement.

Summary

The deteriorating water infrastructure requires action to ensure the continued supply of clean and affordable water while maintaining the nation’s vital water resources. Key to resolving this problem is eliminating the funding gap between water utility revenues and funds needed to upgrade and repair the water infrastructure. The challenge lies in closing this funding gap using cost-effective solutions without making water rates unaffordable for low- and moderate-income customers.

While there are a number of proposed solutions to fund the infrastructure repairs, it is unlikely that any single option will be appropriate for all circumstances.
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Recommended Policy Options

Because replacing and upgrading the water infrastructure is a national priority, the federal government in conjunction with states should develop a national strategy to address the problem and help guide the process. Water infrastructure upgrades should be included in any federal program designed to improve the nation’s infrastructure.

Setting reliability standards for water utilities is an important part of repairing the water infrastructure. Reliability standards should be transparent and hold utilities accountable for meeting them. These standards will allow utilities to prioritize the repair of specific infrastructure elements to maximize the efficient use of available funds.

Reducing the cost of borrowing funds for cost-effective projects will help larger water utilities afford infrastructure repairs. However, smaller systems might not have a sufficient ratepayer base to repay these loans and may require other sources of funds.

Maintaining consumer protections and accountability to the public is essential for any public/private partnership. States and municipalities should ensure that contracts with companies supplying water services provide safe, reliable, and affordable water service to consumers of all incomes. PPP contracts need to address how rates are set and develop mechanisms to hold the private company accountable for its service.

States and the federal government should consider developing low-income water assistance programs to help low-income households cope with the rising cost of water. Similar programs already exist for home energy and telephone service.

Endnotes

1 Infrastructure refers to the system of pipes, reservoirs, treatment facilities, and drainage systems that make up the drinking water and wastewater systems.

2 Other factors include stricter water quality standards, population growth, water scarcity in some areas, and geographic shifts in population.


6 The EPA defines community water systems as public water systems that serve people year-round in their homes. Most people in the United States (268 million) receive their water through a community water system.


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10 American Society of Civil Engineers (ASCE), 2009 Report Card for American Infrastructure (ASCE, March 25, 2009).

11 Ibid.


13 EPA, Report to Congress Impacts and Control of CSOs and SSOs (EPA, August 2004).

14 ASCE, op. cit.

15 Congressional Budget Office (CBO), Future Investment in Drinking Water and Wastewater Infrastructure (CBO, November 2002).

16 Since its inception in 1997, the DWSRF has provided $16.2 billion in funds (EPA, Drinking Water State Revolving Fund: 2009 Annual Report (EPA, November 2010)). The CWSRF, founded in 1988, has provided $74 billion in funds (EPA, 2009 Clean Water State Revolving Fund Programs (EPA, June 2010)).

17 M. Pearson, U.S. Infrastructure Finance Needs for Water and Wastewater (Rural Community Assistance partnership (RCAP), 2007).

18 RCAP, EPA’s FY 2012 budget proposal reflects tough choices needed for the nation’s fiscal health (RCAP, February 15, 2011).


20 Pearson, op cit.

21 Ibid.

22 Details about this program are available at http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs.

23 Details about this program are available at http://www.eda.gov/InvestmentsGrants/Investments.xml.


25 Ibid.


27 Ibid.


29 Pearson, op cit.

30 Details about the European Investment Bank are available at http://www.eib.org/.

31 For example, the National Infrastructure Development Bank Act of 2009 (H.R. 2521), the National Infrastructure Bank Act of 2007 (S. 1926 and H.R. 3401), and the National Infrastructure Development Act (H.R. 3896).

32 Such legislation has been proposed in the past. For example, The Water Protection and Reinvestment Act (H.R. 3202) was proposed in the 111th Congress.


34 For example, S. 652 introduced in the 112th Congress seeks to create the American Infrastructure Financing Authority (AIFA) to operate as a wholly owned government corporation. The AIFA would provide direct loans and loan guarantees to facilitate transportation, water, or energy infrastructure projects.
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37 The GAO noted that it could identify only seven municipalities who have developed PPP agreements for wastewater treatment infrastructure projects. See GAO, *Wastewater Infrastructure Financing, Stakeholder Views on a national Infrastructure Bank and Public-Private Partnerships* GAO-10-728 (Washington, DC: GAO, June 2010).

38 Ibid.