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THE VOICE FOR A CLEAN WATER FUTURE

Water Infrastructure Funding Parity Report

PREPARED FOR:

National Association of Clean Water Agencies

JULY 21, 2022

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List of Acronyms

ASCE	American Society of Civil Engineers
AWIA	America's Water Infrastructure Act
AWWA	American Water Works Association
BEAD	Broadband Equity, Access, and Deployment
BRF	Bay Restoration Fund
CBO	Congressional Budget Office
CDBG	Community Development Block Grant
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWIFP	Corps Water Infrastructure Financing Program
CPI	Consumer Price Index
CWA	Clean Water Act
CWIFP	Corps Water Infrastructure Financing Program
CWNS	Clean Watersheds Needs Assessment
CWSRF	Clean Water State Revolving Fund
DOE	Department of Energy
DWSRF	Drinking Water State Revolving Fund
EDA	Economic Development Administration
EERE	Energy Efficiency and Renewable Energy
EFAB	Environmental Financial Advisory Board
EGLs	Effluent Limitation Guidelines
EIA	Energy Information Administration
EPA	Environmental Protection Agency
EPR	Extended Producer Responsibility
FAST	Fixing America's Surface Transportation
FCC	Federal Communications Commission
FHWA	Federal Highway Administration
GAO	Government Accountability Office
HTF	Highway Trust Fund
HUD	Housing and Urban Development
IIJA	Infrastructure Investment and Jobs Act
LIHEAP	Low Income Heat and Energy Assistance Program
LIHWAP	Low Income Household Water Assistance Program

MHI	Median Household Income
NACWA	National Association of Clean Water Agencies
NTIA	National Telecommunications and Information Administration
O&M	Operation and Maintenance
PFAS	Per- and polyfluoroalkyl substances
PPCPs	Pharmaceuticals and Personal Care Products
RAISE	Rebuilding American Infrastructure with Sustainability and Equity
RFSP	Regional Food System Partnership
SDWA	Safe Drinking Water Act
STAG	State and Tribal Assistance Grants
SUDC	Small, Underserved, and Disadvantaged Communities
SWIFIA	State Infrastructure Financing Authority WIFIA
U.S.	United States
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USF	Universal Service Fund
WEF	Water Environment Federation
WIIN	Water Infrastructure Improvements for the Nation
WIFIA	Water Infrastructure Finance and Innovation Act
WRDA	Water Resource Development Act

Executive Summary

Clean water and drinking water agencies across the United States ("U.S.") provide services that are critical to protecting public health and the environment and necessary for a strong and robust economy. Maintaining these essential services has and will continue to require significant and regular infrastructure investments. This report documents the facts regarding the amount of federal infrastructure funding that has been provided to the clean water and drinking water sectors. It also provides an assessment of how these funding amounts compare to other critical infrastructure sectors and identifies alternative supplemental funding sources that could support clean water agencies and the water sector in the future.

Various agencies and organizations, such as the Congressional Budget Office ("CBO"), the U.S. Environmental Protection Agency ("EPA"), the American Society of Civil Engineers ("ASCE"), and the American Water Works Association ("AWWA") have published estimates of the clean water and total water sector infrastructure investment needs in various industry reports. A summary of these needs scaled to a 20-year estimate and annualized over this period is shown in Table ES-1. As shown, the estimates of infrastructure needs vary depending upon the source of the information and the infrastructure included in the estimates. However, the most comprehensive total water sector estimate, including infrastructure investment for replacement as well as population growth and cost of lead service line replacement is $2.913 trillion over 20-years or $146 billion annualized. This estimate combines the 2021 ASCE Infrastructure Report Card estimate with the EPA lead line replacement cost estimate.

Table E-1: Summary of Water Sector Funding Needs (2020-2039)

Source	Sector	Total Need (in 2022 $s)	Annual Need (in 2022 $s)
EPA Clean Watershed Needs Survey (2012)	Wastewater and Stormwater (replacement)	$337.1	$16.9
EPA Drinking Water Needs Survey (2018)	Drinking Water (replacement)	$570.1	$28.5
AWWA Buried No Longer (2012)	Water Mains (growth and replacement)	$1,064.0	$53.2
ASCE Failure to Act (2020)	Total Water Sector	$3,618.0	$180.9
ASCE Infrastructure Report Card (2021)	Total Water Sector	$2,854.6	$142.7
EPA Federal Register (2021)	Lead Line Replacement	$58.5	$2.9
ASCE (2021) and EPA (2021)	**Total Water Sector**	**$2,913.1**	**$145.7**

in $ billions of dollars

Research was conducted to identify the infrastructure investment needs of other infrastructure sectors, including transportation (roads), power (electricity), broadband, levees, and inland waterways. A summary of the infrastructure investment needs associated with these sectors in comparison to the water sector is provided in Table ES-2. The information was scaled to a 20-year estimate and an annualized estimate over this period. The results of the needs comparison shows that the water sector needs are the second highest among the six sectors that were compared. Only transportation (roads) has a 20-year infrastructure need estimated to be higher than the water sector.

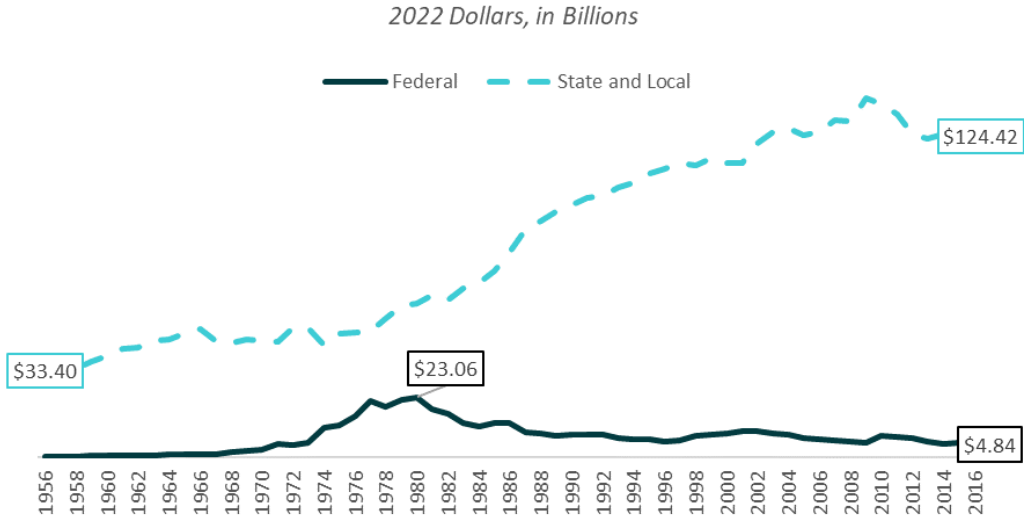
Table ES-2: Summary of Infrastructure Sector Investment (2020-2039)

Sector	Total Need (in 2022 $s)	Annual Need (in 2022 $s)
Transportation (Roads)	$5,966	$298.3
Water Sector	$2,913	$145.7
Power (Electricity)	$2,299	$115.0
Broadband	$92.0	$18.5
Levees	$25.6	$1.3
Inland Waterways	$6.8	$0.3

in $ billions of dollars

Federal support for water sector infrastructure is provided by a variety of federal programs, including the Clean Water State Revolving Fund ("CWSRF") and Drinking Water State Revolving Fund ("DWSRF") loan programs provided by EPA under the umbrella of State and Tribal Assistance Grants ("STAG"), The Water Infrastructure Finance and Innovation Act ("WIFIA"), the U.S. Bureau of Reclamation ("USBR") WaterSMART program, the Army Corp of Engineers Corps Water Infrastructure Financing Program ("CWIFP"), the U.S. Department of Agriculture ("USDA") Rural Development Program, the Housing and Urban Development ("HUD") Community Development Block Grant ("CDBG") program, and the Economic Development Agency ("EDA") Public Works grant program. The estimated annual federal funding support provided by these programs was estimated at approximately $16 billion per year (in 2022 dollars).[1] Over the last six decades, federal funding provided to the water sector has remained relatively flat in comparison to the total annual water sector spending as shown in Figure ES-1.

Figure ES-1. Total Spending on Water Utilities by Source



[1] Computed from published information on federal monetary support associated with the programs listed above dedicated to the water sector.

Federal spending on water utilities represented approximately 5.9% of total annual spending in 1970 and approximately 3.7% in 2017. In contrast, state and local spending was 272% higher in 2017 than it was in 1956. The peak in the federal funding for the water sector occurred in the 1970s and 1980s with the Construction Grants Program, which provided more than $60 billion in federal grants for the construction of public wastewater treatment projects.[2] Today, the Infrastructure Investment and Jobs Act ("IIJA") will increase federal funding for the water sector from approximately 4% of the overall funding need to approximately 11% of the overall funding need. However, in contrast to the Construction Grants Program, much of the funding provided by the IIJA will be in the form of loans, not grants.

Overall, in comparison to the federal infrastructure funding provided to the other infrastructure sectors included in our comparison, federal funding to the water sector remains low relative to these other sectors, as shown in Table ES-3. Other infrastructure sectors, such as transportation (roads) and power (electricity) have received a much greater federal cost share than the water sector.

Table ES-3: Summary of Infrastructure Needs and Federal Funding Support by Sector

Sector	Annualized Funding Needs ($ Billions)[1]	Annualized Federal Support ($ Billions)[2]	Federal Support Programs Included	Federal Support as % of Funding Need
Water Sector	$145.7	$15.7	DWSRF, CWSRF, WINN, WIFIA, WaterSMART, USACE, HUD CDBG, EDA, and IIJA	11%
Transportation (Roads)	$298.3	$128.0	HTF, FAST Act, IIJA	43%
Power (Electricity)	$115.0	$38.4	DOE	33%
Broadband	$18.5	$18.5	USF, FCC, IIJA, NTIA	100%
Levees	$1.3	$0.1	USACE	6%
Inland Waterways	$0.3	$0.3	WTF, IIJA	100%

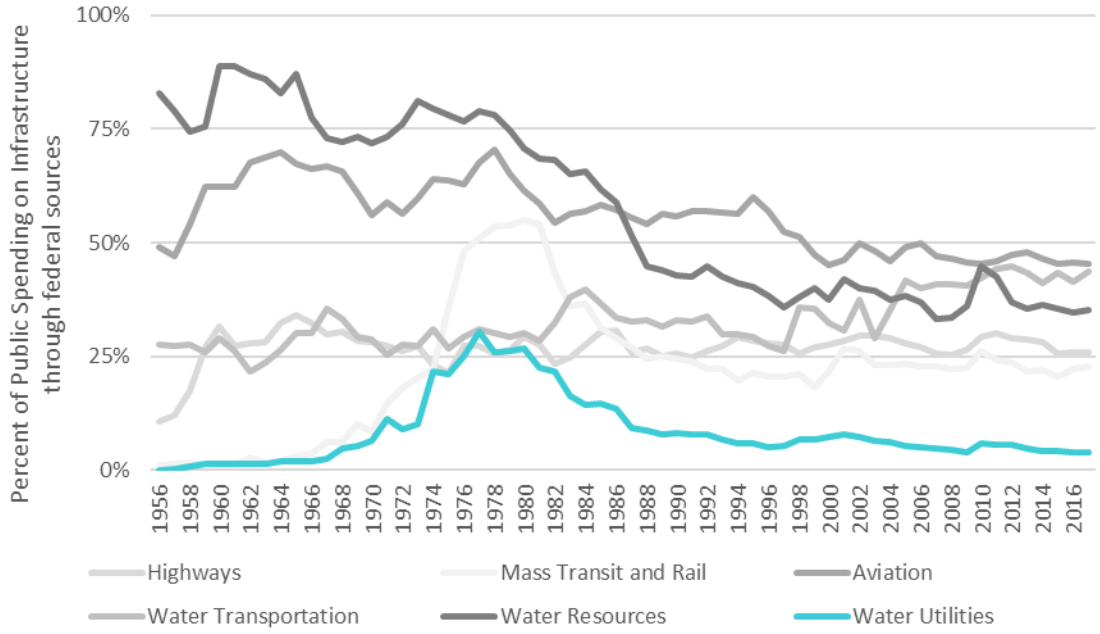
[1]The water sector funding need combines the total water sector need as reported by ASCE in 2021 with the lead line replacement need from the EPA federal register in 2021. Other sector needs were identified from the research descriptions described in Section 2. The identified costs were converted to 2022 dollars and annualized over periods from five to 20 years depending upon the needs descriptions.

[2]The identified federal funding support was annualized over five to 10 years based on the funding programs described in Section 3.

In addition, according to the Congressional Budget Office, other infrastructure sectors, such as aviation, mass transit and rail have received much higher levels of federal infrastructure support. The average annual federal spending for non-water sector infrastructure costs is approximately ten times greater than the federal funding support to the water sector, as shown in Figure ES-2.

[2] Construction Grants Overview. Environmental Protection Agency. Accessed at: https://www.epa.gov/enviro/igms-construction-grants-overview#:~:text=During%20the%201970s%20and%201980s,of%20public%20wastewater%20treatment%20projects.

Figure ES-2. Federal Spending as a Percentage of Total Spending, by Sector



As Table ES-3 and Figure ES-2 indicate, the actual spending by local water sector utilities has been less dependent on federal support and more dependent on the ability of utilities to increase revenues through user charges in their local communities. However, user charges over the past 20 years have increased at a rate significantly exceeding inflation. This has increased the challenge of community affordability and has impacted the ability and willingness of utilities to continue to significantly raise user charges to generate revenues to pay for additional infrastructure improvements.

Future opportunities for the water sector to receive a greater federal cost share include both increasing funding under the existing SRF programs and exploring other niche/targeted opportunities. Since the enhanced funding support for the water sector contained in the IIJA is temporary and will expire in 2026, a more permanent program that extends and enhances federal funding beyond 2026 is a core future opportunity to pursue. The water sector should also consider several other federal funding sources beyond enhancing core SRF funding that have not been fully leveraged to support additional infrastructure investment in the future. For example, the clean water sector could target securing additional federal funding through the Department of Energy's ("DOE's") Office of Energy Efficiency and Renewable Energy ("EERE") program for wastewater resource recovery funding, and its Water Security Grand Challenge program. Other opportunities may include leveraging the U.S. Department of Transportation's ("USDOT's") Rebuilding American Infrastructure with Sustainability and Equity ("RAISE") discretionary grant program for stormwater drainage and water/wastewater pipe relocation or replacement funding and targeting specific IIJA funding programs and elements, such as the Healthy Streets Program for additional stormwater funding.

Other niche/targeted options include advocating for a DOE funding mechanism to support the deployment of full-scale energy recovery infrastructure and enhanced USDA funding for nutrient recovery, advocating for the federal government develop a new enhanced construction grant program

specifically for stormwater projects similar to the program that funded the construction of wastewater treatment plants in the 1970s and 1980s, and providing more dedicated funds through the CWSRF and WIFIA programs specifically for stormwater and for addressing emerging contaminants.

Today, the clean water sector is facing significant potential infrastructure investment needs to address emerging contaminants, such as per- and polyfluoroalkyl substances ("PFAS"), pharmaceuticals, and microplastics. With the potential cost to address these emerging contaminants looming, it is timely to consider alternative funding, such as "polluter pays" models whereby the manufacturing industry provides sources of funding to pay for the cost of treating these contaminants when released into the environment and get into the water supply. Extending producer responsibilities related to micropollutants could be a viable approach that recognizes the producers' distinct responsibility for the products that they place on the market, which extends beyond the production and consumption state to its end-of-life stage, including waste disposal. One approach is to require producers to pay an advanced disposal fee, similar to the excise tax approach described above. Such a tax or fee could be collected by these producers to help fund the wastewater and water treatment required to remove the pollutants from wastewater and water. This concept is being developed in Germany as a pharmaceutical regulatory charge and is intended to make the polluters responsible for the cost of upgrading wastewater treatment plants, rather than ratepayers.

Other models, such as cap-and-trade programs, exist in some states and are used to help deal cost effectively with environmental pollution. While not a direct source of infrastructure funding for the public sector, these programs incentivize source removal of constituents prior to their environmental release and could help reduce the cost of their removal from the environment. These alternative models have already been used to a limited extent in the water sector. Another related funding model could involve EPA providing effluent limitation guidelines and pretreatment program requirements for industries that discharge PFAS or other emerging contaminants into sewer systems. EPA could require industrial dischargers to notify wastewater utilities of the presence and quantity of emerging contaminants in the discharged wastewater as part of the industrial pre-treatment program. Placing limits and reporting requirements on industrial dischargers could help ensure that the industrial sources of these chemicals bear much of the cost to address them and could help shift cost responsibility for discharging PFAS from municipal wastewater treatment operators to the upstream industrial dischargers.

As the water sector continues to face increasing infrastructure investment needs due to aging infrastructure, shifting demographics and regulatory drivers (e.g., lead & copper and emerging contaminants), additional federal funding support and new models of generating revenue will be critical for the water sector to be able to continue to afford to make utility infrastructure investments in the future. Many of the potential alternative sources of federal funding for the water sector identified in this report will require congressional action as well as significant water sector advocacy in the support of new federal legislation and in some cases state legislation. As with past efforts to advocate for federal funding legislation including funding for the water sector, the passage of enabling legislation to make these alternatives a reality would require significant ongoing efforts by NACWA in coordination with other water sector agencies and advocacy groups. NACWA's leadership in legislative, regulatory, and legal advocacy over the past 50 years on a broad spectrum of clean water issues well positions it to lead efforts to advocate for legislation to enhance the federal infrastructure funding for the water sector and garner federal support for the alternatives identified herein.

1. Introduction

1.1. Purpose and Objective

Clean water and drinking water agencies across the United States ("U.S.") provide services that are critical to protecting public health and the environment and necessary for a strong and robust economy. Maintaining these essential services has and will continue to require significant and regular infrastructure investments. It is believed that federal funding support for water infrastructure has not kept pace with other critical infrastructure sectors, such as transportation and energy. The purpose of this report is to document the facts regarding the amount of federal infrastructure funding support that has been provided to clean water agencies and the water sector in the past and is anticipated to be provided over the next five years. This report also provides an assessment of how these funding amounts compare to other critical infrastructure sectors and identifies alternative supplemental funding sources that could support clean water agencies and the water sector in the future.

1.2. Data and Information Sources

Information that was used to complete the report was compiled from various federal, water sector, and other infrastructure sector documents, publications, reports, data, and information. Specific information sources that were relied upon to complete the report, included the following:

1. Clean Watersheds Needs Survey 2012, Report to Congress, U.S. Environmental Protection Agency, 2016.
2. Construction Grants Overview. Environmental Protection Agency. Accessed at: https://www.epa.gov/enviro/igms-construction-grants-overview#:~:text=During%20the%201970s%20and%201980s,of%20public%20wastewater%20treatment%20projects.
3. National Municipal Separate Storm Sewer System (MS4) Needs Assessment Survey Results, WEF Stormwater Institute. May 2019
4. Drinking Water Infrastructure Needs Survey and Assessment: Sixth Report to Congress, U.S. Environmental Protection Agency, Office of Water, EPA. 2016.
5. Infrastructure Report Card, American Society of Civil Engineers. 2021.
6. *The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the U.S. Economic Recovery*, American Society of Civil Engineers, 2020.
7. Buried No Longer: Confronting America's Water Infrastructure Challenge, American Water Works Association. 2010.
8. Infrastructure Report Card, American Society of Civil Engineers, 2021.
9. Failure to Act, Economic Impacts of Status Quo Investment Across Infrastructure Systems, prepared by EPB and ASCE, 2020.
10. Facts & Figures from American Short Line and Regional Railroad Association, 2017

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ties%20served%2072%25%20of%20U.S.%20electricity%20customers%20in%202017&text=According%20to%20the%20U.S.%20Energy,the%20United%20States%20in%202017.

27. Improving the Nations Digital Infrastructure, federal Commerce Commission, Office of Strategic Planning and Policy Analysis. January 17 2017.
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2. Infrastructure Investment Needs

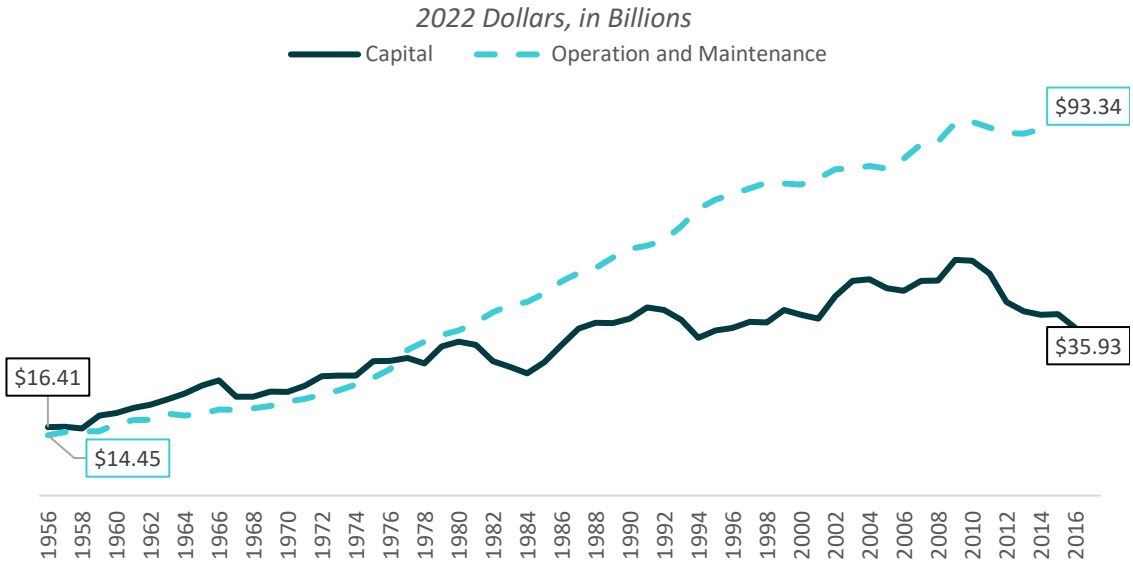
2.1. Water Sector Infrastructure Investment Needs

Water sector infrastructure investment needs are assessed periodically by the United States ("U.S.") Congressional Budget Office ("CBO"), the U.S. Environmental Protection Agency ("EPA"), the American Society of Civil Engineers ("ASCE"), and the American Water Works Association ("AWWA"). For the purposes of this report, the water sector includes drinking water, wastewater, and stormwater. The most recent estimates of needs reported by these agencies and organizations are summarized in this section.

2.1.1. Congressional Budget Office Report

CBO released a report in March 2015 called "*Public Spending on Transportation and Water Infrastructure, 1956 to 2014*" that was subsequently updated with data through 2017.[3] This report presented historical spending in the transportation and water sectors but did not explore future capital investment needs for either sector. The reported trend in the historic capital and operation and maintenance ("O&M") spending by public sector water utilities is shown in Figure 2-1.

Figure 2-1. Public Spending on Water Utilities by Type of Expense[4]



The expenditures shown in Figure 2-1 include water supply and wastewater treatment facilities. This figure depicts a steady increase in water utility expenditures and also suggests some key observations:

[3] Public Spending on Transportation and Water Infrastructure, 1956 to 2017, Congressional Budget Office.

[4] Congressional Budget Office, October 2018.

- Before 1980, spending on O&M was consistent with capital investments, both in magnitude and growth rates. This was a period when significant capital investments were made to expand clean water and drinking water systems, spurred by the CWA in 1972 and SDWA in 1974.
- After this cycle, the pace of spending growth for capital investment slowed relative to continued O&M cost increases. This lower growth in capital investment relative to O&M expenses supports the previously documented reports of a growing backlog of replacement needs due to aging infrastructure.
- As of 2017, nearly three-quarters of all public spending on water utilities was dedicated to system O&M. Despite the well-documented need for substantial capital investment in the water sector, capital spending has not kept pace with the need over this period.

2.1.2. EPA Needs Assessment

EPA completes a needs survey of wastewater and stormwater capital investment needs approximately every five years as required by the Clean Water Act of 1972 ("CWA"). The most recently completed version of the survey was the 2012 Clean Watersheds Needs Survey ("CWNS"), which was published in 2016.[5] As of the date of this report, EPA was in the process of collecting information from states to publish a new edition of the CWNS. The 2012 CWNS identified total wastewater and stormwater infrastructure investment needs of $271.0 billion in 2012 dollars or $337.1 billion in 2022 dollars.[6] The CWNS is intended to document capital infrastructure needs to maintain the current level of utility service over a 20-year forecast period; however, many states did not have documentation of needs over that time span. Therefore, the needs presented in the CWNS are likely understated and more likely represent what a utility plans to spend over a five-year period. The documented wastewater and stormwater infrastructure needs by category are presented in Figure 2-2.

Earlier versions of the CWNS reported the total needs to be $288.9 billion in 2004 and $338.1 billion in 2008 (both presented as 2012 dollars). The CWNS is largely based on published reports, budgets, and capital improvement plans from local governments, state agencies, and other groups. Therefore, the apparent reduction in capital investment needs between 2008 and 2012 may not reflect actual reduction in needs, but rather a reduction in the planned spending over the next five years and/or a reduction in participation in the survey process.

While this survey included stormwater needs estimated at $23.9 billion in 2022 dollars, there is limited information on the comprehensive national capital investment needs associated with stormwater. The most recent attempt to estimate the need on a national scale was completed by the Water Environment Federation ("WEF") Stormwater Institute in 2018, which identified a funding gap for stormwater programs (MS4 compliance activities only) to be $7.5 billion nationally.[7]

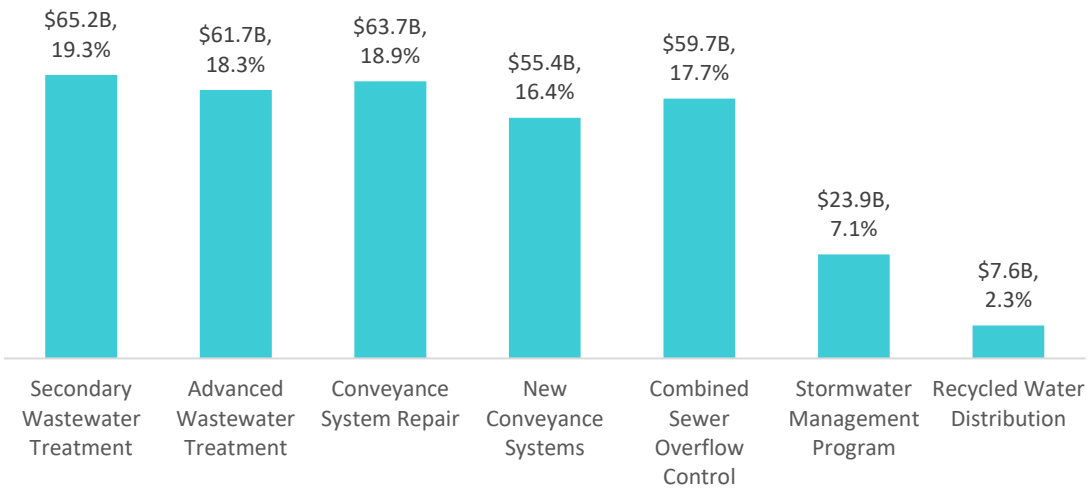
[5] Clean Watersheds Needs Survey 2012, Report to Congress, 2016, US Environmental Protection Agency.

[6] Costs escalated to current dollars using the Consumer Price Index (CPI) for all urban consumers published by the Bureau of Labor Statistics.

[7] National Municipal Separate Storm Sewer System (MS4) Needs Assessment Survey Results, WEF Stormwater Institute. May 2019.

Figure 2-2. Clean Water Utility Infrastructure Investment Needs (EPA 2012)

(2012 Data Escalated to January 2022 Dollars in Billions)



EPA also completes a Drinking Water Infrastructure Needs Survey and Assessment periodically and the sixth edition was submitted to Congress in 2018.[8] This report identified a total 20-year drinking water infrastructure investment need of $472.6 billion in 2015 dollars or approximately $570.1 billion in 2022 dollars. Similar to the CWNS, these survey results may not capture the full 20-year needs. In addition, the identified needs exclude needs associated with infrastructure not eligible for drinking water state revolving fund loan funds, such as raw water, dams, reservoirs, and infrastructure related to population growth. Approximately two-thirds of the needs identified were to address transmission and distribution infrastructure. The breakdown of water infrastructure is presented by water system component and by size of the water system in Figure 2-3 and Figure 2-4, respectively.

It is important to understand drinking water needs because many systems are joint water and wastewater treatment utilities and the same ratepayer pays for both services.

[8] Drinking Water Infrastructure Needs Survey and Assessment: Sixth Report to Congress, 2016, U.S. Environmental Protection Agency, Office of Water.

Figure 2-3 Drinking Water Infrastructure Needs by Infrastructure Component

(2015 Needs Reflected in January 2022 Dollars in Billions)

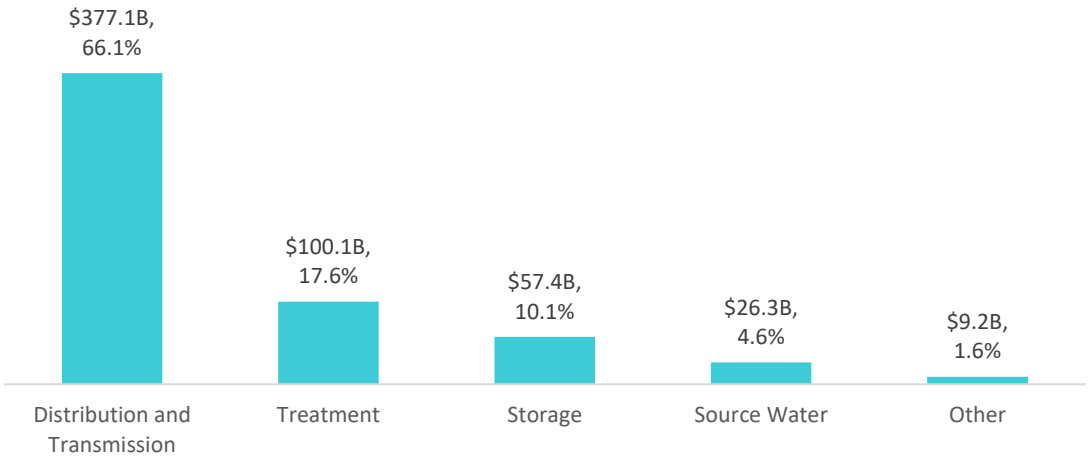
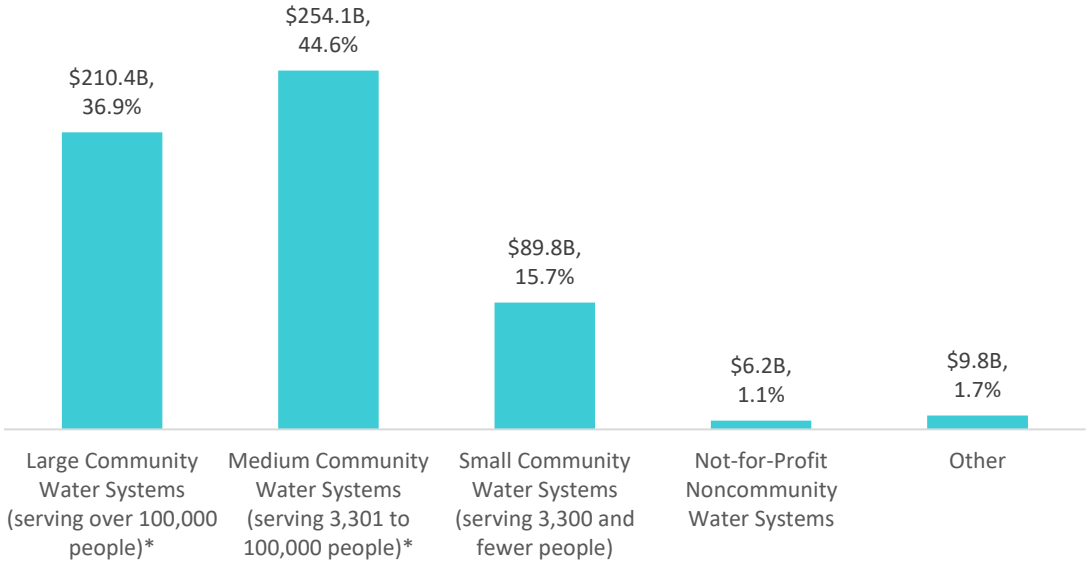


Figure 2-4 Drinking Water Infrastructure Needs by System Size

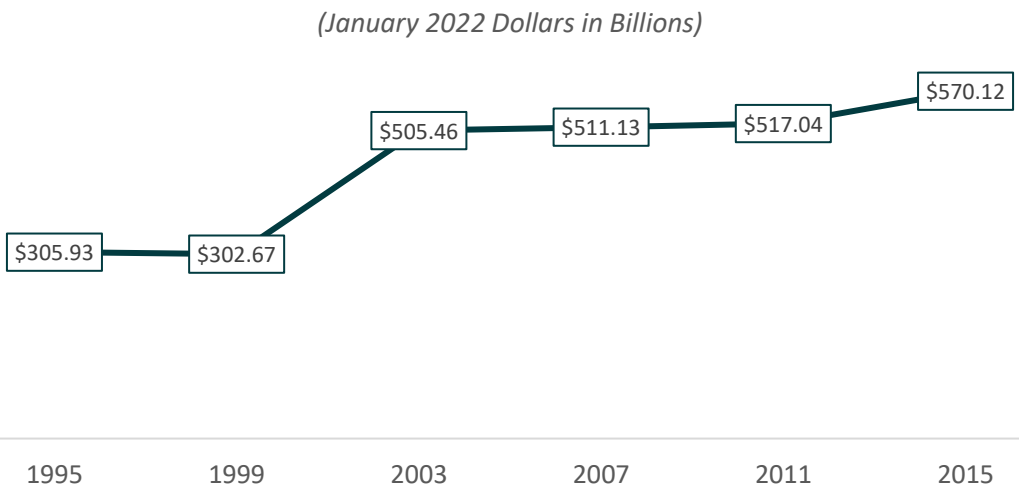
(2015 Needs Reflected in January 2022 Dollars in Billions)



Data from the needs survey further indicated that approximately 12% of the total needs identified were related to compliance with EPA Safe Drinking Water Act ("SDWA") regulations with the remaining portion related to aging infrastructure. Based on the date of this report, the regulatory needs likely do not include potential cost impacts of recent Lead and Copper Rule changes or potential water quality standards that will be released related to per- and polyfluoroalkyl substances ("PFAS") chemicals. These regulations have substantial cost implications that would increase the total water infrastructure needs.

The 2015 Drinking Water Needs Survey and Assessment documents a history of the infrastructure investment needs that were identified in previous reports and there has been a consistent increase in the anticipated 20-year needs since 1995. Figure 2-5 shows the results of the drinking water needs assessments since 1995 and reflects an average annual increase of drinking water infrastructure investment needs of 3.1%. The 2015 Drinking Water Assessment included an asset inventory-based approach to identifying long-term replacement and rehabilitation needs. It is anticipated that as water utilities continue to improve their asset management processes and systems, there is a likelihood that the estimated amount of future infrastructure investment needs will continue to grow.

Figure 2-5 Drinking Water Infrastructure Needs Since 1995



2.1.3. American Society of Civil Engineers Report Card

The American Society of Civil Engineers ("ASCE") completes an evaluation of various infrastructure sector needs and publishes a the ASCE Report Card on the condition of the country's infrastructure approximately every four years. The most recent 2021 ASCE Report Card assigned America's wastewater infrastructure a grade of D+ and water infrastructure a grade of C-.[9]

According to the report card, "*in 2019, the total capital spending on water infrastructure* [including water and wastewater infrastructure] *at all levels was approximately $48 billion, while capital investment needs were $129 billion, creating an $81 billion gap. This underscores a chronic trend of underinvestment in critical water-related infrastructure.*" The reported values of $129 billion and $81 billion in 2019 equates to annual water-related needs of $142.7 billion in annual need and $90.7 billion annual funding gap in 2022 dollars. The ASCE report also documented that water sector O&M costs are outpacing available funding, with a funding gap of $10.5 billion in 2019 ($11.8 billion in 2022). The ASCE also estimates that if funding needs and

[9] 2021 Infrastructure Report Card, Drinking Water, 2021, American Society of Civil Engineers (https://infrastructurereportcard.org/cat-item/drinking-water/)

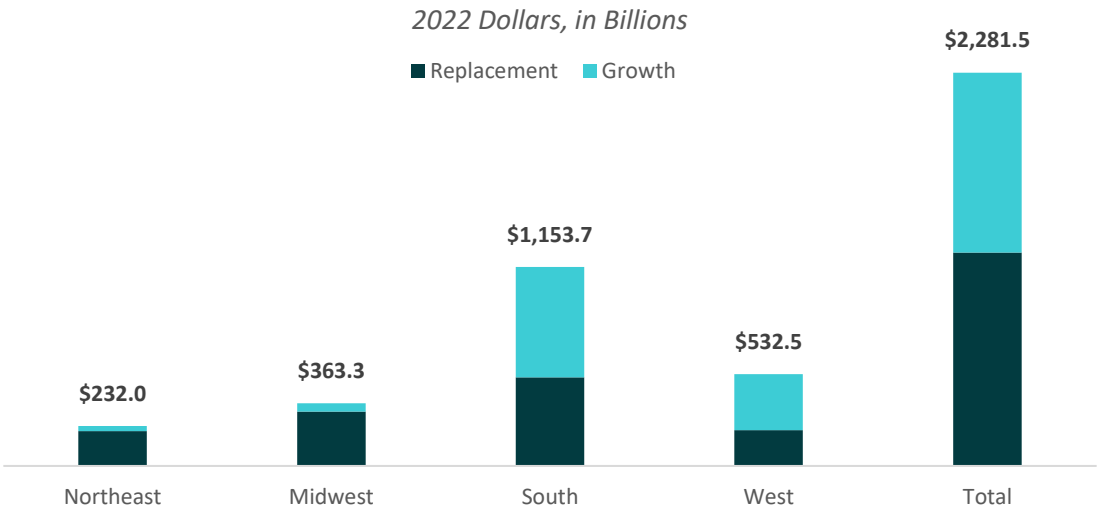
infrastructure trends continue, the cumulative water and wastewater capital investment need between 2019 and 2039 is expected to total $3.27 trillion in 2019 dollars or $3.62 trillion in 2022 dollars.[10]

The ASCE Report estimated the cost to comply with EPA's 2019 Lead and Copper Rule to be between $130 and $286 million.[11] Furthermore, based upon information from the Economic Analysis for the Final Lead and Copper Rule, EPA estimates that there are between 6.3 and 9.3 million lead service lines nationally and the cost of replacing all of these lines is between $25 and $56 billion.[12]

2.1.4. AWWA Buried No Longer Report

The American Water Works Association ("AWWA") published the report, "*Buried No Longer: Confronting America's Water Infrastructure Challenge*" in 2012.[13] This report documented the estimated need to repair and replace the water mains throughout the U.S. based on asset records for installation dates, pipe materials, useful life and pipe size. The report also explored the investment needs to support growth of water systems. The report identified $1.024 trillion of investment need in water mains for 2011 through 2035 and $1.75 trillion of investment through 2050 (in 2010 dollars, which equate to $1.33 and $2.28 trillion in 2022 dollars, respectively). Figure 2-6 summarizes the aggregate water main capital infrastructure investment needs by region from Buried No Longer report.

Figure 2-6. Aggregate Needs for Water Main Investment (AWWA, 2011-2050)



It is difficult to say with certainty how much of the initial water main investment needs identified in the "Buried No Longer" report have been made since its publication. Anecdotal evidence would suggest that water utilities have not prioritized main replacement to the levels suggested by the report.

[10] The Economic Benefits of Investing in Water Infrastructure. How a Failure to Act Would Affect the U.S. Economic Recovery, American Society of Civil Engineers, 2020.

[11] Ibid.

[12] Federal Register information. Accessed at: https://www.federalregister.gov/documents/2021/06/16/2021-12600/national-primary-drinking-water-regulations-lead-and-copper-rule-revisions-delay-of-effective-and#:~:text=Based%20upon%20information%20from%20the,between%20%2425%20and%20%2456%20billion.

[13] Buried No Longer: Confronting America's Water Infrastructure Challenge, 2012, American Water Works Association.

2.1.5. Summary of Total Water Sector Funding Needs

A summary of the water sector infrastructure investment needs is provided in Table 2-1 from the various sources discussed above. The information was scaled to a 20-year estimate and an annualized estimate over this period. As shown, estimates of infrastructure needs over the next 20 years vary depending upon the source of the information and the infrastructure included in the estimates. However, the most comprehensive total water sector estimate, including infrastructure investment for replacement, as well as population growth and cost of lead service line replacement, is $2.913 trillion over 20-years or $146 billion annualized. This estimate combines the 2021 ASCE estimate with the EPA lead line replacement cost estimate.

Table 2-1: Summary of Water Sector Funding Needs (2020-2039)

Source	Sector	Total Need (in 2022 $s)	Annual Need (in 2022 $s)
EPA Clean Watershed Needs Survey (2012)	Wastewater and Stormwater (replacement)	$337.1	$16.9
EPA Drinking Water Needs Survey (2018)	Drinking Water (replacement)	$570.1	$28.5
AWWA Buried No Longer (2012)	Water Mains (growth and replacement)	$1,064.0	$53.2
ASCE Failure to Act (2020)	Total Water Sector	$3,618.0	$180.9
ASCE Infrastructure Report Card (2021)	Total Water Sector	$2,854.6	$142.7
EPA Federal Register (2021)	Lead Line Replacement	$58.5	$2.9
ASCE (2021) and EPA (2021)	**Total Water Sector**	**$2,913.1**	**$145.7**

in $ billions of dollars

2.2. Other Infrastructure Sector Investment Needs

Research was completed to identify the infrastructure investment needs of other sectors, including transportation (roads), power (electricity), broadband, levees, and inland waterways. The investment needs in these sectors are summarized below.

2.2.1. Transportation (Roads) – U.S. Department of Transportation

There are over 4 million miles of public roadways in the U.S., including federal, state, and local roads, that are critical for carrying people and goods to their destinations. The number of vehicle miles traveled on roads in "poor" condition has risen from 15% to more than 17% over the last decade, indicating that the need for road infrastructure investment has increased over this period of time.[14]

The funding need for roadway and bridge capital needs was estimated at $786 billion in 2021. The bulk of the backlog ($435 billion) is in repairing existing roads, while $125 billion is needed for bridge repair, $120 billion is needed for capacity expansion, and $105 billion is needed for safety enhancements,

[14] Infrastructure Report Card, American Society of Civil Engineers, 2021.

operational improvements, and environmental projects.[15] Furthermore, ASCE estimates that over the next 20 years, the funding required to rehabilitate roadway pavement will average $53 billion annually. The total cumulative surface transportation infrastructure investment needs over the period from 2020 to 2029 was estimated to be $5.392 trillion in 2019 dollars or $5.966 trillion in 2022 dollars.[16]

Table 2-2 provides a summary of the total infrastructure funding needs for the 20-year period from 2020 to 2039 based on the 2021 ASCE Infrastructure Report.[17]

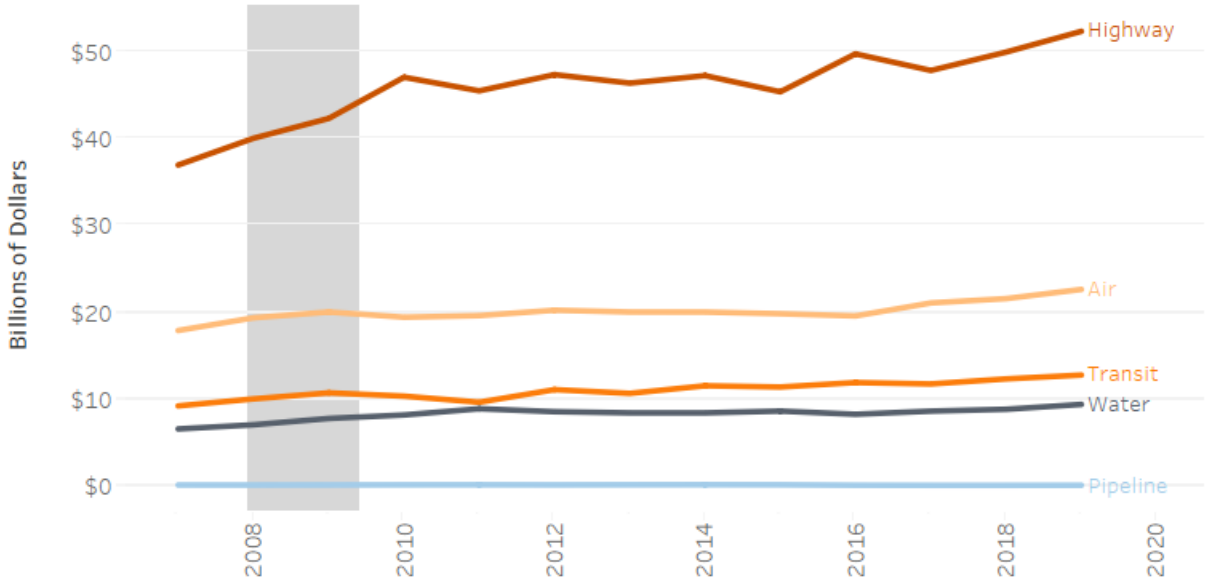
Table 2-2: Surface Transportation Funding Needs (2020-2039)

Infrastructure Category	Annual Need (in 2019 $s)	Total Need (n 2019 $s)	Annual Need (in 2022 $s)	Total Need (in 2022)
Surface Transportation	$270	$5,392	$298	$5,966

in $ billions of dollars

A breakdown of the historical trends in infrastructure expenditures by mode of transportation from 2008 to 2020, including surface, air, and water transportation is provided in Figure 2-7.[18]

Figure 2-7. Trends in Transportation Expenditures by Modes of Transportation (2012 $s)



Spending on highways and roads is split between state and local governments. In 2019, states provided 62 percent of highway and road spending while local governments provided 38 percent.

[15] Ibid.

[16] Failure to Act, Economic Impacts of Status Quo Investment Across Infrastructure Systems, prepared by EPB and ASCE, 2020.

[17] Data from Failure to Act, American Society of Civil Engineers, 2021 and Facts & Figures from American Short Line and Regional Railroad Association, 2017.

[18] Bureau of Transportation Statistics, U.S. Department of Transportation. Accessed at: https://www.bts.gov/browse-statistical-products-and-data/gtfs/transportation-expenditure-trends-by-level-of-gov-and-mode

State spending is typically for highways and tollways; whereas, local governments spend more money on local streets and roads.[19]

2.2.2. Power Sector - Department of Energy

Power infrastructure in the U.S. is used to generate, transmit, and distribute electricity. Electricity delivery is through a complex network of power generation facilities, 600,000 miles of transmission lines, and approximately 5.5 million miles of local distribution lines. Similar to water infrastructure, the majority of the nation's electricity grid is aging, with some components over 100 years old, and 70% of transmission and distribution lines past 50% of their lifespan.[20] In 2020, ASCE released a study highlighting energy infrastructure and the criticality of the need to invest in improvements.[21] According to this report, there is a significant investment gap in U.S. power generation and distribution. The historical annual average spending (from 2013 to 2019) was $87 billion in 2019 dollars, or $96 billion in 2022 dollars, as summarized in Table 2-3.

Table 2-3: Annual Capital Expenditures for Electricity Infrastructure (2013-2019)

Expenditure Type	Average Annual Expenditure	Low Annual Expenditure	High Annual Expenditure
Generation	$35	$32	$42
Transmission	$20	$17	$24
Distribution	$31	$22	$36
Total	$87	$74	$95

in $ billions (2019)

Projected forward, this level of spending from 2020 to 2029 totals $1.925 trillion in 2022 dollars. The shortfall in electricity infrastructure investment is estimated to be $208 billion by 2029 with that figure rising to $338 billion by 2039 in 2019 dollars or $374 billion in 2022 dollars.[22] Therefore, the total estimated electricity infrastructure investment needs over the 20-year period from 2020 to 2029 was estimated to be $2.299 trillion, as summarized in Table 2-4. Despite the gap, transmission infrastructure has benefited from increased annual spending nationally from $15.6 billion per year in 2012 to $21.9 billion in 2017 driven by a focus on increasing the grid's reliability, security, and resilience.

Table 2-4: Power Sector Funding Needs (2020-2039)

Infrastructure Category	Annual Need (in 2019 $s)	Total Need (in 2019 $s)	Annual Need (in 2022 $s)	Total Need (in 2022 $s)
Power Sector (Electricity)	$104	$2,078	$115	$2,299

in $ billions of dollars

[19] Highway and Road Expenditures | Urban Institute https://www.urban.org/policy-centers/cross-center-initiatives/state-and-local-finance-initiative/state-and-local-backgrounders/highway-and-road-expenditures#Question2Highway

[20] ASCE 2021 Infrastructure Report Card, supra, citation 14, Energy.

[21] Failure to Act: Electric Infrastructure Investment Gaps in a Rapidly Changing Environment Report, prepared by EBP and ASCE. 2020.

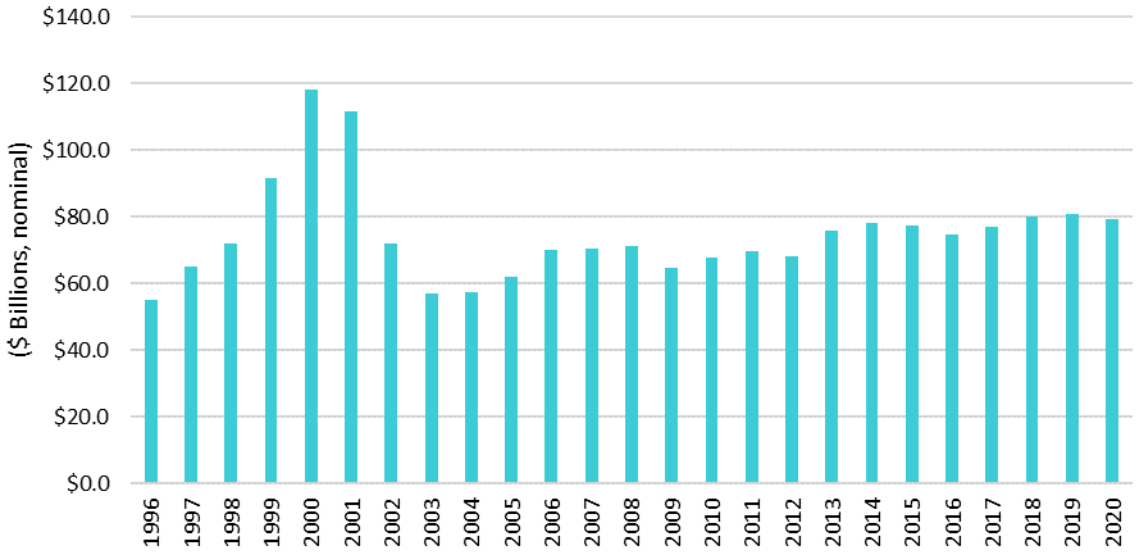
[22] ASCE 2021 Infrastructure Report Card, supra, citation 14, Energy.

2.2.3. Broadband

Broadband is a generic term for high-speed internet access. The historical infrastructure spending on broadband has averaged $75 billion per year from 1996 to 2020 as shown in Figure 2-8. When the coronavirus pandemic forced millions of Americans to stay home in 2020 and 2021, an estimated one in five school-aged children lacked the high-speed internet connection needed to access lessons and other materials.[23]

The U.S. reliance on fast internet is only forecasted to grow in the coming years. The Federal Communications Commission ("FCC") estimates that it will cost $40 billion to $80 billion (in 2017 dollars) or $46 billion to $96 billion (in 2022 dollars) to expand broadband coverage. The lower estimate would increase coverage from 86% to 98% broadband coverage and the higher estimate would achieve 100% coverage nationally.[24]

Figure 2-8. Trends in Broadband Expenditures



Source: 2020 Broadband CAPEX Report, US Telecom, accessed at: USTelecom-2020-Broadband-Capex-Report.pdf

2.2.4. Other (Levees, Waterways, etc.)

There are approximately 40,000 miles of levees across the U.S. that protect critical infrastructure systems and property. Approximately 30,000 miles of levees are included in the U.S. Army Corp of Engineers ("USACE") portfolio and the remaining 10,000 outside the portfolio whose location and condition are unknown due to complex and varying local ownership. In 2018, it was estimated that $21 billion is needed to improve and maintain the moderate-, high-, and very high-risk levees in USACE's portfolio, so

[23] ASCE 2021 Infrastructure Report Card, supra, citation 14, Broadband.

[24] Improving the Nations Digital Infrastructure, federal Commerce Commission, Office of Strategic Planning and Policy Analysis.

that actual cost to improve the levees is likely much higher.[25] Extrapolating the reported need to the total miles of levees results in an estimated need of $25.6 billion in 2022 dollars.

The U.S. waterway network is comprised of locks, dams, and navigation channels. There are approximately 12,000 miles of inland navigation channels and 11,000 miles of intracoastal waterways owned and operated by USACE. Most of the mileage of USACE's inland network is comprised of the Mississippi River and connecting waterways. Inland waterways are an important part of the multi-modal freight network and nearly 830 million tons of cargo are moved on the inland waterways system annually. The ASCE estimates that the backlog of infrastructure investment needs associated with inland waterways totals approximately $6.8 billion in 2021 dollars or $7.1 billion in 2022 dollars.[26]

2.3. Summary of Infrastructure Sector Investment Needs

A summary of the infrastructure investment needs associated with water, transportation (roads), power (electricity), broadband, levees, and inland waterways is provided in Table 2-5 from the various sources discussed above. The information was scaled to a 20-year estimate and an annualized estimate over this period. As shown in Table 2-5, the water sector has the second highest total infrastructure needs as compared to the needs of the other infrastructure sectors that were examined.

Table 2-5: Summary of Infrastructure Sector Investment (2020-2039)

Sector	Total Need (in 2022 $s)	Annual Need (in 2022 $s)
Transportation (Roads)	$5,966	$298.3
Water Sector	**$2,913**	**$145.7**
Power (Electricity)	$2,299	$115.0
Broadband	$92	$18.5
Levees	$25.6	$1.3
Inland Waterways	$6.8	$0.3

in $ billions of dollars. Broadband total needs annualized over five years.

[25] A Summary of Risks and Benefits Associated with the USACE Levee Portfolio, U.S. Army Corps of Engineers Levee Portfolio Report, March 2018.

[26] ASCE 2021 Infrastructure Report Card, supra, citation 14, Inland Waterways

3. Federal Funding Support

Federal funding for clean water infrastructure, as a national objective, originated in the CWA of 1972. The Title II program within the CWA provided grant funding for the construction of wastewater treatment facilities. Annual allocations were distributed among the states using a formula contained in the CWA, and through fiscal year ("FY") 1984, Title II grants represented the largest federal nonmilitary infrastructure project outside of the interstate highway system with $41 billion appropriated in nominal dollars.[27] In 2021 dollars, those Title II grants appropriated just from FY 1973 through FY 1984 represent $171 billion in appropriations, or $14.2 billion per year. Moreover, the federal contribution limit for Title II grants through FY 1984 was 75% of the total construction cost, an important metric for comparison to current water sector funding mechanisms and federal contribution limits, which are largely centered around subsidized interest rates on loans.

Since the Title II grant program ended, other funding programs and mechanisms for the clean water sector have arisen across the federal government. Various agencies have enabled funding for the clean water and drinking water sectors in support of their own agency-specific missions. The following sections provide an overview of the salient features of the major funding programs.

3.1. Current Water Infrastructure Federal Funding Programs

3.1.1. Environmental Protection Agency

EPA has been the primary federal funding source for the clean water sector since the Title II program. The 1987 Water Quality Act phased out the Title II construction grants in favor of establishing the Clean Water State Revolving Fund ("CWSRF") program, which provides subsidized loans in favor of grant funding. In addition to the CWSRF program, EPA administers a collection of grants to support water infrastructure under the umbrella of State and Tribal Assistance Grants ("STAG"). More recently, the Water Infrastructure Finance and Innovation Act ("WIFIA") provided a major new source of federal clean water funding support. The following sections provide details on STAG, its structure, funding mechanisms, and recent changes.

3.1.1.1. STATE AND TRIBAL ASSISTANCE GRANTS

As part of its annual appropriations, EPA is charged with disbursing grant money through its STAG program. In broad terms, STAG can be divided into three buckets: capitalization grants to state CWSRF programs, capitalization grants to state DWSRF programs, and "other" grants which are directed at specific water sector funding priorities.

Each state operates its own CWSRF and DWSRF programs. As they are functionally similar, only the CWSRF program will be described here. The federal government makes an annual appropriation to STAG, with specified amounts designated to the CWSRF program, which is then allocated among the states according to a formula. Each state is typically required to provide a 20% match to qualify to receive

[27] Congressional Research Service, Infrastructure and Jobs Act (IIJA): Drinking Water and Wastewater Infrastructure, January 4, 2022. https://crsreports.congress.gov/product/pdf/R/R46892

its full allocated amount. At its inception, the CWSRF program was envisioned to become a self-sustaining subsidized loan program, in which continuing capitalization and loan repayments created a growing pool of money from which subsidized loans could be made. In this case, "subsidized loans" mean that loans must have interest rates at or below the market rate, inclusive of interest-free loans, and that the loan terms may be up to 30 years or the useful life of the project. The strategy of subsidized loans represented something of a sea change from the prior wastewater construction grant program.

In recent years, legislative tweaks have introduced the notion of "additional subsidies" to the CWSRF program, such as principal forgiveness, negative interest rates, and even grants. In 2014, amendments to the CWA provided authority to states that allowed for additional subsidization, matching the authority granted to CWSRF programs in the 1996 SDWA amendments. Additional subsidization was not predicated on different eligibility requirements than the current CWSRF requirements on the federal level. Recent appropriations have gone even further, and now require states to use a minimum of their CWSRF grants towards additional subsidization. In FY 2021, states were required to spend a minimum of 10% of their CWSRF grants on additional subsidization.[28]

The types of projects eligible for CWSRF funding depend on the types of agencies seeking support. Any municipality, or inter-municipal, interstate, or state agency may receive CWSRF funding for the following sorts of projects: construction of publicly owned treatment works; water conservation, efficiency, and reuse; and energy efficiency. Any public, private, or nonprofit entities are eligible for CWSRF funding for: nonpoint source projects; national estuary program projects; decentralized wastewater treatment systems; stormwater; watershed pilot projects; water reuse; and security measures at publicly owned treatment works. Finally, any qualified nonprofit entity may qualify for technical assistance for small and medium sized publicly owned treatment works to plan, develop, and obtain financing for CWSRF-eligible projects.

In recent years, appropriations to CWSRF and DWSRF capitalization grants have represented roughly two-thirds of total STAG appropriations made in the normal annual appropriations process. The remaining third of STAG grants are in a broad array of EPA funding categories, not limited to water infrastructure. For example, STAG grant programs direct funding towards areas such as diesel emissions reductions and targeted airsheds. Over 20 grant areas are labeled as "Categorical Grants" which target specific funding priorities, some of which may be applicable towards clean water infrastructure, such as Wetlands Program Development and Underground Injection Control.

In 2019, the annual federal appropriations for the CWSRF and the DWSRF programs were $1.7 billion and $1.2 billion, respectively. These additional appropriations contribute to the revolving nature of these funds.[29] An additional $40 million in special project funding was appropriated in 2019 as well.

The 2016 Water Infrastructure Improvements for the Nation ("WIIN") Act established a number of new grant programs in response to varying drinking water challenges across the country, most notably the emergence of Flint, MI, as a high-profile community responding to widespread lead service lines. For example, the legislation authorized EPA to create the Small, Underserved, and Disadvantaged Communities ("SUDC") Grant Program to provide grant funding to help such systems meet SDWA

[28] Ibid.

[29] Water Infrastructure Financing: History of EPA Appropriations, Congressional Research Service, April 10, 2019.

requirements. Grants are allocated among states, tribes, and territories according to a formula, and in FY 2021 ~~the~~ EPA intended to award approximately $25.8 million through this program.[30] However, it should also be noted that while Congress took the effort to authorize numerous programs, many of them have yet to receive funding and were not stood up.

The CWSRF and DWSRF grants to states are intended such that the states determine the project prioritization and funding levels within the constraints provided by the respective SRF programs. However, the FY 2022 omnibus spending bill passed by Congress included earmarks for specific projects identified by lawmakers within the appropriations to the SRF programs. Those earmarks represented roughly 30% of the total SRF appropriations, and it is unknown what role and to what extent earmarks will play in future funding.

3.1.1.2. WATER INFRASTRUCTURE FINANCE AND INNOVATION ACT (WIFIA)

The WIFIA Act of 2014 provided an alternative to the SRF program as a mechanism to subsidize water infrastructure projects. Like STAG funding, the WIFIA program is administered by EPA. The WIFIA program lacks the perpetual nature of a revolving fund, but its subsidization mechanism, namely low interest rate loans, is similar to the SRF program. The interest rate of a WIFIA loan is set equal to that of a U.S. Treasury rate of a similar maturity on the date of issuance. A distinguishing feature to WIFIA funding is its customizability. The loan term may be up to 35 years in length and repayment may be deferred up to five years after substantial completion of the project. Moreover, the repayment schedule can be structured according to the needs of the borrower. For instance, repayment can be structured such that the borrower makes small payments in the initial years until existing loans are repaid, thereby freeing up additional capacity for debt service.

A significant difference between the WIFIA and SRF programs is that WIFIA is designed to only provide a minority of funding (up to 49% of project costs) and smaller projects are not eligible for WIFIA funding. The minimum project size for large communities is $50 million and communities with populations of 25,000 or less require a $5 million minimum project size for eligibility.[30] As the WIFIA program is designed to provide only a minority of total project funding, another benefit is that in some cases the WIFIA loan can be made subordinate to other loans, which increases coverage ratios on senior debt.

Section 4201 of America's Water Infrastructure Act ("AWIA") of 2018 created the state infrastructure financing authority WIFIA ("SWIFIA"), which operates under the same structure as WIFIA loans. The major difference between WIFIA and SWIFIA is that the only eligible recipients of SWIFIA funds are the state infrastructure financing authorities, which are the State entities designated to receive capitalization grants for the SRF programs.

Most recently, the Further Consolidated Appropriations Act of 2022 provided $58.5 million for the WIFIA program, which EPA estimates will provide approximately $5.5 billion in credit assistance and may finance approximately $11 billion in water infrastructure investment.[31] In addition, the Act provided $5 million in budget authority for the cost of direct loans to state infrastructure financing authority

[30] EPA, "WIFIA Program Information", https://www.epa.gov/sites/default/files/2021-03/documents/wifia_program_overview_factsheet.pdf

[31] Notice of Funding Availability for Credit Assistance under the WIFIA Program. June 10, 2022. Accessed at: https://www.epa.gov/system/files/documents/2022-06/Pre-Publication_WIFIA_NOFA%20FY22.pdf

borrowers for projects under SWIFIA. EPA estimates that the budget authority may provide approximately $1 billion in credit assistance and may finance approximately $2 billion in infrastructure investments.[32] Since 2017, the WIFIA program has received $319 million in federal funding appropriated by Congress and has closed on 88 loans and provided $15.3 billion in total financing.[33]

3.1.2. Bureau of Reclamation

The U.S. Bureau of Reclamation ("USBR") provides funding for a variety of water infrastructure priorities under the umbrella of its WaterSMART program, similar to the manner in which EPA's STAG program is an umbrella for its funding programs. The funding opportunities in WaterSMART vary in eligibility requirements as well as federal cost sharing limits. However, WaterSMART funding is grant-based, unlike the loan-based WIFIA and SRF programs, and these funding activities are generally limited to the "17 Western States" that USBR has historically operated in since its founding in 1902: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. Additionally, Alaska and Hawaii are eligible for funding as are certain U.S. territories, including American Samoa, Guam, the Northern Mariana Islands, the Virgin Islands, and Puerto Rico.

The funding programs available through WaterSMART are briefly described below[34]:

- **Water and Energy Efficiency Grants** – On-the-ground water management improvement projects, including projects that conserve water and address water supply reliability.
- **Small-Scale Water Efficiency Projects** – Small water efficiency improvements that have been identified through previous planning efforts.
- **Water Marketing Strategy Grants** – Planning activities to develop water marketing strategies that establish or expand water markets or water marketing activities between willing participants
- **Drought Resiliency Projects** – Funding for on-the-ground projects and modeling tools that will increase water reliability and improve water management.
- **Environmental Water Resources Projects** – Water conservation and efficiency projects that result in quantifiable and sustained water savings and benefit ecological values, water management or infrastructure improvements to mitigate drought-related impacts to ecological values, and watershed management or restoration projects benefitting ecological values that have a nexus to water resources or water resources management.
- **Applied Science Grants** – Projects to develop hydrologic information and water management tools and to improve modeling and forecasting capabilities.
- **Cooperative Watershed Management Program - Phase I** – Watershed group development, watershed restoration planning, and watershed management project design.

[32] Notice of Funding Availability for Credit Assistance Under SWIFIA Program, accessed at https://www.federalregister.gov/documents/2022/06/17/2022-12986/notice-of-funding-availability-for-credit-assistance-under-swifia-program

[33] Information accessed at: https://www.epa.gov/wifia

[34] Project descriptions are found on "Status of WaterSMART Program Funding Opportunities", https://www.usbr.gov/watersmart/docs/WaterSMART_Schedule.pdf

- **Title XVI Authorized Projects** – Funding for planning, design, and construction of specific congressionally authorized water recycling and reuse projects.
- **Title XVI Water Infrastructure Improvements for the Nation (WIIN) Act Water Reclamation and Reuse Projects** – Funding for planning, design, and construction of WIIN Act water recycling and reuse projects.
- **Desalination Construction** – Funding for planning, design, and construction of WIIN Act brackish groundwater and ocean desalination projects.
- **Drought Contingency Planning** – Funding for development, or update, of comprehensive drought plans.
- **Drought Emergency Response Actions** – Emergency response actions undertaken by Reclamation to minimize losses and damages resulting from drought.

In 2019, USBR and EPA signed a Memorandum of Understanding to leverage the WIFIA and Title XVI programs, with each agency committing to give additional consideration to projects that had won funding under the other's funding program.[35]

Since 2016, Department of the Interior has funded 749 WaterSMART projects using $365 million in federal funding and leveraged $1.1 billion dollars in non-federal funds. In addition, the IIJA included federal funding for the WaterSMART program totaling $400 million over five years.

3.1.3. Army Corps of Engineers

Civil works is one of the three primary mission areas of the USACE and is composed of three business lines: navigation, flood and storm damage protection, and aquatic ecosystem restoration. USACE is known for the large public works they construct and operate, such as locks, dams, and hydropower, but USACE also provides funding for water sector infrastructure through two separate funding programs.

USACE's Section 219 program was congressionally authorized as part of the 1992 Water Resource Development Act ("WRDA"), which allows USACE to provide assistance to three types of projects collectively known as environmental infrastructure: drinking water treatment and distribution, wastewater treatment, and stormwater management. Congress authorizes specific projects by designating the geographic location, the purpose of the project, and the amount of authorized dollars. Most projects require cost-sharing, with a 25% nonfederal cost share requirement as the typical minimum. Between 1992 and 2007, Congress authorized 310 projects, though 58 were later de-authorized. Between 1992 and 2017, USACE expended roughly $440 million on Section 219 projects. However, a recent Government Accountability Office ("GAO") report found that USACE lacked consistent prioritization standards for Section 219 projects.[36]

Recently, WIFIA also established the Corps Water Infrastructure Financing Program ("CWIFP"). This new program is structured in a near identical manner to the WIFIA financing program, with the same program features and financial benefits (e.g., funds a minority of project costs, loan terms of up to 35

[35] https://www.epa.gov/sites/default/files/2019-11/documents/mou_administering_and_servicing_federal_credit_instruments.pdf

[36] "Army Corps of Engineers: Process for Selecting Section 219 Projects for Funding Could be Strengthened", United States Government Accountability Office, June 2019. https://www.gao.gov/assets/gao-19-487.pdf

years with interest rates near those of U.S. Treasuries, etc.). As of February 2022, CWIFP had received $76 million for credit subsidy, which will enable the issuance of approximately $7 billion in loans. However, eligible projects are limited only to dam safety projects. In 2018, the Army Corps of Engineers and EPA signed a Memorandum of Understanding to cooperate in the administration of the WIFIA program.[37]

Similar to the situation with SRF appropriations, Congress also included Congressional Directed Projects, or earmarks, through USACE for water-related infrastructure in recent USACE legislation. It remains to be seen whether Congress will continue this earmark process in the years ahead.

3.1.4. USDA Rural Development Water and Environmental Program

The U.S. Department of Agriculture ("USDA") Rural Development is designed to assist rural communities of 10,000 or fewer residents. Rural Development works in several different areas, but its Water and Environmental Program is designed to assist communities in receiving both technical assistance and financing for clean water and waste disposal systems. The financing program includes both loans and grants. The loans provided are at fixed rates with terms of up to 40 years. Interest rates as of January 2022 range from 1.125% to 2.125%.

Availability of grant funding is determined by the local economic conditions, as measured by the Median Household Income ("MHI"). The maximum fraction of grant funding is 75% of project costs and is only achievable for water and wastewater projects necessary to protect public health and for communities with an MHI that is below the higher of either the federal poverty level or 80% of the state nonmetropolitan household income.

In 2021, USDA Rural Development funded $2.12 billion in water and wastewater construction costs.[38] Between FY 1965 and FY 1995, the USDA RD program spent $28 billion in 1994 dollars, or approximately $51 billion in 2021 dollars, which equates to approximately $1.65 billion per year.[39]

3.1.5. Housing and Urban Development Community Development Block Grants

The Department of Housing and Urban Development ("HUD") Community Development Block Grants ("CDBG") are grants provided on a formula basis to states, cities, and counties. Eligible communities are identified as being any of the following: principal cities of Metropolitan Statistical Areas, other metropolitan cities with populations of at least 50,000, qualified urban counties with populations of at least 200,000 (excluding the population of entitled cities), and states and insular areas. Allocations to the eligible communities are then made on a formula basis that considers a variety of objective measures including the extent of poverty, population, housing overcrowding, age of housing, and lag in population growth relative to other metropolitan areas. Grants are intended to "provide decent housing and a suitable living environment, and by expanding economic opportunities, principally for low- and

[37] https://www.epa.gov/sites/default/files/2019-11/documents/mou_wifia-dept_of_army.pdf

[38] https://www.rd.usda.gov/newsroom/news-release/water-and-environmental-programs-update-take-advantage-historically-low-interest-rates

[39] GAO, "Rural Development: USDA's Approach to Funding Water and Sewer Projects", September 1995., accessed at https://www.govinfo.gov/content/pkg/GAOREPORTS-RCED-95-258/html/GAOREPORTS-RCED-95-258.htm

moderate-income persons."[40] The CDBG program was funded at a level of $3.45 billion in 2021, which was an increase of $50 million over the 2020 funding level. The ability to use CDBG funds for water and wastewater treatment projects is explicitly allowed, though unlike other funding programs described thus far, water and wastewater projects are not the primary purpose of the CDBG program.

One of the largest investments of CDBG is public utility development specifically for water and sewer improvements as well as for stormwater drainage. In 2021, grantees applied nearly $400 million for water and sewer upgrades, which represented over 11% of all CDBG expenditures for the year.[41]

3.1.6. Department of Commerce Economic Development Administration

The Economic Development Administration's ("EDAs") mission "…is to lead the federal economic development agenda by promoting innovation and competitiveness, preparing American regions for growth and success in the worldwide economy." EDA provides grants and revolving loan funds to local entities in furtherance of their mission. Public Works is one of nine funding programs, including Economic Adjustment Assistance, Assistance to Coal Communities, Assistance to Nuclear Closure Communities, Partnership Planning, Technical Assistance, Research and Evaluation, Trade Adjustment Assistance, Regional Innovation Program (Build to Scale), and STEM Apprenticeships. In FY 2020, appropriations for Public Works represented $118.5 million out of the total $292.5 million appropriated for the EDA program. The funding for Public Works in FY 2020 is consistent with the recent average funding of $118 million in 2019 dollars for 2010 to 2019.[42] EDA is designed to be flexible and a review of recently funded Public Works projects showed a range of projects in furtherance of EDA's mission: extension of roadways and sewerage to future industrial development sites, a pumping station, and a water treatment operator training center.

3.1.7. Infrastructure Investment and Jobs Act

In 2021, Congress passed the Infrastructure Investment and Jobs Act ("IIJA"), directing $550 billion of new spending in FY 2022 through 2026 at an array of infrastructure sectors. For the water sector, IIJA spending is directed primarily through funding programs at EPA and USBR. New appropriations for the water sector of approximately $50 billion are directed primarily at existing funding programs (mainly SRF programs). However, while using existing funding programs, the IIJA does direct spending to specific new spending priorities, namely lead service line replacement and emerging contaminants (e.g., PFAS). The major spending categories are:[43]

[40] https://www.hud.gov/program_offices/comm_planning/cdbg#eligibleactivities

[41] CDBG Improving Lives and Strengthening Communities, A Report by the CDBG Coalition. April 12, 2022. Accessed at: https://coscda.org/wp-content/uploads/2022/04/CDBG-Impact-Report-April-12-2022FINAL.pdf

[42] https://www.urban.org/sites/default/files/publication/105006/economic-development-administration-programs-and-project-types_1.pdf

[43] EPA, "Bipartisan Infrastructure Law: A Historic Investment in Water", https://www.epa.gov/system/files/documents/2021-11/e-ow-bid-fact-sheet-final.508.pdf

- **Safe Drinking Water**
    - **Lead Service Line Replacement** - $15 billion is provided to the DWSRF program, with 49% of funds to be used as grants or principal forgiveness loans and the remainder as low-interest loans. No state match is required.
    - **DWSRF** - $11.7 billion in new appropriations is made to the DWSRF program, with 49% of funds to be used as grants or principal forgiveness loans and the remainder as low-interest loans. The required state match is reduced to 10%.
    - **Addressing Emerging Contaminants through the DWSRF** - $4 billion to be used as grants or principal forgiveness loans to remediate PFAS in drinking water. No state match is required.
    - **Addressing Emerging Contaminants in Disadvantaged Communities** - $5 billion of new funding is being made through Small, Underserved, and Disadvantaged Communities Grants to remediate PFAS in drinking water. (To speak to the scale of this spending, in FY 2021 EPA intended to award $25.8 million in SUDC grants.)
- **Clean Water for Communities**
    - **CWSRF** - $11.7 billion in new appropriations is made to the CWSRF program, with 49% of funds to be used as grants or principal forgiveness loans and the remainder as low-interest loans. The required state match is reduced to 10%.
    - **Addressing Emerging Contaminants** - $1 billion to be provided through the CWSRF program as grants or principal forgiveness.
- **Protecting Regional Waters**
    - **Geographic Programs** - $1.7 billion of funding directed to 12 federally recognized geographic programs.
    - **National Estuary Program** - $132 million of funding directed to 28 federally recognized estuaries.
- **Title XVI Water Reclamation and Reuse Grants** - $550 million for USBR's Title XVI grant program. The majority of funding is likely to be directed to the Title XVI-WIIN program, which is a competitive grant, as opposed to the Title XVI program contained congressionally authorized projects and which has not had new projects added since 2009. Funding is limited to entities in the Western states.

The IIJA also appropriates $8.3 billion in new spending for water infrastructure in the Western states.[44] Like the IIJA appropriations to the EPA, much of this money is to be distributed through existing programs, though funding programs will be new. The $8.3 billion is allocated to the following areas:

- Aging infrastructure ($3.2 billion)
- Water storage projects ($1.05 billion)
- Rural water projects ($1.0 billion)

[44] Bureau of Reclamation Provisions in the Infrastructure Investment and Jobs Act (P.L. 117-58), Congressional Research Service, February 16, 2022. https://crsreports.congress.gov/product/pdf/R/R47032

- Water recycling and reuse ($1.0 billion, $550 million of which is directed to Title XVI and Title XVI-WIIN grants programs)
- Dam safety projects ($500 million)
- Water energy and efficiency projects through WaterSMART ($400 million)
- Upper and Lower Colorado River drought contingency plans ($300 million)
- Water desalination projects ($250 million)
- Ecosystem restoration ($250 million)
- Cooperative Watershed Management Program ($100 million)
- Watershed health improvement ($100 million)
- Colorado River endangered fish ($50 million)

The funding to address aging infrastructure is designed to assist USBR in maintenance of its own assets. However, USBR generally operates under a "beneficiary-pays" model and since the beneficiaries of USBR projects do not own the assets, they cannot obtain financing for major repairs to the assets. This $3.2 billion is thus being used to establish an internal revolving loan fund in which USBR can pay for repairs and to its assets and recoup the costs from the beneficiaries over a period of up to 50 years.

The other new USBR funding program contained within the IIJA is the watershed health improvement program. The program is to be established to award competitive grants for the design, implementation, and monitoring of multi-benefit habitat restoration projects in river basins that have been adversely impacted by USBR projects.

3.1.8. Other Funding Programs

In recent years there have been other funding sources for the clean water sector, though unlike the previously federal funding sources, these sources should be considered less programmatic or "one-off" temporary funding sources. As part of the response to the Covid-19 pandemic, Congress created the Low-Income Household Water Assistance Program ("LIHWAP"), which is administered through the Department of Health and Human Services. The LIHWAP program, as the name implies, provides water bill assistance to low-income households and is modeled on the Low-Income Home Energy Assistance Program ("LIHEAP"). However, LIHWAP only funds customer bills, and is not a direct source of funds for infrastructure. Also, as part of the Covid-19 pandemic response, Congress passed the American Rescue Plan Act of 2021, which included $350 billion for state, local, territorial, and tribal governments. States and local governments received nearly all of this funding ($195 billion and $130 billion, respectively). State and local governments have significant discretion in how they may use this funding, including for infrastructure projects including water and sewer. However, there is neither a requirement that any portion of this money be spent on water or sewer projects, nor is it currently known how much of this money might eventually be spent on water and sewer projects. For these reasons, the amount of funding associated with the LIHWAP and American Rescue Plan that was potentially used to help fund water and wastewater infrastructure is unknown and was not included in the aggregate funding totals included in this report.

3.2. Trends in Water Sector Infrastructure Annual Appropriations and Funding

3.2.1. Congressional Research Service Information

A 2018 CBO report found that federal support for water utility infrastructure investment continues to decline as a percentage of annual needs, as shown in Figures 3-1 and 3-2.[45] State and local agencies have made up the difference in funding by increasing the amount of funding for water sector costs over the past 50 years.

Figure 3-1 summarizes the historical trend in federal vs. state and local water utility infrastructure funding and shows that over the last six decades, state and local governments have continued to fund increasing amounts of water sector expenditures; whereas, federal funding has been relatively flat. State and local spending was 272% higher in 2017 than it was in 1956. Federal spending on water utilities represented approximately 5.9% of total annual spending in in 1970 and approximately 3.7% in 2017. A brief increase in federal spending for water utilities occurred between 1972 and 1986 before trending back down to steady levels by 1990. The peak in the federal funding for the water sector occurred in the 1970s and 1980s with the Clean Water Construction Grants Program, which provided more than $60 billion in federal grants for the construction of public wastewater treatment projects.[46] This federal spending was converted to the CWSRF loan program and the DWSRF program.

Figure 3-1. Total Spending on Water Utilities by Source

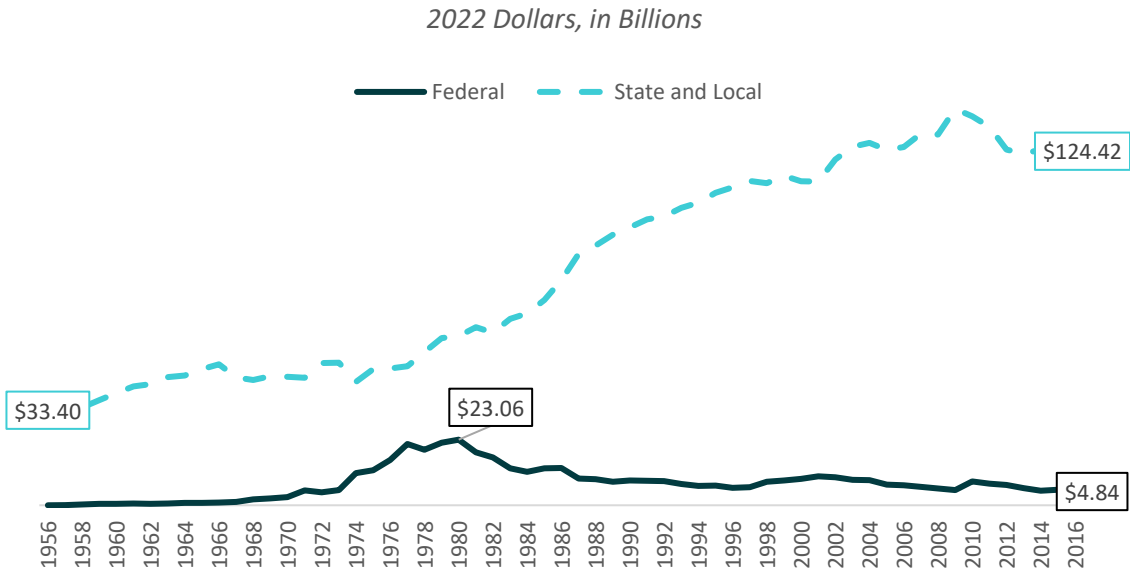


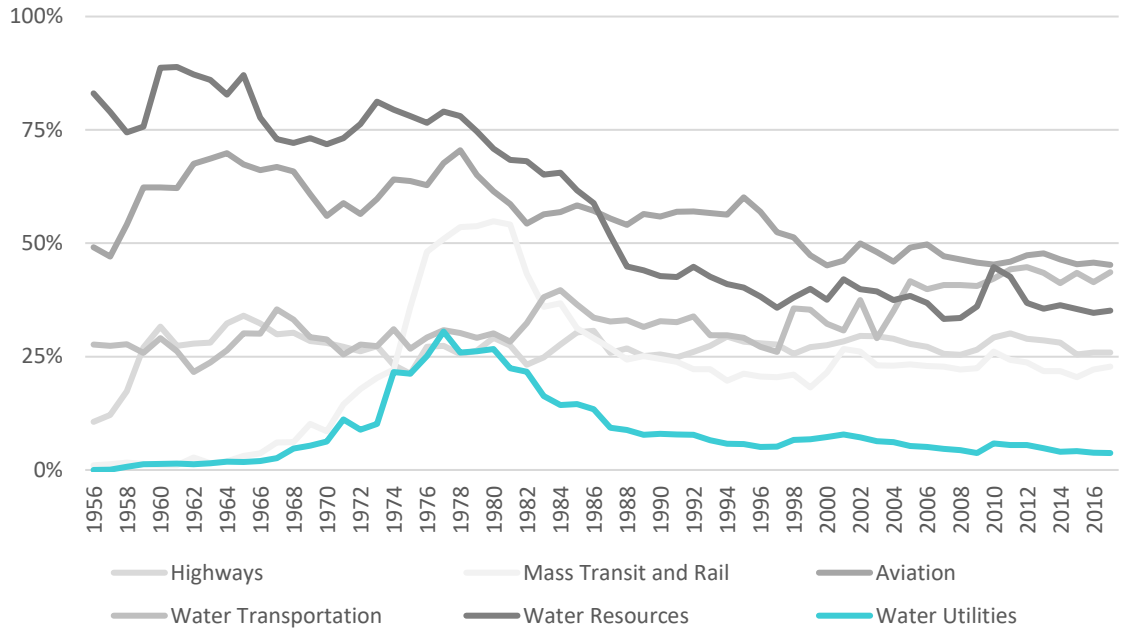
Figure 3-2 presents the percentage of historical public spending on transportation and water infrastructure through federal sources. Each sector is reported separately such that 25% federal spending indicates 75% of public spending was through state and local sources. Public spending on water utilities in 2017 was

[45] Public Spending on Transportation and Water Infrastructure, supra, citation 1.

[46] Construction Grants Overview. Environmental Protection Agency, supra, citation 2.

achieved with more than 96% state and local sources and only 3.7% federal spending. This is substantially lower than other sectors reported in the CBO report, as shown in Figure 3-2. The average annual federal spending for non-water sector infrastructure costs is approximately ten times greater than water sector spending based on the percent of annual spending as a portion of total public spending.

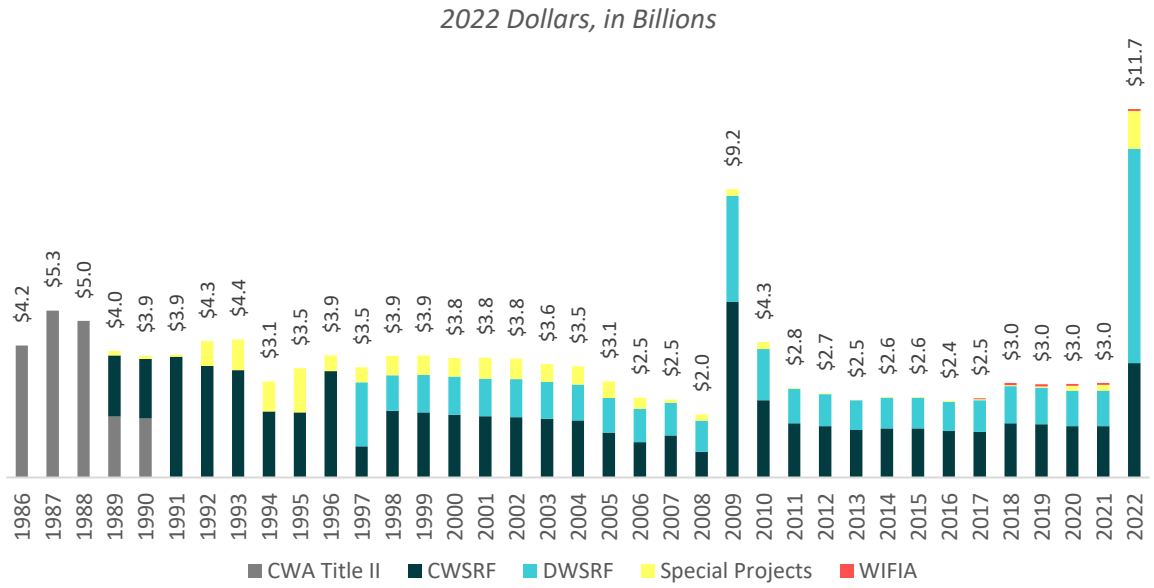
Figure 3-2. Federal Spending as a Percentage of Total Spending, by Sector



Currently, substantial water sector funding from federal sources is delivered through the SRF programs. A 2019 report published from the Congressional Research Service details the history of EPA appropriations for water infrastructure financing. Since the CWA was enacted in 1972, appropriations have totaled $98 billion for the CWSRF. The SDWA in 1996 paved the way for the DWSRF and appropriations have totaled $23 billion since 1997.

Annual appropriations for the SRF programs have gradually declined when adjusted for inflation (see Figure 3-3). A significant increase in SRF appropriations can be seen in 2009 which was a result of the American Recovery and Reinvestment Act. Additionally, Figure 3-3 includes additional funding that was appropriated as part of the IIJA in 2022. The IIJA accounts for approximately $8.7 billion of the $11.7 billion of appropriations in 2022. As previously described in Section 3.1.7, the IIJA authorized approximately $55 billion in additional funding to the water sector between 2022 and 2026.

Figure 3-3. Annual Federal Program Appropriations



The federal programs described in Section 3.1 include some appropriations that are not presented in Figure 3-3. The most substantial source of water sector funding not included in Figure 3-1 is provided by USDA Rural Development program. This program has annual funding of approximately $2.0 billion per year. Additional funding is available through the Bureau of Reclamation's WaterSMART program as well as the Army Corps' Section 219 spending, with total spending around $200 million per year.

3.3. Other Infrastructure Sectors' Federal Funding Support

When comparing federal funding support in the water sector with other infrastructure sectors, like power and broadband, it is important to recognize that the ownership structure of these sectors is significantly different than the water sector. The vast majority of the water and wastewater utilities in the U.S. are owned by municipalities or public, not-for-profit agencies. In the water sector, water and wastewater utilities are primarily government-owned systems. Investor-owned drinking water utilities serve only approximately 16% of the population and investor-owned wastewater utilizes serve only approximately 3% of the population.[47] This is significantly different than the power sector where nearly three-quarters of

[47] Setting the Record Straight on Investor-Owned Water Utilities, WaterOnline, June 6, 2016. Accessed at: https://www.wateronline.com/doc/setting-the-record-straight-on-investor-owned-water-utilities-0001

the U.S. population is served by investor-owned utilities.[48] In addition, the vast majority of broadband is provided by the private sector.[49]

Public utility commissions regulate investor-owned utilities, such as the majority of electric utilities and a portion of water utilities, and these utilities are able to earn a rate of return on their capital investments and rate base and are incentivized to grow their rate base by continuing to make investments in infrastructure. As rate base grows, earnings grow for these private companies. Such incentives do not exist with municipally owned water utilities because there is no profit motive but there is significant political resistance to raise utility rates.

Given the ownership differences and economic incentives of investor-owned and publicly owned utilities, sectors that are comprised of more publicly owned utilities may have a stronger desire to rely more on federal funding support than sectors with a higher concentration of investor-owned utilities. However, as will be shown below, more federal funding support has been provided to infrastructure sectors that are comprised of a larger proportion of private utilities.

3.3.1. Transportation (Roads)

Both state and local governments dedicate motor fuel tax revenue and highway toll revenue to transportation spending. However, these state and local taxes and tolls contributed 26 percent and 11 percent of the funding, respectively. The rest of the funding for highway and road spending came from state and local general funds and federal funds.[50]

The federal government has long provided significant financial support for public transportation. Federal spending accounted for about one-sixth of the $79 billion in public spending on transit in 2019.[51] Since 1956, federal surface transportation programs have been funded largely by dedicated user fee-funded sources, such as taxes on motor fuels, that flow into the Highway Trust Fund ("HTF"). Over the period from 2016 to 2021, the FTA received regular annual funding averaging $13 billion per year. Funding from the HTF accounted for $10 billion and was concentrated in two large grant programs. Roughly one-half went to the Urbanized Area Formula Funding program and about another quarter went to the State of Good Repair Formula program. The remaining $3 billion of annual funding for transit programs came from the Treasury's general fund and went to the Capital Investment Grants Program.[52]

The current excise tax is 18.4 cents per gallon on gasoline and 24.4 cents per gallon on diesel fuel, in addition to other federal taxes on truck users. A steady increase in the revenues flowing into the HTF due to increased motor vehicle use has accommodated growth in surface transportation spending over several decades. However, the primary source of funding for the HTF, federal motor fuels taxes, have not been raised since 1993 and inflation has impacted the purchasing power of these revenues. [53] In 2001, HTF

[48] U.S. Energy Information Administration Information as of August 15, 2019. Accessed at: https://www.eia.gov/todayinenergy/detail.php?id=40913#:~:text=Investor%2Downed%20utilities%20served%2072%25%20of%20U.S.%20electricity%20customers%20in%202017&text=According%20to%20the%20U.S.%20Energy,the%20United%20States%20in%202017.

[49] Improving the Nations Digital Infrastructure, federal Commerce Commission, Office of Strategic Planning and Policy Analysis. January 17 2017.

[50] Highway and Road Expenditures, Urban Institute, citation 19, supra.

[51] Federal Financial Support for Public Transportation, Congressional Budget Office, March 22, 2022.

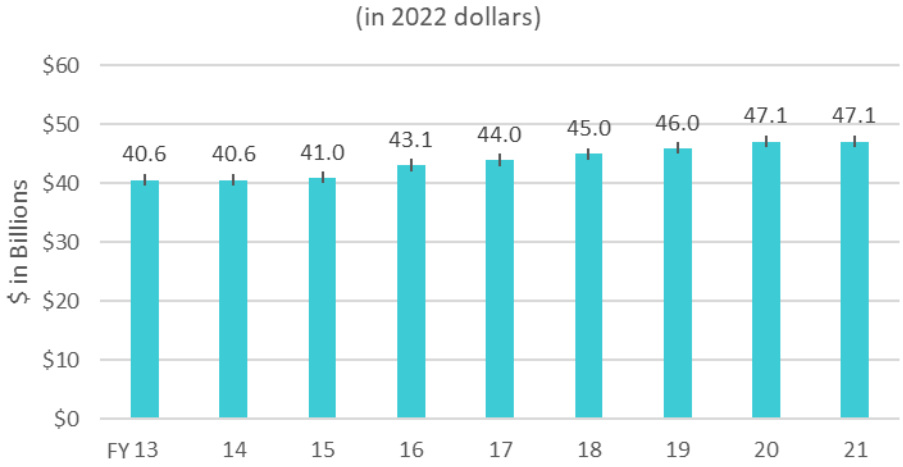
[52] federal Financial Support for Public Transportation, Congressional Budget Office. March 2022.

[53] U.S. Dept of Transportation Bureau of Transportation Statistics

revenues stopped growing faster than spending. In 2008 Congress began providing Treasury general fund transfers to keep the HTF solvent.[54]

Figure 3-4 provides a summary of the federal highway funding from 2013 to 2021. Federal highway construction and safety programs were previously authorized through September 30, 2020, under the five-year Fixing America's Surface Transportation ("FAST") Act.55 The FAST Act provided an average of $45 billion annually for the 1,027,849-mile system of federal-aid highways, corresponding to approximately $43,781 per mile per year of funding. Although there are exceptions, federally funded projects are generally limited to this system that includes roughly 25% of all U.S. public road mileage. Of these funds, nearly 93% are distributed to the states via a federal formula. The states have nearly complete control over the use of these funds, within the limits of federal planning, eligibility, and oversight rules. Money is not provided up front. A state is reimbursed after work is started, costs are incurred, and the state submits a voucher to the Federal Highway Administration ("FHWA").

Figure 3-4. Federal-Aid Highway Funding: FY2013-FY2021



Source: Federal Highway Administration.

The IIJA has allocated an additional $350 billion in highway programs over the next 5 years.

Table 3-1 provides a summary of the total needs and anticipated federal funding for surface transportation for the 20-year period from 2020 to 2039 based on the 2021 ASCE Infrastructure Report.[56]

Table 3-1: Surface Transportation Funding Needs and Federal Funding Support (2020-2039)

Infrastructure Category	Total Need	Federal Funding	Funding Gap $	Funding Gap %
Surface Transportation	$5,966	$3,211	$2,755	46%

in $ billions of dollars (2022)

[54] Based on Federal Highway Administration (FHWA) data. Balances in the HTF accrued in previous years were large enough to keep the fund sufficient until FY2008.

[55] FAST Act; P.L. 114-94.

[56] Data from Failure to Act, American Society of Civil Engineers, 2021 and Facts & Figures from American Short Line and Regional Railroad Association, 2017.

3.3.2. Power Sector

According to the latest U.S. Energy Information Administration ("EIA") report, the energy sector received federal subsidies of $15.0 billion in 2016, which was down from $29.3 billion in 2013 and $38.0 billion in 2010, all in 2016 dollars.[57] These subsidies include direct expenditures, tax expenditures, Research and Development, and the Department of Energy ("DOE") Loan Guarantee programs. The subsidies are provided to a variety of energy types, including coal, refined coal, natural gas and petroleum, nuclear, renewables, electricity smart grid and transmission, conservation, and end use. Excluding coal, gas, and nuclear, the 2016 amount totals approximately $14.1 billion in 2016 dollars or $16.7 in 2022 dollars.[58] This amount corresponds to approximately 17% of the $96.3 billion of total average annual spending from 2013 to 2019 in 2022 dollars.

The IIJA also includes more than $62 billion for electric and grid infrastructure and more than $47 billion for power sector resilience and cybersecurity.[59]

Table 3-2: Power Sector Spending vs Federal Funding Support (2013 to 2019)

Infrastructure Category	Average Annual Spending (in 2022 $s)	Annual Federal Funding (in 2022 $s)	Federal Funding %
Power Sector (Electricity)	$96.3	$16.7	17.3%

in $ billions of dollars (2022)

In the energy sector as a whole, the amount of the DOE budget authority and outlays for energy related investment has steadily increased since the 1980s as shown in Figure 3-5.[60]

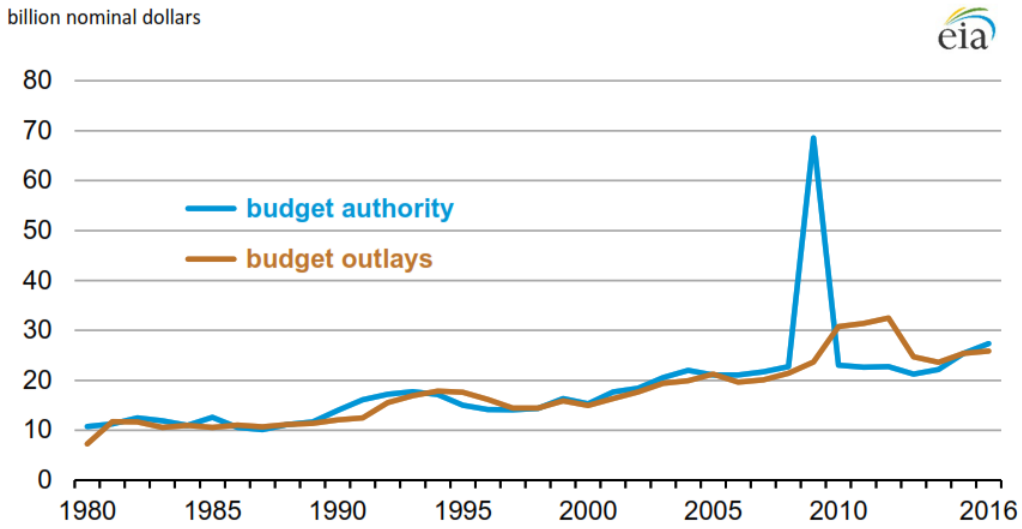
[57] Direct federal Financial Interventions and Subsidies in Energy in Fiscal Year 2016, U.S. Energy Information Administration. April 2018.

[58] Ibid.

[59] Five steps for utilities preparing for IIJA Funding, PowerGrid International, May 3, 2022. Accessed at: https://www.power-grid.com/smart-grid/5-steps-for-utilities-preparing-for-iija-funding/#gref

[60] Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2016, U.S. Energy Information Administration.

Figure 3-5. U.S. Department of Energy Budget Authority and Outlays (FY1980-FY2016)



3.3.3. Broadband

Both the telecommunications industry and federal government investments have expanded access to broadband in the U.S. The federal government has been funding broadband expansion since the Telecommunications Act of 1996, which amended the definition of "universal service" (the principle that all Americans should have access to communications services like the telephone) to include high-speed internet. From 2009 through 2017, the industry made capital investments of about $795 billion, including investments in broadband infrastructure. During this time, federal investments totaled about $47.3 billion to target broadband infrastructure for rural areas over the same time period.[61] This federal investment corresponds to approximately 6% of the total capital investments over this period.

FCC established the Universal Service Fund ("USF") consisting of Connect America fund for rural areas, the Lifeline Fund for low-income consumers to purchase internet services, and two funds for schools and rural health care. The USF is financed by telephone companies that provide international and interstate service. A total of $9.2 billion in funding over 10 years was allocated in 2019 from the USF for expanding service, and the American Recovery and Reinvestment Act of 2009 allocated $7.2 billion towards broadband initiatives for low income and rural communities.[62]

Through the FCC, the federal government disbursed over $15 billion by funding various programs across the U.S. between 2000 and 2018. In 2020, the agency launched the Rural Digital Opportunity Fund, a 10-year, $20 billion program that will finance the deployment of faster broadband networks to underserved rural areas. Other public agencies are also focused on closing the digital divide. The U.S. Department of Agriculture awarded $600 million in rural telecom grants between 2009 to 2016.

[61] Observations on Past and Ongoing Efforts to Expand Access and Improve Mapping Data. U.S Government Accountability Office, June 2020.

[62] The benefits and costs of broadband expansion, Campbell, Castro, and Wessel, August 18, 2021. Accessed at: https://www.brookings.edu/blog/up-front/2021/08/18/the-benefits-and-costs-of-broadband-expansion/

Governors and state legislatures have established broadband deployment grants and requested coordinated policy from relevant state agencies.

The IIJA addresses the access component of the digital divide by providing $42.5 billion in state grants for broadband. This investment builds upon the funding for broadband deployment provided in the American Rescue Plan, the Consolidated Appropriations Act of 2021, FCC's USF, and USDA's Rural Utilities Service broadband programs. Broadband deployment is the largest component of broadband funding in the IIJA.

The National Telecommunications and Information Administration ("NTIA"), serves state, local, and tribal governments, industry, and nonprofits that seek to expand broadband connectivity and promote digital inclusion. NTIA is the Executive Branch agency principally responsible for advising the President on telecommunications and information policy issues. As of 2021, NTIA received funding to implement the following programs:

- **Broadband Equity, Access, and Deployment (BEAD) Program:** Appropriates $42.45 billion for states, territories, the District of Columbia (D.C.), and Puerto Rico (P.R.) to utilize for broadband deployment, mapping, and adoption projects.
- **Enabling Middle Mile Broadband Infrastructure Program:** Establishes and funds a $1 billion program for the construction, improvement, or acquisition of middle mile infrastructure. The purpose of the grant program is to expand and extend middle mile infrastructure to reduce the cost of connecting unserved and underserved areas to the internet backbone.
- **Tribal Broadband Connectivity Program:** Provides an additional $2 billion to TBCP, a NTIA program previously implemented under the Consolidated Appropriations Act of 2021. The TBCP directs funding to tribal governments to be used for broadband deployment on tribal lands, as well as for telehealth, distance learning, broadband affordability, and digital inclusion.
- **Digital Equity Act Programs:** Dedicates $2.75 billion to establish three grant programs that promote digital inclusion and equity to ensure that all individuals and communities have the skills, technology, and capacity needed to reap the full benefits of our digital economy.

In total, the federal funding support for Broadband from the programs identified above are estimated to provide approximately $152 billion over the next five to 10 years, or approximately $19 billion per year.

3.3.4. Levees and Waterways

Several federal funding programs exist to help pay for the levee infrastructure needs, including the USACE Rehabilitation program and funding through the IIJA. The Rehabilitation program provides federal repair funds to levees that are damaged by floods or coastal storms. The Water Resources Reform & Development Act ("WRRDA") of 2014 authorized the creation of a National Levee Safety Program. In 2021, appropriations provided $5 million in federal funding, even though the National Levee Safety Program was authorized at $79 million per year.

The IIJA also includes an unprecedented $17 billion to improve infrastructure at coastal ports, inland ports and waterways, and land ports of entry along the border. These resources will deliver near-term assistance and make long-term investments to strengthen supply chain resiliency. Together, the Bipartisan Infrastructure Deal is the single largest federal investment in our ports in U.S. history. This

program created levee safety guidelines and a rehabilitation program, provides funding for completing a National Levee database, provides assistance to states for establishing safety programs, and promotes community education and awareness about levees.[63]

Traditionally, 50% of inland waterway rehabilitation and construction has been paid with the support of the U.S. General Fund, and the remaining 50% is supported with revenue from the Inland Waterways Trust Fund account. This fund collects money from a 29 cents per gallon tax on barge fuel paid by shippers using the navigation channels. In 2015, an increase to the barge fuel tax was enacted, resulting in raising the annual funds available to support waterway infrastructure improvements to approximately $25 million per year.[64]

In addition to the federal funding programs identified above, a portion of levees across of the U.S. are under the jurisdiction of USACE, with the balance under the control of local levee districts, cities, and counties. Some additional funding may be available for levees under the control of USACE through the USACE funding programs discussed earlier in this report.

In total, the estimated federal funding for levees and waterways from the programs identified above is estimated to total approximately $18 billion over the next five years or approximately $3.5 billion per year.

3.4. Comparison of Water Sector Needs and Funding with Other Sectors

Past research reports that have been published show that infrastructure sectors outside of water have historically received more federal funding support than the water sector in total and when normalized based on the identified need. For example, information reported from CBO demonstrates that federal funding for water and wastewater utilities was much lower as a percentage of total spending in 2017 as compared to the transportation sector, as shown in Table 3-3.[65] According to the CBO report, this disparity of federal funding support for the water sector in comparison to transportation has been consistent for decades.

As documented in this report, despite having the second highest funding needs, the water utility sector receives substantially less federal funding support than the other sectors represented. Figure 3-6 demonstrates the difference in federal funding as a percentage of total sector spending.

[63] ASCE Report Card, 2021, supra, citation 14, Levees.

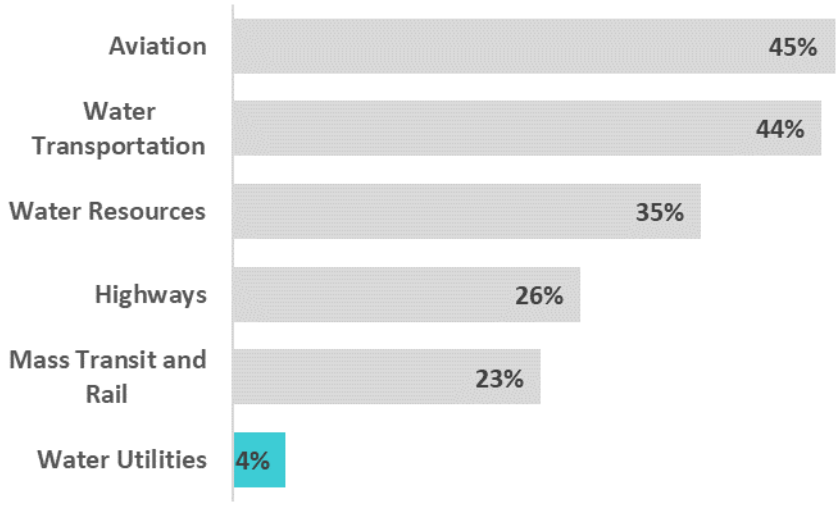
[64] ASCE Report Card, 2021, supra, citation 14, Inland Waterways.

[65] Public Spending on Transportation and Water Infrastructure, 1956 to 2017, supra, citation 1.

Table 3-3: Sector Needs vs. Federal Funding Support - 2017 CBO Report (in 2022 $s)

Sector	Funding Needs *($ Billions)*	Federal Support *($ Billions)*	Federal Support as % of Funding Need
Highways	$205.38	$53.22	26%
Water Sector Utilities	$131.23	$4.92	4%
Mass Transit and Rail	$86.60	$19.76	23%
Aviation	$43.06	$19.47	45%
Water Resources	$33.31	$11.70	35%
Water Transportation	$11.84	$5.16	44%

Figure 3-6. Federal Government Spending as a Percent of Total Spending on Transportation and Water Infrastructure by Type (2017)



Since CBO reported comparisons were prepared as of 2017, it does not include the federal funding that the water sector received as part of the IIJA. The $55 billion in IIJA funds for the water sector will help to close some of the funding gap identified in this report, but even with the IIJA funds, the water sector continues to lag behind other sectors related to the percent of spending from federal sources, as shown in Table 3-4.

Table 3-4: Summary of Infrastructure Needs After IIJA Support

Sector	Funding Needs *($ Billions)*	Federal Support *($ Billions)*	Federal Support as % of Funding Need	IIJA Annual Appropriation	Revised Federal Support %
Highways	$205.38	$53.22	26%	$24.20	34%
Water Sector Utilities	$131.23	$4.92	4%	$11.00	11%
Mass Transit and Rail	$86.60	$19.76	23%	$21.04	38%
Aviation	$43.06	$19.47	45%	$5.00	51%
Water Resources	$33.31	$11.70	35%	n/a	35%
Water Transportation	$11.84	$5.16	44%	$3.46	56%

A similar comparison was made for the water, transportation (roads), power (electricity), broadband, levee, and inland waterway sectors based on the infrastructure investment needs and federal funding support identified in Sections 2 and 3 of this report. The comparison indicates that the water sector receives significantly less federal funding support in proportion to the identified need than the other sectors examined, except for levees, as shown in Table 3-5.

Table 3-5: Summary of Infrastructure Needs and Federal Funding Support by Sector

Sector	Annualized Funding Needs ($ Billions)[1]	Annualized Federal Support ($ Billions)[2]	Federal Support Programs Included	Federal Support as % of Funding Need
Transportation (Roads)	$298.3	$128.0	HTF, FAST Act, IIJA	43%
Water Sector	$145.7	$15.7	DWSRF, CWSRF, WINN, WIFIA, WaterSMART, USACE, HUD CDBG, EDA, and IIJA	11%
Power (Electricity)	$115.0	$38.4	DOE	33%
Broadband	$18.5	$18.5	USF, FCC, IIJA, NTIA	100%
Levees	$1.3	$0.1	USACE	6%
Inland Waterways	$0.3	$0.3	WTF, IIJA	100%

[1]The water sector funding need combines the total water sector need as reported by ASCE in 2021 with the lead line replacement need from the EPA federal register in 2021. Other sector needs were identified from the research descriptions described in Section 2. The identified costs were converted to 2022 dollars and annualized over periods from five to 20 years depending upon the needs descriptions.

[2]The identified federal funding support was annualized over five to 10 years based on the funding programs described in Section 3.

As Table 3-5 indicates, some sectors, such as transportation, levees, and inland waterways rely heavily on federal funding support for infrastructure improvements. In these sectors, where the needs exceed the support provided, the actual spending on infrastructure in any given year may be reduced to match the federal funding support provided in that year. In the water sector, the actual spending by local utilities

has been less dependent on federal support and more dependent on the ability of utilities to increase revenues through user charges in their local communities. However, user charges over the past 20 years have increased at a rate significantly exceeding inflation. This has increased the challenge of community affordability and has impacted the ability and willingness of utilities to continue to significantly raise user charges to generate revenues to pay for additional infrastructure improvements.[66] As the water sector continues to face increasing infrastructure investment needs due to aging infrastructure, shifting demographics, and regulatory drivers (e.g., lead & copper and emerging contaminants, including PFAS, pharmaceuticals, etc.), additional federal funding support and new models of generating revenue may be critical for the water sector to be able to continue to afford to make utility infrastructure investments in the future.

The conclusions that the water sector has received a lower portion of federal funding support in relation to its infrastructure investment needs in comparison to other sectors validates similar claims that have been made in water sector for several years. For example, in 2020, the Environmental Finance Advisory Board ("EFAB") published a report that documented that current stormwater funding mechanisms are not sufficient to confront the significant needs across the nation and recommended increases in federal investment in stormwater infrastructure, including additional grants and loans to local governments among other recommendations.[67]

[66] Water Bills Become a Burden for Low Income Customers, M. Coopersmith, F. Moriarty, R. Craley, J. Crea, M. Palmer, Raftelis, 2021. Accessed at: https://www.raftelis.com/insight/water-bills-become-a-burden-for-low-income-customers/

[67] Evaluating Stormwater Infrastructure Funding and Financing, Environmental Financial Advisory Board, March 2020.

4. Potential Additional Sources of Federal Funds for the Water Sector

4.1. Introduction

Future opportunities for the water sector to receive a greater federal cost share include both increasing funding under the existing SRF programs and also exploring other niche/targeted opportunities. This section of the report identifies these potential additional sources of federal funding for water sector infrastructure, some of which are currently available but under-utilized or could be enhanced to provide additional funding support for the water sector. These sources of funding may be explored further to support the water sector where applicable.

4.2. Potential Additional Sources of Federal Funds for the Clean Water Sector

As described in Section 3.1, existing federal funding support for the clean water sector is provided to varying degrees across several different executive departments of the U.S., including the Departments of Interior (Bureau of Reclamation), Environmental Protection Agency (EPA), Agriculture (Rural Development), Commerce (EDA), Housing and Urban Development (CDBG), and Defense (USACE). Potential additional sources of federal funding are identified below.

4.2.1. Wastewater Resource Recovery Funding

Additional federal funding avenues for clean water infrastructure could likely be centered upon the concept of wastewater treatment as resource recovery. Not only is wastewater treatment being increasingly referred to as "water recovery," but additional attention is being paid to the energy and nutrient resources contained within wastewater streams. Anaerobic digestion has long been utilized as a source of biogas at water recovery facilities, yet continues to be underutilized, despite additional non-energy benefits, including improved biosolids conditions. Yet other potential energy sources exist within wastewater, including thermal energy. For example, Metro Water Recovery, the regional wastewater treatment agency for the metropolitan Denver area, is pursuing heat recovery technologies so that private development can benefit from the thermal energy contained within the wastewater stream – and thereby assist Metro Water Recovery meet upcoming effluent temperature regulations. These sorts of energy production and recovery technologies would appear to be a suitable target for federal support. In particular, DOE's Office of Energy Efficiency and Renewable Energy ("EERE") is a logical funding agency for such projects. The EERE issues funding opportunities on a continuous basis in a range of areas related to their core mission. However, a review of recent funding opportunities did not indicate any that were potentially directed towards the clean water sector.

Nutrient recovery is also an area that has the potential to attract funding from new federal sources. Biosolids handling and removal is a significant component of wastewater treatment efforts. Many utilities landfill their biosolids rather than treat them to the level necessary for land application, yet for utilities that do land apply their biosolids, there is often a backlog of farmers waiting to accept "free" nutrients and soil amendments. Given the substantial energy needs required to produce fertilizer, nutrient recovery

from wastewater could justifiably be supported by the EERE, and the benefits that farmers receive from biosolids application could also be justification for funding support from USDA.

4.2.2. Expansion of Federal Funding for Stormwater Infrastructure

Given the magnitude of stormwater funding needs described in Section 2, additional federal funding for stormwater infrastructure would help the sector address stormwater management issues. Several recommendations have been documented in the literature to provide more federal funding support for stormwater infrastructure. Included among these, is a recommendation for the federal government to develop a new enhanced construction grant program specifically for stormwater projects similar to the Municipal Construction Grants program that funded the construction of wastewater treatment plants in the 1970s and 1980s. Just as the Construction Grant Program of the 1970s and 1980s jump started secondary treatment investments, a federal infusion to address stormwater at a time of increasing regulatory requirements (e.g., MS4) would support substantial improvements in stormwater infrastructure, which is a key source of outstanding water quality concerns. The federal government could also provide funds for the CWSRF and WIFIA programs specifically for stormwater. This would provide communities with an incentive to create dedicated funding sources to demonstrate financial capacity and capabilities, while still retaining the flexibility and local control of the actual method of repayment.[68]

4.2.3. Surface Transportation Funding Eligible for Water Sector Projects

The U.S. Department of Transportation ("USDOT") manages the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) discretionary grant program. The RAISE grant program was previously known as the BUILD program, which was in turn known as the TIGER program. This competitive grant program is designed to fund capital investments in surface transportation (e.g., road, rail, transit, and port) projects. However, large transportation projects often have significant clean water components bundled with them, particularly stormwater drainage and water/wastewater pipe replacement or relocation. Under this funding program, related project components, such as stormwater elements, are eligible to receive grant funding. Since 2009, the TIGER/BUILD/RAISE programs have awarded $3.8 billion to 345 projects.[69] This program could be further leveraged by the clean water sector.

4.2.4. Energy Sector Funding Eligible for Water Sector Projects

DOE routinely funds clean energy development projects through the Office of Energy Efficiency & Renewable Energy. However, they do not have standing general funding programs in the manner of EPA's SRF programs. Rather, DOE opens specific funding priorities, such as for geothermal drilling technology demonstrations or for electric vehicle battery recycling programs. Few of these funding opportunities are likely to be relevant to the clean water sector, though some programs that may fund such things as solar development or local energy resilience may present opportunities.[70] DOE has made efforts in the recent past to consider the water-energy nexus, including publishing a report in 2014, "The

[68] Evaluating Stormwater Infrastructure Funding and Financing, Environmental Financial Advisory Board, March 2020.

[69] USDOT, "About RAISE Grants", https://www.transportation.gov/RAISEgrants/about

[70] US DOE, Office of Energy & Renewable Energy, "Funding Opportunities", https://www.energy.gov/eere/funding/eere-funding-opportunities

Water-Energy Nexus: Challenges and Opportunities" and providing technical assistance to water and wastewater utilities through its SWIFT Accelerator and Industrial Assessment Centers. But efforts to date seem limited to providing technical recommendations and supporting individual efforts -- not directly leading to industry-scale funding opportunities.

4.2.5. Infrastructure Investment and Jobs Act

The IIJA is a massive funding bill that contains many funding programs and elements. Some of these programs and elements provide opportunities for water sector funding that provide co-benefits for water and other infrastructure sectors including the following:

- Section 40804 ("Ecosystem Restoration") provides $2.1 billion over five years for a wide range of projects to improve the ecological health of land and waters, including detecting and removing invasive species, restoring streambeds, improving water quality and fish passages.
- Funds allocated to the states for transportation projects also provide some support for flood protection and aquatic ecosystem restoration, and the assessment of transportation and coastal risks from extreme floods, droughts, and sea-level rise (Section 11405).
- A "Healthy Streets Program" includes support for "cool" and "porous" pavement that will mitigate some of the impacts of rising urban temperatures and reduce stormwater risks (Section 11406).
- A National Academy of Sciences study will be prepared on best management practices for stormwater, especially to reduce runoff pollution associated with severe storms (Section 11520).
- DOE's Office of Energy Efficiency and Renewable Energy will prepare technical assessments of the opportunities for, among other things, "improving efficient use of water in manufacturing processes" (Section 40333).

These and other IIJA programs and elements should be explored by water sector utilities to maximize the use of IIJA funding.

4.3. Potential Additional Funding Agency Support

The most likely candidate for funding energy recovery capital infrastructure is DOE. In fact, DOE is supporting the Water Security Grand Challenge,[71] a program designed to provide funding to research and development projects and pilot scale projects for energy recovery from wastewater. However, DOE does not have a funding mechanism to support deployment of full-scale energy recovery infrastructure as of yet. This is an opportunity for the clean water sector to advocate to DOE to support energy recovery projects in the water sector.

Funding from DOE need not be confined to biogas. Many clean water facilities are ideal candidates for solar and wind installations, yet the unavailability of tax credits and the costs of financing may leave utilities hesitant to pursue such options even if projects have a beneficial long-term cost-benefit ratio. Subsidized loan programs such as CWSRF or WIFIA could be the additional incentive needed to spur

[71] https://www.energy.gov/water-security-grand-challenge/water-security-grand-challenge

widespread adoption of clean energy technologies that can have the added benefit of reducing one of the largest cost centers for utilities.

As for nutrient recovery, USDA may be available to support projects that improve the quality of biosolids in furtherance of additional, improved, or more efficient land application. Biosolids are a known mechanism of reducing needed fertilizer applications and improving the soil structure. USDA's National Institute of Food and Agriculture has funding opportunities that may support development of biosolids application to benefit the agriculture sector. USDA's Agricultural Marketing Service operates a Regional Food System Partnerships ("RFSP") program that also may be a suitable funding source that may fund biosolids application. The RFSP is intended to "support partnerships that connect public and private resources to plan and develop local or regional food systems. As the program is dedicated to strengthening the viability and resilience of regional food economies through collaboration and coordination, it may be ideal funding vehicle to support biosolids applications.

4.4. Alternative Funding Mechanisms Used in Other Infrastructure Sectors

The water sector could model new alternative funding mechanisms after those used in other infrastructure sectors, such as polluter pays models. Polluter pays models are a commonly accepted model where those who produce pollution bear the cost of managing it to prevent damage to human health and the environment. A similar model where those who cause the wear and tear on infrastructure contribute to the repair and replacement of the infrastructure as it is being used has also been developed. Some examples of these types of models are provided below.

Environmental Excise Taxes

Since the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") was enacted in 1980 that established superfund programs, EPA has administered superfund site cleanup funded in part through excise taxes on petroleum and chemical manufacturers and importers. Most of the revenues collected from the taxes associated with this polluter pays model are dedicated to help fund efforts to prevent environmental releases of these substances. While businesses that cause environmental contamination are often held responsible for the environmental clean-up, in the event responsible parties are not able to cover the costs, funds are allocated from the environmental excise tax revenues to support the clean-up.[72] However, at the end of 1995, the excise taxes expired and clean-up efforts were funded through the general disbursement of other tax revenues.[73]

Recently, the IIJA reinstated the superfund excise tax on certain chemical substances effective July 1, 2022. The tax applies to companies that manufacturer, produce, or input any of 42 specific chemicals listed in the tax code, including ammonia, butane, benzene, and mercury. These companies are required to pay a tax of $0.22 to $4.87 per ton, depending on the chemical.[74] It is estimated that the reinstated tax

[72] Environmental Excise Taxes, Focusing on Ozone-Depleting Chemicals, Sara P. Boroshok., 1993.

[73] Senate-passed infrastructure bill would reinstate superfund excise taxes, PWC, August 2021. Accessed at: https://www.pwc.com/us/en/services/tax/library/infrastructure-bill-would-reinstate-superfund-excise-taxes.html

[74] Reinstated Superfund Excise Tax Imposed on Certain Chemical Substances, The National Law Review, May 19, 2022. Accessed at: https://www.natlawreview.com/article/reinstated-superfund-excise-tax-imposed-certain-chemical-substances

associated with this polluter pays model will generate $14.5 billion in funding form FY 2022 to FY 2031 or approximately $1.2 billion annually. The water sector could advocate for a similar tax on manufacturers of products that contribute to emerging water contaminants, such as PFAS, pharmaceuticals, and microplastics. Such a federal tax could help fund the water and wastewater treatment systems should such upgrades be needed to remove these contaminants from drinking water and wastewater. This model could be a supportable model in the water sector to address emerging contaminants if it specifically reaches back to the industries and manufacturers that released these contaminants into the environment for funding water quality improvements rather than placing the cost burden onto water sector utilities. In addition, the wastewater utilities could potentially impose higher excess strength surcharges on industries and manufacturers that cause these utilities to implement enhanced treatment processes and incur associated costs to deal with these contaminants.

Highway Tax Fund

Excise taxes are narrowly based taxes on consumption, levied on specific goods, services, and activities. They can be a per unit tax (such as the per gallon tax on gasoline) or a percentage of the price (such as the airline ticket tax). Excise taxes from gasoline and diesel taxes, which are 18.4 cents and 24.4 cents per gallon, respectively, support the Highway Trust Fund and are used to help pay for the cost of highway infrastructure needs.[75]

The heavy vehicle use tax, for example, is a fee assessed annually on heavy vehicles operating on public highways at registered gross weights equal to or exceeding 55,000 pounds. The gross taxable weight of a vehicle is determined by adding the unloaded weight of the motor vehicle and any trailers together with the maximum load customarily carried on roads by the truck-trailer combination. The need for road surface maintenance is greatly attributable to the heaviest vehicles. The U.S. Department of Transportation in its most recent Highway Cost Allocation Study estimated that light single-unit trucks, operating at less than 25,000 pounds, pay 150 percent of their road costs while the heaviest tractor-trailer combination trucks, weighing over 100,000 pounds, pay only 50 percent of their road costs.[76]

Gas taxes are excise taxes that are paid when users fill their cars with gas. The federal government and states both impose gas taxes, with much of the revenue raised going toward fixing highways and other infrastructure projects. State gas taxes range from just under 10 cents to nearly 60 cents for a gallon of for a gallon of gas, though some states charge based on the price—rather than on the amount—of gas that is purchased. [77] This concept could be applied to the clean water sector by imposing a tax on toilet paper, for example, as a supplemental way to collect fund from the users of wastewater systems.

Excise Tax on Tires

The federal government generates revenue for the Highway Trust Fund in part from a tax on certain tires purchased for heavy trucks.[78] The tax applies to tires with load capacities in excess of 3,500 pounds as

[75] Briefing Book, A citizen's guide to the fascinating elements of the US tax system, Tax Policy Center, May 2020. Accessed at: https://www.taxpolicycenter.org/briefing-book/what-are-major-federal-excise-taxes-and-how-much-money-do-they-raise

[76] U.S. Federal Highway Administration, www.fhwa.dot.gov/policy/091116

[77] U.S. Energy Information Administration. "Gasoline and Diesel Fuel Update."

[78] Addressing the Long-Term Solvency of the Highway Trust Fund, Testimony of Joseph Kile before the Committee on Environment and Public Works, United States Senate. April 14, 2021. Accessed at: https://www.cbo.gov/system/files/2021-04/57110-highway-testimony.pdf

heavier vehicles cause greater damage to both roads and bridges than automobiles. Revenues from the tire fees help fund the rehabilitation of roads.[79] This concept could be applied to the clean water sector by imposing a tax on disposable wipes, for example, that cause significant operational issues at wastewater treatment plants as a way to collect funds from users to address the maintenance issues associated with this product.

In many states, a tire disposal fee applies to every purchase of new tires. In most cases, these fees are collected by the tire seller. The state tire fee revenues are used for the collection, storage, processing, and use of scrap tires. State-funded tire recycling programs are responsible for decreasing the number of stockpiled scrap tires in the U.S. from more nearly 580 million in 1994 to around 111 million in 2010. Scrap tire legislation has been a priority in many states in recent years, largely because of the effect of tires on the environment and because the components of tires can be recycled into reusable products, such as playground surfaces, mulch, and asphalt. Many states have used the funds collected from tire disposal fees to find new uses for materials from recycled tires.[80] A similar model could be used in the water sector to help utilities pay for the cost of treatment of residual contaminants in water from the use of these products, such as pharmaceuticals.

California's Greenhouse Gas Emissions Cap and Trade Program

The cap-and-trade program is a key element of California's strategy to reduce greenhouse gas emissions. It complements other measures to ensure that California cost-effectively meets its goals for greenhouse gas emissions reductions.[81] This program is a key element of California's climate plan. It sets a statewide limit on sources responsible for 85 percent of California's greenhouse gas emissions and establishes a price signal needed to drive long-term investment in cleaner fuels and more efficient use of energy.[82]

The cap-and-trade regulation establishes a declining limit on major sources of greenhouse gas emissions throughout California and it creates a powerful economic incentive for significant investment in cleaner, more efficient technologies. The program creates allowances equal to the total amount of permissible emissions (i.e., the "cap"). One allowance equals one metric ton of carbon dioxide equivalent emissions (using the 100-year global warming potential).

This type of cap-and-trade program is similar to the water quality or nutrient credit trading programs that exists in some states, such as Connecticut and Pennsylvania, which are used to help cost effectively deal with nitrogen and phosphorous loading into sensitive bodies of water. While not a direct source of infrastructure funding for the public sector, these programs incentivize source removal of constituents prior to their environmental release and could help reduce the cost of their removal from the environment.

[79] Federal Excise Tax on Tires: Where the Rubber Meets the Road, CRS Report for Congress, April 4, 2006.

[80] Information accessed at: https://www.tirebuyer.com/education/tire-disposal-fees-collected-by-tirebuyer

[81] The California Air Resources Board, Cap-and-Trade Program | California Air Resources Board, https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/about

[82] California Environmental Protection Agency, California Air Resources Board, https://ww2.arb.ca.gov/sites/default/files/cap-and-trade/guidance/cap_trade_overview.pdf

4.5. Potential Alternative Funding Mechanisms for the Clean Water Sector

The congressional funding of the Clean Water Construction Grants Program helped utilities construct the necessary water resource recovery facilities to meet the 1972 Water Pollution Control Act goals. However, to receive these grant funds, utilities were required to adopt a system of user charges to assure that each recipient of waste treatment would pay its proportionate share of costs of operation, maintenance, and replacement of the waste treatment services provided. This requirement was considered necessary by legislators at the time because many utilities did not charge user rates, but rather paid for wastewater treatment services through the jurisdiction's ad valorem tax system.[83] The requirement to establish a user charge system was a significant step in moving the clean water sector to a user pay model for funding wastewater utility system costs.

Today, such user charge systems are prevalent across the clean water sector. However, as user charges have been rising faster than inflation over the past two decades and as local affordability has become more of an issue, the clean water sector may look to potential alternative funding mechanisms to enhance or supplement funding for infrastructure. Some alternative approaches to enhance or supplement funding for clean water infrastructure are discussed below.

4.5.1. Alternative State Administered Funding Programs

The Clean Water Sector could look to supplement existing infrastructure funding with state programs that collect money from homeowners and businesses and direct money towards specific programs that aimed at point source water quality issues. One example of such a state administered program is the Maryland Bay Restoration ("BRF") Fund.

Maryland Bay Restoration Fund

The State of Maryland created the BRF program in 2004. This program included the creation of a dedicated source of revenue to reduce nutrient pollution in the waters of the State. The purpose of the BRF was to create a dedicated fund, financed by wastewater treatment plant users, to upgrade Maryland's wastewater treatment plants with enhanced nutrient removal technology so that they can achieve a low level of nitrogen and phosphorous discharge. In addition, a similar fund was created supported by a fee paid by septic system users used to upgrade onsite septic systems to enhanced systems that reduce nitrogen and phosphorous loading into the Chesapeake Bay.

The State of Maryland collects $5.00 per month for residential and commercial/industrial users for each equivalent dwelling unit ("EDU"), not exceeding 2,000 EDUs, up to a $120,000 annual maximum.[84] Fee waivers exist for certain users, including residential users that demonstrate substantial financial hardship, as well as certain legal municipal entities, including counties, municipal corporations, bi-county or multi-county agencies, housing authorities, school boards, community colleges, and other units of county or municipal corporations and local fire departments. Fees collected from wastewater treatment plant users generate approximately $100 million per year and fees collected from onsite system users generate

[83] Financing and Charges for Wastewater System, Manual of Practice No. 27, Fourth Edition. Water Environment Federation. P.4.

[84] http://www.ccgov.org/government/finance/property-tax/bay-restoration-fee

approximately $27 million per year. These funds are used to provide grants to support wastewater treatment plant and onsite disposal system infrastructure upgrades.[85]

Water Quality Trading Programs

Water Quality trading programs are market-based programs that involve the exchange of pollution allocations, such as nitrogen and phosphorous, between different point sources. A "point source" is a source of pollution that can be attributed to a specific physical location, such as wastewater treatment plants. Conceptually, pollution trading is appealing as a cost-effective and flexible way to achieve and maintain water quality goals and provides a framework to limit the discharge of nutrients. Some states have adopted these programs, such as Connecticut's Long-Island Sound program, North Carolina's Tar-Pamlico Basin program and Pennsylvania and Virginia's Chesapeake Bay Watershed program.[86] While such cap-and-trade programs do not provide a supplemental source for Clean Water infrastructure funding, they offer a market-based approach to nutrient management and help to ensure that nutrient reduction occurs in a cost-effective manner.

The benefits of water quality trading programs include flexibility, cost-effectiveness, and potential to reduce non-point source pollution. Water quality trading programs are designed to give facilities flexibility in timing and methods used to control water pollution. In addition, some entities can reduce pollution at a lower cost than others allowing for cost-effective management of the problem. Furthermore, the programs can be targeted to both point sources and non-point sources.[87]

However, there are several challenges associated with water quality trading programs. Uncertainties regarding the ability to control pollution due to production volume differences and weather variables can cause variable trading volumes. Since water quality trading allows polluters to purchase credits instead of meeting pollution requirements, such program can cause hot spots of high pollution levels. Furthermore, it can be difficult to accurately measure avoided nutrient pollution especially for non-point sources.

Nutrient credit trading programs could be expanded to more watershed locations to potentially result in more cost-effective management of point-source nutrient discharges.

4.5.2. Polluter Pays Models for Emerging Contaminants

EPA has identified contaminants of emerging concern, including pharmaceuticals and personal care products ("PPCPs"), and there is concern that these compounds may have an impact on aquatic life. In addition, some contaminants of emerging concern act as so-called endocrine disruptors, compounds that alter the normal functions of hormones resulting in a variety of adverse health effects.[88] Several regulatory models are emerging as a way to deal with the emerging contaminants, with some providing a potentially

[85] Maryland Bay Restoration Fund information accessed at: https://mde.maryland.gov/programs/water/BayRestorationFund/Pages/Index.aspx

[86] Facts About Nutrient Trading, Chesapeake Bay Foundation. Accessed at: https://www.cbf.org/document-library/cbf-guides-fact-sheets/nutrient_trading_fact_sheet_-_pa_and_va374c.pdf

[87] Three Strengths and Weaknesses of Water Quality Trading Policies, Kate Fialko, UNC Environmental Finance Center, April 26, 2018. Accessed at: https://efc.web.unc.edu/2018/04/26/three-strengths-and-weaknesses-of-water-quality-trading-policies/

[88] Contaminants of Emerging Concern including Pharmaceuticals and Personal Care Products, EPA. Accessed at: https://www.epa.gov/wqc/contaminants-emerging-concern-including-pharmaceuticals-and-personal-care-products

new source of revenue to fund water and wastewater infrastructure costs. With the potential cost to address emerging contaminants looming, it is timely to consider such alternative funding.

Expanded Pretreatment Requirements for Industrial Dischargers

Per- and polyfluoroalkyl substances ("PFAS") are a broad class of chemicals with diverse properties that are present in a wide variety of industries, including first responder services and safety equipment, aerospace, energy, automotive, medical devices, pharmaceuticals, telecommunications, textiles, and electronics.[89] In cases where the polluter is known, the cost of water treatment may be recoverable through litigation settlements. However, more often, the precise source of PFAS contamination is unclear, making litigation or a regulatory outcome more uncertain. To address this issue, EPA could provide effluent limitations guidelines ("ELGs") and pretreatment program requirements for industrial dischargers that discharge PFAS-containing effluent into sewer systems. In addition, EPA could require industrial dischargers to notify wastewater utilities of the presence and quantity of emerging contaminants in the discharged wastewater as part of the industrial pre-treatment program. Placing limits and reporting requirements on industrial dischargers would help ensure that the industrial creators of these chemicals bear much of the cost to address them and could help shift the potential downstream compliance and enforcement repercussions of discharging PFAS from municipal wastewater treatment operators to the upstream industrial dischargers.

Extended Producer Responsibility

The presence of micropollutants is likely to have significant costs on drinking water and wastewater utilities in the future. For example, one European study reports that the extra treatment to comply with current or future legislative requirements for drinking water and wastewater due to micropollutants and microplastics is anticipated to result in several billions of euros per year of investment in advanced water treatment technologies and additional operational costs unless effective source-control measures are taken.[90]

Extended Producer Responsibility ("EPR") is an approach that recognizes the producers' distinct responsibility for the products that they place on the market, which extends beyond the production and consumption state to its end-of-life stage. Through EPR policies, the producer takes on the costs of ensuring safe end-of-life waste disposal. This approach can help relieve public utilities and the public of some of the cost of environmental contamination and waste disposal. An important aspect of EPR is to provide incentives for producers to take into account environmental considerations over the products' life cycle by internalizing the external costs in order to drive and incentivize greener design.[91]

EPR frameworks could be considered that aim to control the problem at the source rather than address downstream pollution challenges. This could be accomplished using eco-modulation. Eco-modulation is a concept of penalizing the use of materials that are less environmentally friendly and rewarding the use of those which are better, for example through charging a higher rate of tax for products that are harder

[89] EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan, EPA 823R18004, February 2019. Accessed at: https://www.epa.gov/sites/default/files/2019-02/documents/pfas_action_plan_021319_508compliant_1.pdf

[90] EUREAU EPR Study. P.1

[91] Study on the Feasibility of Applying Extended Producer Responsibility to Micropollutants and Microplastics Emitted in the Aquatic Environment from Products During Their Life Cycle. Prepared for EurEau by Deloitte. December 2019.

to recycle or address in the water cycle once it is contaminated. The collected funds could be used to finance pollution mitigation measures at water and wastewater treatment plants or at the source of the contamination. However, such a scheme would require a clear regulatory framework based on a full life-cycle approach to consumer and industrial products.

One approach to encourage EPR is to require producers to pay an advanced disposal fee. One example of this is Washington State's Hazardous Substance Tax that is imposed on the first processor of hazardous substances (petroleum products, pesticides, and certain chemicals) sold in Washington State. This is a 0.7% excise tax on the wholesale value of the hazardous substance. The funds collected are deposited into a state account and a portion of the funding is passed through to local jurisdictions for use in water and air quality management efforts.[92] This type of producer fee or tax could be applied to micropollutants to help defray the cost of water and wastewater treatment plant upgrades to remove these pollutants.

A research study recently completed in Germany proposed a pharmaceuticals regulatory charge to address pharmaceutical micropollutants in water resources. Under this proposal, the charge would be collected to fund a "fourth wastewater treatment stage" to remove the micropollutants from wastewater. The concept of the pharmaceutical regulatory charge was developed to provide a mechanism for funding the infrastructure and operational costs of this "fourth treatment stage." This approach makes the polluters responsible for the cost of upgrading wastewater treatment plants, rather than rate payers. The research proposes a three-tier tariff or regulatory charge collected at the national level for handling the water pollutants. If it is unclear whether a pharmaceutical product causes damage to water, either the manufacturer or the pharmacy would pay a charge for the products potential effect on water, as a precaution. An increased fee would be charged if it is clear that the product is a water pollutant. However, if it can be proven that the pharmaceutical product does not have any damaging effects on water, no fee would be charged. This approach would provide the needed funding to support wastewater treatment plant upgrades and could have an important compensatory function as part of a comprehensive strategy for combating micropollutants.[93] A similar type regulatory charge could be introduced in the U.S. at the state or national level to help pay for water and wastewater treatment upgrades to remove these pollutants.

4.6. Legal and Statutory Considerations

Many of the potential additional sources of federal funding for the water sector identified in this report, such as the continuation of the federal funding support contained in the current IIJA beyond 2026, the extension of producer responsibilities through the enactment of excise taxes on manufacturers and products contributing to emerging contaminants, the extension of pretreatment requirements for industrial discharges of such contaminants to shift the cost burden utilities to these produces, the expansion of cap-and-trade programs, and the enactment of an enhanced grant program to fund stormwater needs similar to the Clean Water Construction Grants Program of the 1970s and 1980s will require congressional action as well as significant water sector advocacy in the support of new federal legislation and in some cases state legislation. As with past efforts to advocate for federal funding

[92] Hazardous Substance Tax, Washington State Department of Revenue. Accessed at: https://dor.wa.gov/taxes-rates/other-taxes/hazardous-substance-tax

[93] Reducing Micro-Pollutants in Water: How to Finance, Dr. Erik Gawel, Helmholtz Centre of Environmental Research. 2017. Accessed at: https://www.ufz.de/index.php?en=36336&webc_pm=21/2018

legislation including funding for the water sector, the passage of enabling legislation to make these alternatives a reality would require significant, ongoing efforts by NACWA in coordination with other water sector agencies and advocacy groups. NACWA's leadership in legislative, regulatory, and legal advocacy over the past 50 years on a broad spectrum of clean water issues well positions it to lead efforts to advocate for legislation to enhance the federal infrastructure funding for the water sector and garner federal support for the alternatives identified herein.

5. Conclusions

The following are the primary results and conclusions from the research:

1. Various water sector agencies and organizations have published estimates of clean water and total water sector infrastructure needs. Combined, the total water sector estimate, including infrastructure investment for replacement, infrastructure needed for population growth, and the cost of lead service line replacement was estimated to be $2.913 trillion over 20-years or approximately $146 billion annualized.
2. The total identified need for transportation (roads) over 20 years was $5.966 trillion or $298 billion annually, for power (electricity) was $2.299 trillion or $115 billion annually, for broadband was $92 billion or $18.5 billion annually, for levees was $25.6 billion or $1.3 billion annually, and for inland waterways was $6.8 billion or $0.3 billion annually and reflected in 2022 dollars. Only transportation (roads) has a 20-year infrastructure need that was estimated to be higher than the water sector.
3. The estimated annual funding support for the water sector provided by the various federal programs identified in this report total approximately $15.7 billion per year (in 2022 dollars).
4. Historically, over the last six decades, state and local governments funded increasing amounts of water sector expenditures, while federal funding has been relatively flat. State and local spending was 272% higher in 2017 than it was in 1956. Federal spending on water utilities represented approximately 5.9% of total annual spending in 1970 and approximately 3.7% in 2017.
5. The IIJA will increase federal funding for the water sector from approximately 4% of the overall funding need to approximately 11% of the overall funding need between 2022 and 2026. However, this federal spending support remains significantly less than the federal spending of most of the other infrastructure sectors that were examined, includes a significant portion as loans that must be repaid, and is only set to last for a five-year period. During a period of supply chain shortages and inflation, it is also likely that need has grown as well.
6. Spending by local water sector utilities has been less dependent on federal support and more dependent on the ability of utilities to increase revenues through user charges in their local communities. However, user charges over the past 20 years have increased at a rate significantly exceeding inflation. This has increased the challenge of community affordability and has impacted the ability and willingness of utilities to continue to significantly raise user charges to generate revenues to pay for additional infrastructure improvements.
7. Some existing federal funding sources may be available to support additional water infrastructure investment, which have not currently been heavily leveraged by water sector utilities. For example, the clean water sector could target securing additional federal funding through DOE's EERE program for wastewater resource recovery funding, and its Water Security Grand Challenge program. Other opportunities may include leveraging USDOT's RAISE discretionary grant program for stormwater drainage and water/wastewater pipe relocation or replacement funding, and targeting specific IIJA funding programs and elements, such as the Healthy Streets Program for additional stormwater funding.

8. Options for future stormwater funding may also include having the federal government develop a new enhanced construction grant program specifically for stormwater projects similar to the Municipal Construction Grants program that funded the construction of wastewater treatment plants in the 1970s and 1980s and providing dedicated funds for the CWSRF and WIFIA programs specifically for stormwater.
9. Several "polluter pays" models have been established and are used in other infrastructure sectors that could potentially be applied to the clean water sector. These include excise taxes on companies that manufacturer, produce, or input specific chemicals that may eventually cause environmental contamination.
10. As the water sector continues to face increasing infrastructure investment needs due to aging infrastructure, shifting demographics, and regulatory drivers (e.g., lead & copper, and emerging contaminants including PFAS, pharmaceuticals, etc.), additional federal funding support and new models of generating revenue will be critical for the water sector to be able to continue to afford to make utility infrastructure investments in the future.
11. Alternative "polluter pays" funding mechanisms could be used to fund water sector infrastructure improvements and are already being used to a limited extent. For example, the Maryland BRF program included the creation of a dedicated source of revenue to reduce nutrient pollution in the waters of the state by collecting a monthly fee from residential and commercial properties. These types of models could include state or federal funding approaches that collect fees from homeowners and businesses and dedicate these funds to infrastructure programs, expanding water quality trading programs, and implementing new polluter pays models.
12. One approach to dealing with emerging contaminants, such as PFAS and pharmaceuticals, is to require producers to pay an advanced disposal fee, similar to the excise tax approach described above. Such a tax or fee could be collected by these producers to help fund the wastewater and water treatment required to remove the pollutants. This concept is being developed in Germany as a pharmaceutical regulatory charge and is intended to make the polluters responsible for the cost of upgrading wastewater treatment plants, rather than rate payers.
13. Another "polluter pays" model enhancement could involve EPA providing effluent limitation guidelines and pretreatment program requirements for industrial dischargers that discharge PFAS-containing effluent into sewer systems. Placing limits and reporting requirements on industrial dischargers could help ensure that the industrial creators of these chemicals bear much of the cost to address them and could help shift cost responsibility for discharging PFAS from municipal wastewater treatment operators to the upstream industrial dischargers. With the potential cost to address emerging contaminants looming, it is timely to consider such alternative funding.