Report to Congress on Alternative Decentralized and Centralized Wastewater Treatment Technology

U.S. Environmental Protection Agency

Office of Water

July 2024

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Abbreviations and Acronyms

AAA	Augmented Alternatives Analysis
ACWA	Association of California Water Agencies
AWIA	America's Water Infrastructure Act
CWA	Clean Water Act
CWISA	Clean Water Indian Set Aside
CWSRF	Clean Water State Revolving Fund
CZARA	Coastal Zone Management Act Reauthorization Amendments
EFAB	Environmental Financial Advisory Board
EFC	Environmental Finance Center
EPA	United States Environmental Protection Agency
ETV	Environmental Technology Verification
EUM	Effective Utility Management
GRTS	Grants Reporting and Tracking System
IA	Interagency Agreement
IHS	Indian Health Service
MGD	Million Gallons per Day
MOU	Memorandum of Understanding
NDWRCDP	National Decentralized Water Resources Capacity Development Project
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NSFC	National Small Flows Clearinghouse
NSSS	National Sewage Sludge Surveys
PFAS	Per- and Polyfluoroalkyl Substances
POTWs	Publicly Owned Treatment Works
RCAP	Rural Community Assistance Partnership
REUSExplorer	Regulations and End-Use Specifications Explorer
RST TA	Rural, Small, and Tribal Technical Assistance
SBIR	Small Business Innovation Research
SCOWT	Searchable Clearinghouse of Wastewater Technology
SRF	State Revolving Fund
SWIFT	Sustainable Water Initiative for Tomorrow
Tech Center	Clean Water Technology Center
TWIST	The Wastewater Information System Tool
U.S.	United States
USC	United States Code
USDA-RD	United States Department of Agriculture Rural Development
Water Finance Center	Water Infrastructure and Resiliency Finance Center
WaterTA	Water Technical Assistance
WEFTEC	Water Environment Federation's Technical Exhibition and Conference
WIFIA	Water Infrastructure Finance and Innovation Act
WRAP	National Water Reuse Action Plan

Executive Summary

The U.S. Environmental Protection Agency's (EPA's) Office of Water is responsible for sharing information on alternative wastewater treatment and recycling technologies, as implementation of these effective and affordable technologies can reduce costs, improve efficiency, and protect public health and the environment. The EPA's Office of Water also provides information on sources of funding for these types of technologies.

The EPA regularly provides information to the public on wastewater treatment systems and recycling technologies, including decentralized and onsite systems, water reuse, water and energy efficiency, nutrient removal, disinfection, and other topics. This Report to Congress has been developed to satisfy requirements of America's Water Infrastructure Act of 2018 (AWIA), Section 4102, codified in Title 33 Section 1314a of the U.S. Code (33 USC 1314a), which requires the EPA to provide an updated Report to Congress at least every three years that addresses the following main topics—(1) the type and amount of information provided to units of local government and nonprofit organizations regarding alternative wastewater treatment and recycling technologies; (2) the states and regions that have made the greatest use of alternative wastewater treatment and recycling technologies; and (3) the actions taken by the Administrator to assist states in the deployment of alternative wastewater treatment and recycling technologies, including onsite and decentralized systems. The EPA developed an initial Report to Congress on these topics, submitted in July 2021.

This report addresses each of the three AWIA Section 4102 topics with information updated since the 2021 Report to Congress. It describes active resources provided by the EPA regarding alternative decentralized and centralized wastewater treatment systems and recycling technologies, including publications, platforms, projects, programs, and collaborations. Funding resources provided by the EPA for these types of technologies are also discussed. The EPA's new efforts since the 2021 Report to Congress include but are not limited to the development of the Searchable Clearinghouse of Wastewater Technology (SCOWT), implementation of the Bipartisan Infrastructure Law, and the Water Technical Assistance (WaterTA) initiative.

1. Introduction

The America's Water Infrastructure Act of 2018 (AWIA), Section 4102(2)(b), codified in Title 33 Section 1314a(b) of the U.S. Code (33 USC 1314a(b)), requires the EPA to provide an updated Report to Congress at least every three years that describes the following three reporting topics:

(1) *The type and amount of information provided to units of local government and nonprofit organizations regarding alternative wastewater treatment and recycling technologies*;
(2) *The states and regions that have made greatest use of alternative wastewater treatment and recycling technologies; and*
(3) *The actions taken by the Administrator to assist states in the deployment of alternative wastewater treatment and recycling technologies, including onsite and decentralized systems.*

2021 Report to Congress

The EPA submitted the first Report to Congress under this provision in July 2021 (EPA, 2021d). The 2021 Report provided various types of information about alternative wastewater treatment and recycling technologies to satisfy the request. For example, it included a compilation of historical and current data from grant and loan programs; current reports, publications, funding programs, and technical assistance documents related to alternative wastewater treatment and recycling technologies; and data on investments awarded to the states through the EPA's loan, grant, and technical assistance programs through mid-2021. This information helped demonstrate which states and regions had made the greatest use of alternative wastewater treatment and recycling technologies at that point in time. The 2021 Report to Congress also included an overview of programs initiated and products developed or supported by the EPA, including grant programs, technical assistance tools, guidance documents, and other resources.

Alternative Technologies:

Fully proven wastewater treatment systems that reclaim or reuse wastewater, productively recycle wastewater components, recover energy, or eliminate pollutant discharge. Specific alternative technologies include onsite treatment or alternative wastewater conveyance systems for small communities, land treatment of wastewater and sludge, direct reuse (non-potable) of treated wastewater, aquifer recharge, composting, co-disposal of sludge and refuse, and methane recovery and use. Alternative technologies typically provide cost savings compared to conventional treatment because of lower operation and maintenance costs or cost recovery through productive use of wastes (EPA, 1989).

2024 Report to Congress

This report provides updates on efforts from the 2021 Report that are still active, as well as information on new efforts that have been initiated since the development of the previous report. The information in this report is current through March 2024.

The EPA's response to topic (1) *the type and amount of information provided to units of local governments and nonprofit organizations regarding alternative wastewater treatment and recycling technologies* includes publications, programs, and collaborations on decentralized and centralized wastewater treatment and recycling technologies that the EPA has made available to states, local

governments, communities, and nonprofit organizations since 2021. For this report, the EPA accessed publicly available resources, including financing mechanisms focused on alternative wastewater treatment and recycling technologies. See Section 2.1 for more information.

The EPA's response to topic (2) *the states and regions that have made greatest use of alternative wastewater treatment and recycling technologies* includes data on investments awarded to states through the EPA's loan and grant programs, and information on technical assistance programs. For this report, the EPA included the use of alternative wastewater treatment and recycling technologies by states that have distributed funds specifically for these projects and programs. See Section 2.2 for more information.

Decentralized and Centralized Technologies:

A general term that encompasses a wide range of decentralized and centralized wastewater systems. Decentralized technologies include, but are not limited to, septic systems, onsite wastewater treatment systems, and onsite sewage disposal systems for use by an individual household. Centralized technologies include public sewer systems that collect municipal wastewater from homes, businesses, and industries and deliver it to a single, centralized treatment plant for processing. More information on these types of systems can be found at https://www.epa.gov/small-and-rural-wastewater-systems/about-small-wastewater-systems.

The EPA's response to topic (3) *the actions taken by the Administrator to assist states in the deployment of alternative wastewater treatment and recycling technologies, including onsite and decentralized systems*, recognizes that many items covered in topic (1) also apply to topic (3). For this report, the EPA interprets the phrase "actions taken by the Administrator" to refer to programs and policies facilitated by the EPA to assist in the adoption of alternative wastewater and recycling technologies. See Section 2.3 for more information.

2. AWIA Section 4102(2)(b) Reporting Topics

This section addresses each of the three reporting topics in AWIA Section 4102(2)(b), providing detailed information about any changes or progress since issuance of the 2021 Report. Information on inactive programs can be found in the 2021 Report and in Appendix A of this document.

2.1. Information Provided to Local Governments and Nonprofit Organizations

This section discusses the EPA's efforts to share information about alternative and cost-effective wastewater treatment and recycling technologies, and how it disseminates this information through platforms, programs, and collaborations.

2.1.1. Platforms

Searchable Clearinghouse of Wastewater Technology

The Searchable Clearinghouse of Wastewater Technology (SCOWT), previously referred to as the Wastewater Technology Clearinghouse, is an information-sharing platform that provides resources on the cost-effectiveness and performance of innovative, alternative, and reuse wastewater technologies.

The platform was launched by the EPA in 2021, as mandated in AWIA Section 4102(a), and is available to the public. Resources are separated into three searchable databases, which also include a map function that allows users to search by geographical location. As of May 2024, there were 214 resources available in the centralized clearinghouse database, 74 resources in the onsite and decentralized clearinghouse database, and 54 resources in the water reuse clearinghouse database. Fifty-two of these resources were published within the last three years. Examples of recent innovative wastewater treatment and recycling technology resources are listed in Table 1 below. A significant addition to SCOWT is an interface that allows communities to identify technical assistance providers for wastewater management and water reuse. This technical assistance provider tool (available for both states and Tribes) consists of a map and filter tool that assist communities in choosing from technical assistance providers that can assist with various needs such as technical, managerial, and financial assistance. Since the inception of SCOWT, the overall website has been visited over 18,100 times, with over 900 visits for centralized resources, over 900 visits for decentralized resources, over 400 visits for water reuse resources, and over 600 visits for technical assistance.

Table 1. Examples of SCOWT Database Resources

Title (Year)	Description	Technology Type
Compendium of Decentralized Wastewater Demonstration Grant Projects (EPA, 2021a)	Compendium summarizing 18 final reports from community decentralized project grantees funded under congressional appropriations. Project topics include installation of new advanced wastewater treatment systems, community-wide assessments, green infrastructure, and stormwater improvements.	Decentralized
Innovative Nutrient Removal Technologies: Case Studies of Intensified or Enhanced Treatment (EPA, 2021b)	Study and report analyzing the long-term performance of six facilities (five in the U.S., one in Canada) that implemented innovative technologies or process enhancements designed to significantly intensify treatment or enhance the removal of nitrogen or phosphorus species.	Centralized
WRAP Second Anniversary Brings New Water Reuse Resources (WateReuse, 2022)	Information from a symposium sharing progress made in four Water Reuse Action Plan (WRAP) actions, as well as new resources developed. Resources include expanded information on state regulations, stormwater capture and use, National Pollutant Discharge Elimination System (NPDES) permitting, and lessons in successful collaboration for multi-agency water reuse programs.	Water Reuse

National Water Reuse Action Plan Online Platform

The National Water Reuse Action Plan (WRAP) was developed to drive progress on reuse and address local and national barriers across a range of topics, including technical, institutional, and financial issues. The WRAP Online Platform, which has produced over 170 resources to date, contains up-to-date information on WRAP actions that represent the collaborative efforts of 157 action leaders and partner organizations, including reports, action summaries, and webinars. Through communication with action leaders, the information is frequently updated to share progress, including completion of implementation milestones, new entities collaborating on actions, and links to relevant action outputs.

Water Reuse:

Water reuse is the practice of reclaiming water from a variety of sources, treating it, and reusing it for beneficial purposes. It can provide alternative supplies for potable and non-potable uses to enhance water security, sustainability, and resilience. More information on water reuse can be found at https://www.epa.gov/waterreuse/.

The Water Reuse Program has also developed a Water Reuse Information Library and Water Reuse Resource Hub by End-Use Application. The Water Reuse Information Library is designed to help water reuse practitioners access relevant and important resources, including reports and publications, fact sheets, webinar recordings, and webpages. The Resource Hub is organized by water reuse application, reflecting the recycling of an alternative source of water that is adequately treated for its intended use. Each end-use page compiles resources such as state policies, webinars, information about typical source waters, and publications. Collectively, these materials inform, document, and share stories of approaches taken by communities to initiate and implement water reuse. In addition, a webpage dedicated to nature-based solutions has been created to showcase examples of water reuse projects that use nature-based solutions and provide information on the benefits of nature-based solutions in water reuse projects.

The Regulations and End-Use Specifications Explorer (REUSExplorer) tool, which was developed by the EPA and partners as part of WRAP Action 3.1, is also available. This database compiles state-level regulations and guidelines for different sources of water and end-use applications to assist states interested in developing regulations. The REUSExplorer allows users to visualize the regulatory landscape for different reuse applications, while also helping utilities and practitioners to better understand current regulations by providing users with a summary of the state regulations/guidelines and links to the official state language. The database includes information on the following reuse end-use applications: potable, onsite non-potable water reuse, centralized non-potable reuse, consumption by livestock, agriculture, landscaping, environmental restoration, industry, and impoundments. The EPA will update the available information in REUSExplorer every two years, or as provided by the states. The most recent content was added in February 2024.

Water Finance Clearinghouse

The Water Finance Clearinghouse is a free and online database of financial assistance information. The Clearinghouse helps communities locate information to assist them in making informed financial decisions for drinking water, wastewater, and stormwater infrastructure needs. The Clearinghouse includes two searchable databases: Funds and Resources. The Funds database contains available

funding sources for water infrastructure. This database includes descriptions and contact information for over 1,000 funding programs and allows the user to filter these programs by scope, sector, eligible use, and eligible applicants. The Resources database contains resources such as reports, case studies, and webinars related to financing mechanisms and approaches that can help communities access capital for meeting water infrastructure needs. Examples of these resources are presented in Table 2 below. The Clearinghouse also hosts water finance learning modules that provide information on various financing sources and funding topics related to water infrastructure investments.

Table 2. Examples of Water Finance Clearinghouse Resources

Resource	Description
Environmental Finance Advisory Board (EFAB) Publications	Federal advisory committee publications that provide ideas and advice to the EPA's Administrator and program offices on ways to lower the costs of and increase investments in environmental and public health protection. EFAB's work focuses on lowering the cost of environmental protection; removing financial and programmatic barriers that raise costs; increasing public and private contribution in environmental facilities and services; and building state and local financial ability to meet environmental laws.
Water Affordability Publications	Resources available for addressing affordability issues within the water sector. Offerings include the *Clean Water Act Financial Capability Assessment Guidance* (EPA, 2024) and a compendium of *Drinking Water and Wastewater Utility Customer Assistance Programs* (EPA, 2016).
Infrastructure Financial Tools	Designed to help utilities make financing decisions to meet their local infrastructure needs. Offerings include the Water Utility COVID-19 Financial Impact Tool, the Financing Alternatives Comparison Tool (FACT), and several guidance documents with information on over 300 additional financial tools.

EPA Decentralized Wastewater Program Website

The EPA Decentralized Wastewater Program website includes information for homeowners and technical resources for wastewater professionals, such as case studies, guidance documents, learning modules, and external links to decentralized related topics. The SepticSmart Week Program has over 55 online and printable resources available to guide homeowners, local environmental groups, county health departments, and local governments to increase education on the various types of septic systems, including alternative technologies, and to promote awareness in caring for them. The EPA's Decentralized Wastewater Management Memorandum of Understanding (MOU) Partnership is designed to improve the overall performance and management of decentralized systems and alternative technologies across the county. Program resources include the most recent MOU agreements, several position papers, and webinars. To keep up with new alternative technology and information, the EPA's Decentralized Wastewater Program also hosts webinars on related topics, highlights demonstration projects, and maintains an up-to-date library of important reports, regulations, guidance, and manuals.

2.1.2. Programs

Clean Water State Revolving Fund Program

The Clean Water State Revolving Fund (CWSRF) is a financial assistance program for a wide range of water infrastructure projects that was established by the 1987 Amendments to the Clean Water Act (CWA), under 33 USC 1383, and replaced the EPA's Construction Grants Program[1]. The CWSRF allows states the flexibility to fund a range of projects that address their highest priority water quality needs. The 51 CWSRF programs, including Puerto Rico's program, function like banks by providing low-interest loans to eligible recipients for water infrastructure projects. As money is paid back into the state's revolving loan fund, the state makes new loans to other recipients for high priority water quality activities. In this way, funds in a state's CWSRF "revolve" at the state level over time. Projects eligible for CWSRF funding include the construction of publicly owned treatment works (POTWs); nonpoint source (NPS) programs; National Estuary Program projects; decentralized wastewater treatment systems; stormwater management systems**;** water conservation, efficiency, and reuse projects; watershed pilot projects; and projects that increase energy efficiency. Since 1988, the EPA has provided $52.4 billion in capitalization through the CWSRF. These funds have been used by all 50 states and Puerto Rico to provide approximately $172 billion in CWSRF assistance for water quality projects. Of those projects, 92 percent involved centralized wastewater treatment. The remaining 8 percent addressed stormwater, promoted energy and water conservation, and mitigated NPS pollution. The 2021 Bipartisan Infrastructure Law delivered more than $50 billion to the EPA to improve the nation's drinking water, wastewater, and stormwater infrastructure, with $11.7 billion of those funds allotted to the CWSRF and set-aside programs for Tribes, territories, and the District of Columbia. Since the last Report to Congress, the State Revolving Fund (SRF) program launched an SRF Public Portal that provides financial and programmatic information on national, state, and assistance agreement levels.

Section 2.2 provides state-specific information on use of the CWSRF for decentralized and centralized wastewater and recycling projects.

Clean Water State Revolving Fund for Emerging Contaminants

The 2021 Bipartisan Infrastructure Law provides a $1 billion appropriation for fiscal years 2022 through 2026 to the CWSRF to address emerging contaminants, such as perfluoroalkyl and polyfluoroalkyl substances (PFAS), in wastewater, stormwater, and NPS pollution (EPA, 2023). The emerging contaminants funding catalyzes the utilization of various technologies, such as granular activated carbon (GAC), to treat wastewater. The funds also enable states to invest in lab equipment to build their capacity to address emerging contaminants and develop a pipeline of emerging contaminants projects. The EPA has developed multiple resources to provide information about this funding source, including a Frequent Questions page and case studies of eligible projects. The EPA has also presented about the CWSRF emerging contaminants funds at multiple webinars and created a quick reference fact sheet for technical assistance providers. All of these materials are available on the emerging contaminants web page.

[1] See Appendix A for more information about the Construction Grants Program.

Section 319 of the CWA – Nonpoint Source Pollution Program

Congress enacted Section 319 of the CWA in 1987, establishing a national program to control NPS water pollution, which the EPA continues to support. Section 319 is one of the grant programs that still provides funding to address decentralized wastewater treatment needs. Through the Section 319 Grant Program, the EPA provides funds and guidance to all 50 states, as well as territories and Tribes, to implement their NPS programs. The projects are guided by state-specific NPS management program plans. These resources can support a wide variety of activities including regulatory or nonregulatory programs, technical assistance, financial assistance, education, training, technology transfer, watershed projects, and monitoring to assess the success of specific NPS implementation projects. Section 319 funds are used to implement on-the-ground projects to improve water quality affected by a wide variety of NPS impacts or to protect water quality from potential impacts (*i.e.,* watershed implementation projects). NPS categories cover a spectrum of sources, such as agriculture, urban, silviculture, abandoned mine drainage, and decentralized wastewater treatment systems. Section 319 funds also can be used for water reuse projects such as agricultural drainage management practices that utilize recycled water, irrigation tailwater recovery systems, cisterns, rain barrels, urban runoff collection and reuse systems, and aquifer recharge projects. Collectively, work funded by Section 319 of the CWA has restored over 13,000 miles of streams and more than 335,000 acres of lakes since the EPA began tracking progress in 2005. Decentralized projects funded through the NPS program are outlined in Figure 3 of Section 2.2.

The EPA's NPS Program has provided multiple guidance documents on the management of decentralized wastewater treatment systems. The following guidance documents provided by the EPA are available:

- *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* was produced in 1993, as required under the Coastal Zone Management Act Reauthorization Amendments (CZARA) of 1990. Chapter 4 of this document includes two management measures for onsite disposal systems: one for new onsite systems and another for operating onsite systems (EPA, 1993a). Those states and territories with coastal NPS programs developed under CZARA must develop programs that implement these two management measures. Thus far, this guidance applies to 34 state and territory coastal NPS programs. One outcome of CZARA has been to greatly increase rates of inspection, maintenance and repair of septic systems and their alternatives across these states and territories. To date, the EPA, in conjunction with the National Oceanic and Atmospheric Administration (NOAA), has fully approved 30 state and territory coastal NPS programs. These agencies continue to work closely with the 4 remaining states to complete the development of their coastal NPS programs (EPA, 1993b).
- The EPA published the *National Management Measures to Control Nonpoint Source Pollution from Urban Areas* in 2005. Chapter 6 of this document included a management measure on new and existing onsite wastewater treatment systems. This voluntary guidance was an update to the 1993 CZARA guidance and written for audiences at the national level, not just coastal states and territories (EPA, 2005).
- As required under Section 502 of the Executive Order 13508, the EPA produced *Guidance for Federal Land Management in the Chesapeake Bay Watershed* in 2010 (EPA, 2010b). This

guidance presented the most effective tools and practices to address NPS pollution from federal land management activities in the Chesapeake Bay watershed. Chapter 6 of this document presented five implementation measures to minimize nitrogen from decentralized wastewater treatment systems (EPA, 2010a). This document served as the basis for *The Model Program for Onsite Management in the Chesapeake Bay Watershed* published by the EPA in 2013 (EPA, 2013).

- Along with these guidance documents, the EPA's NPS Program co-published an *Onsite Wastewater Treatment Systems Manual* with the EPA's Office of Research and Development in 2002. The manual provided information on onsite wastewater treatment system siting, design, installation, maintenance, and replacement. It identified advances to help onsite systems become more cost-effective and environmentally protective. In addition to providing a wealth of technical information on a variety of traditional and new system designs, the manual promoted a performance-based approach to selecting and designing onsite systems (EPA, 2002).
- The *Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems* document was produced through collaboration between the EPA's Office of Water and the EPA's Office of Research and Development in 2003. The information in the management guidelines is intended to be used to help select appropriate management strategies and technologies for areas that rely on decentralized treatment systems (EPA, 2003).

Green Infrastructure Program

Green infrastructure uses plants, soils, and nature itself to manage stormwater and create healthier urban environments. Green infrastructure practices can be used to reduce the need for expensive gray infrastructure—pipes, storage facilities, and treatment systems—because plants and soils soak up, store, and use the rainwater. Communities also can create or preserve existing vegetated areas to maintain a high quality of life for residents through flood protection, cleaner air and water, and more appealing transportation corridors and outdoor spaces. The legal definition of green infrastructure can be found in Section 502 of the CWA.[2]

EPA's Green Infrastructure Program focuses on the following:

- Facilitating information exchange between communities, practitioners, and other green infrastructure stakeholders.
- Providing information, training, and other resources that increase the technical, financial, and managerial capacity necessary for successful green infrastructure implementation.
- Showcasing local success stories that highlight the multiple benefits of green infrastructure practices and provide a roadmap for other communities, practitioners, and regulatory stakeholders to follow. These projects are all available online to communities interested in these topics.

[2] Section 502 of the CWA defines green infrastructure as "...the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters."

EPA's technical resources explain how to develop and evaluate combined sewer overflow controls, permit requirements and enforcement actions that include green infrastructure. View EPA's permitting and enforcement fact sheets to learn how green infrastructure is a solution that supports healthy and clean waterways. EPA's green infrastructure webcast series features leading academics and professionals from around the country sharing expertise on a range of topics related to green infrastructure. For more information visit https://www.epa.gov/green-infrastructure.

Section 405 of the CWA – Biosolids Program

Section 405 of the CWA provides the framework for establishing regulations for the disposal and/or reuse of sewage sludge. Part 503 of Title 40 of the Code of Federal Regulations (40 CFR Part 503) sets the framework for sewage sludge regulations and in 1993 brought the management of sewage sludge residuals from wastewater treatment processes to reside under the National Pollutant Discharge Elimination System (NPDES) permit program. The terms "sewage sludge" and "biosolids" are often used interchangeably by the public; however, the EPA typically uses the term "biosolids" to mean sewage sludge that has been treated to meet the requirements in Part 503 and is intended to be applied to land as a soil amendment or fertilizer. The CWA and the EPA's regulations only use the term "sewage sludge." As part of the biosolids program, the EPA provides technical resources for biosolids managers, including information on methods, technologies, management practices, domestic septage, and lagoon clean outs.

The EPA still plays an important role in biosolids research, implementation of pilot projects, rulemaking, and funding. Innovative pathogen reduction processes can gain regulatory acceptance by demonstrating equivalency in a process managed by the EPA's Pathogen Equivalency Committee and overseen by the permitting authority. The EPA also provides fact sheets related to biosolids wastewater treatment train technology, guidance documents related to domestic septage, and information on a variety of biosolids use and disposal management practices. The EPA periodically conducts reviews of pollutants which may be found in sewage sludge through Biennial Reviews and National Sewage Sludge Surveys (NSSS). Pollutants identified in sewage sludge are then reviewed for potential risk through a risk assessment framework. The EPA may set regulations for pollutants if sufficient scientific evidence shows they may harm human health or the environment. The most recent biennial review was published in December 2022 (EPA, 2022a). The next NSSS focusing on PFAS is being conducted in conjunction with EPA's POTW Influent PFAS Study, which will help inform potential options for managing risk from biosolids containing PFAS that are applied on agricultural land.

Effective Utility Management Initiative

The EPA manages the Effective Utility Management (EUM) Initiative, which helps utilities of all sizes assess their current effectiveness. The assessment is based on a series of "Attributes of Effectively Managed Utilities" and is used to develop a roadmap for improving a utility's effectiveness in priority

areas, such as energy and water efficiency, workforce development, asset management, and other critical aspects of their operations. The EUM Initiative has sponsored over 20 workshops and webinars to train utilities on how to use EUM to improve their performance. The EPA also partners with a range of professional water associations that support EUM.

Building from the EPA's Planning for Sustainability Handbook, the 2022 guidance document *Making the Right Choices for Your Utility: Using Sustainability Criteria for Water Infrastructure Decision Making* (EPA, 2022c) provides more detail on steps water sector utilities can take to use sustainability criteria in comparing various infrastructure alternatives using an Augmented Alternatives Analysis (AAA) method. This method incorporates past experiences and lessons learned to provide utilities with a simple, sound, easily explainable, and transparent way to incorporate community values and best meet utility needs as they evaluate and select infrastructure investments. As part of this method, the EPA provides AAA worksheets, which collate step-by-step input to help utilities derive the best choice for their communities.

Water Efficiency:

Associated with projects that reduce the demand for POTW capacity through reduced water consumption. Examples include water meters, plumbing fixture retrofits or replacements, water-efficient appliances, water-efficient irrigation equipment (*e.g.*, moisture and rain sensing equipment), and educational programs (EPA, 2017). EPA's WaterSense program develops criteria for water-efficient products (plumbing and irrigation). The program also provides education and guidance to help consumers and businesses manage water use.

Water Infrastructure Finance and Innovation Act Program

The Water Infrastructure Finance and Innovation Act of 2014 (WIFIA) established the WIFIA program, a credit program administered by the EPA for eligible drinking water, wastewater, and stormwater infrastructure projects. Since 2017, the WIFIA program has made available approximately $6 billion annually in credit assistance to communities for water infrastructure projects, including alternative wastewater treatment and recycling technologies. To support prospective borrowers seeking WIFIA financing, the EPA provides multiple resources including in-person and virtual information sessions and webinars. Prospective borrowers can also schedule individual meetings with WIFIA staff to answer questions related to WIFIA funding, potential loan benefits, and the application process. Since implementation of the program began in 2017, the WIFIA program has closed 125 loans, totaling $20 billion in direct assistance to support nearly $44 billion in water infrastructure projects (data through March 2024). Of those projects, 30 percent of projects were related to drinking water, 37 percent were related to wastewater, 14 percent were related to water reuse, and 5 percent were related to stormwater. The remaining projects were a combination of these four categories. State-specific WIFIA funding is provided in Section 2.2.

To share information, the WIFIA program created a panel session for the Annual WateReuse Symposium in March 2023. The panel session included four WIFIA borrowers, who described how WIFIA financing supported their water reuse projects. The borrowers represented communities in California, Georgia, Idaho, and Virginia. Additionally, the WIFIA program director gave a speech during the WateReuse Texas Conference in September 2023 and explained how the WIFIA program and other funding programs at the EPA can support water reuse projects. Finally, in March 2024, WIFIA staff presented during the

Annual WateReuse Symposium and provided an overview of the WIFIA program and how WIFIA funding can be used to implement water reuse projects.

Environmental Finance Center Grant Program

The Environmental Finance Center (EFC) Grant Program has been operating since the early 1990s to help communities access federal funding for infrastructure projects that improve public health and environmental protection. In 2022, the EFC grant program was reimagined through the historic levels of funding provided from the Bipartisan Infrastructure Law. The EPA announced the establishment of 29 EFCs and two new types of EFCs: the Regional and National Water Infrastructure EFCs. The 12 Regional Multi-Environmental Media EFCs are the traditional EFCs focused on providing technical assistance for managerial and financial capacity building services to local, state, and Tribal governments, and non-governmental organizations in the equitable implementation of environmental programs and infrastructure investments in the areas of water, air, and land. The 13 new Regional Water Infrastructure EFCs provide direct clean water and drinking water finance technical assistance services to support community access to SRF funding. The four new National Water Infrastructure EFCs help support the Regional Water Infrastructure EFCs by identifying and filling any gaps that exist across the strategy and provide direct technical assistance to communities as well.

Clean Water Rural, Small, and Tribal Technical Assistance Grant Program

The Clean Water Rural, Small, and Tribal Technical Assistance (RST TA) Grant Program was authorized by the AWIA in 2018. The program aims to provide technical assistance and training to improve rural, small, and Tribal wastewater system operations and management practices, making them more sustainable and resilient, and supporting the EPA's mission to protect public health and the environment. The program also aims to provide technical assistance in planning, developing, and accessing finance and funding for clean water projects under the CWSRF, including Infrastructure Investments and Jobs Act funds. The EPA announced the first grantees under the RST TA program in 2021, with $12 million in grant funding provided that year for conducting technical assistance. The RST TA funding supported work on 11 Closing America's Wastewater Access Gap Pilots.

As an example of RST TA outcomes, this report highlights one of the RST TA grantees, the Rural Community Assistance Partnership (RCAP). During the 2022-2023 RST TA Grant Program project period, RCAP successfully worked on 183 technical assistance (TA) projects, benefiting 49 states and all 5 U.S. territories. By the end of the 2022-2023 grant period, RCAP completed a total of 99 projects, and conducted 77 tailored training sessions, directly benefiting small, rural, and Tribal communities. The grant funding to RCAP also supported the development of resources for decentralized systems, including a National Onsite Wastewater Recycling Association (NOWRA)-supported homeowners septic guide (NOWRA, 2023) and a University of Illinois-supported new septic system assessment form (University of Illinois at Urbana-Champaign, 2023).

In 2023, the EPA provided $41 million in federal RST TA grant funding. Applications for support were submitted in five priority areas, two of which included decentralized and lagoon systems. Applicants selected under the decentralized systems priority area will provide training and technical assistance for communities that rely on decentralized wastewater treatment systems, specifically to support planning,

development, and acquisition of finance. Applicants selected under the lagoon systems priority area will provide training and technical assistance for communities that use lagoon wastewater treatment systems.

Innovative Water Infrastructure Workforce Development Grant Program

In 2020, the EPA released *America's Water Sector Workforce Initiative: A Call to Action* (EPA, 2020a). The Initiative laid out a number of actions that the EPA, other federal agencies, and various water sector partners would be taking in the coming years to encourage innovative workforce practices at water systems, highlight the value water protection specialists provide every day, and help make water a career of choice through education and sustained public outreach. The initiative was intended as a call to action for these stakeholders to come together and collaboratively address the major challenges facing the water sector workforce.

On October 15, 2021, the EPA announced the selection of nine organizations to receive $3.8 million in funding for the Innovative Water Infrastructure Workforce Development Grant Program. The goal of the grant program is to help build the water workforce and connect individuals to career opportunities in the drinking water and wastewater utility sector, as well as to expand public awareness about opportunities in the drinking water and wastewater utilities. Recipients included Rowan University's WaterWorks program and East Central University's EdPASS-H2O program. The WaterWorks program will provide educational modules to grades K through 12 to prepare for the integration of technology in the wastewater and drinking water utility sectors, including innovative mobile apps and remote sensing technologies. The EdPASS-H2O program will target students in grades K through 12; program graduates will receive a certificate of completion that will qualify them to apply for the National Rural Water Association's two-year Formal Apprenticeship Program.

In September 2023, the EPA announced a Request for Applications (RFA) for over $20 million in available grant funding for organizations interested in building a stronger pool of skilled and diverse workers in the water and wastewater utilities sector. Funding will be spread across six project areas, including education and training programs designed for decentralized (septic) water workers to support public health for communities that rely on private wells for drinking water or septic systems.

Small Business Innovation Research Program

The EPA's Small Business Innovation Research (SBIR) program funds small businesses to develop and commercialize innovative environmental technologies in broad focus areas that include clean and safe water, air quality and climate, homeland security, sustainable materials management/circular economy, safer chemicals, and risk assessment. The EPA is one of 11 federal agencies that participate in the SBIR Program. SBIR projects are funded using a phased approach. For Phase I, the EPA awards up to $100,000 for six months for "proof of concept" of the proposed technology. Small businesses that have received a Phase I award can submit a proposal for a Phase II award of $400,000 to further develop and commercialize the technology. To accelerate commercialization, the EPA also offers a "Commercialization Option" of up to $100,000 in Phase II as a partial match for companies that secure third-party investment. As of 2023, $3.4 million in the EPA's SBIR Program funding has been awarded to 13 small U.S. businesses to develop water reuse technologies. Several of the EPA's successful SBIR water

reuse projects are highlighted online at https://www.epa.gov/sbir/supporting-innovative-water-reuse-technologies-through-sbir.

2.1.3. Collaborations and Centers

Action Plans

The EPA has collaborated with partners on multiple action plans related to decentralized and centralized wastewater treatment and recycling/reuse technologies, including *EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan* (EPA, 2019), the *National Water Reuse Action Plan* (EPA, 2020c), and the *Lagoon Wastewater Treatment Action Plan* (EPA, 2022b).

The PFAS Action Plan describes the EPA's approach to identifying and understanding PFAS, addressing current PFAS contamination, preventing future contamination, and effectively communicating with the public about PFAS. As part of the Plan, the EPA works to collaborate with states, federal agencies, public water utilities, universities, and private industry to develop the treatment technology advances needed for removal of PFAS from a variety of media, including wastewater. In addition to the PFAS Action Plan, the EPA has developed the *PFAS Strategic Roadmap* for 2021 to 2024, with a goal to deliver tangible public health benefits to all communities impacted by PFAS (EPA, 2021c).

The WRAP was developed with partners across the water sector in 2019 and launched in 2020 with the intent to drive progress on reuse and address local and national barriers across a range of topics, including technical, institutional, and financial. There are currently 157 action leaders and partners, including a federal Interagency Working Group, collaborating to advance reuse around the country. The goal of the WRAP is to ensure that water reuse is accessible, straightforward to implement, and sensitive to climate and environmental justice considerations.

The EPA has presented current information on the WRAP at several conferences, including the American Water Works Association's Potable Reuse and Biological Treatment Symposium (July 2023), the Groundwater Protection Council Annual Forum (September 2023) the Annual WateReuse Symposium, and the annual Association of California Water Agencies (ACWA) WateReuse California Conference. In 2023, the EPA held a workshop titled "Regulating Innovation: Building the Nation's Capacity to Permit New Wastewater Management Approaches" to advance Action 2.19 of the WRAP. At the March 2024 WateReuse Symposium, WRAP action leaders and federal water reuse interagency working group representatives were a part of 15 different sessions at the symposium and the EPA helped convene nearly 20 states at the 4th State Summit on Water Reuse, where states and a federal panel shared lessons learned related to water reuse policy, planning, and implementation. Also in 2024, the EPA held an Onsite Water Reuse Summit in the District of Columbia, which brought leaders and practitioners from around the country to share research and innovations in onsite water reuse.

The goal of the Lagoon Action Plan is to improve public health and clean waterway protections for small, rural, and Tribal communities that rely on lagoon wastewater treatment systems. The Plan outlines actions to provide equitable, accessible, and coordinated technical and financial assistance. The Plan also contains several action items focused on technology, research, and tools. Four action items have been recently completed: (1) the EPA developed a Lagoon Inventory Dataset and published a report on the Universe of Lagoons; (2) the EPA awarded close to $2 million to two universities to research and accelerate innovative and alternative wastewater technologies for lagoon systems; (3) the EPA

published a new lagoon troubleshooting manual to assist communities with lagoon operation and compliance; and (4) the EPA published a new document outlining best management practices for use or disposal of sewage sludge removed from lagoons.

Clean Water Technology Center

The EPA's Clean Water Technology Center (Tech Center) provides resources and services to help communities of all sizes build their capacity to become more sustainable by adopting innovative and alternative wastewater technologies that address local water challenges. The Tech Center tracks the state of the science in various wastewater technology areas, assesses technologies in priority areas, and shares objective cost and performance information. The SCOWT was also created by the Tech Center.

The Tech Center also maintains a booth at the Water Environment Federation's Technical Exhibition and Conference (WEFTEC) to coordinate with the water infrastructure industry; promote agency programs; network with water utility and industry partners; share ideas, resources, and tools; and learn about industry best practices. During WEFTEC, the EPA communicates with water infrastructure stakeholders on a variety of programs and priorities, which typically fall under five key themes: water quality, technology and innovation, resilient utilities, infrastructure finance, and various other topics related to wastewater, stormwater, and drinking water. For the EPA, WEFTEC represents a key venue for coordinating and exchanging information with the water infrastructure industry.

Water Infrastructure and Resiliency Finance Center

The Water Infrastructure and Resiliency Finance Center (Water Finance Center) provides information and assistance identifying water infrastructure financing approaches that help communities reach their public health and environmental goals. The Water Finance Center manages the Water Finance Clearinghouse (described in Section 2.1.1).

Water Technical Assistance

The EPA's Water Technical Assistance (WaterTA) provides free support to communities to identify water challenges, develop plans, build technical, financial, and managerial capacity, and develop application materials to access water infrastructure funding. Services provided through WaterTA include planning and assessment, project development, partnerships and engagement, funding and financing, and program support management. The EPA collaborates with states, Tribes, territories, community partners, and other key stakeholders to implement WaterTA efforts. Communities can request water technical assistance through a webform provided by the EPA or through the providers directly. In 2023, the EPA launched an interactive map of technical assistance providers in the SCOWT as part of WaterTA. Through this map, the EPA assists communities with determining which organization(s) may be able to provide technical assistance in their state or territory. The EPA is utilizing new and existing WaterTA initiatives to support effective implementation of the Bipartisan Infrastructure Law. Existing WaterTA initiatives include but are not limited to the examples listed in Table 3 below, as well as Creating Resilient Water Utilities (CRWU), WIRFC, and Utility Workforce Development.

Table 3. Examples of WaterTA Initiatives

WaterTA Initiative	Focus
Environmental Finance Centers (EFCs)	EFCs will help communities across the country improve environmental performance and access federal funding for infrastructure projects that improve public health and environmental protection.
Clean Water Rural, Small, and Tribal Technical Assistance (RST TA) Providers	Support rural, small municipalities, and Tribal governments to access finance/funding and support rural, small, and Tribal centralized and decentralized wastewater systems to build capacity to protect water quality and comply with the CWA. The EPA funded nine organizations in 2023.
Closing America's Wastewater Access Gap	In partnership with U.S. Department of Agriculture (USDA), technical assistance providers, states, Tribes, communities and others - assists underserved areas with significant decentralized wastewater needs (or no wastewater infrastructure at all) to make progress in accessing Bipartisan Infrastructure Law funding.
Water Technical Assistance (WaterTA) Request Form	Online platform for communities to directly request technical assistance and be connected to a technical assistance provider.

Decentralized Wastewater Management Memorandum of Understanding Partnership

The EPA created a Decentralized Wastewater MOU Partnership in 2005 with federal agencies, state organizations, non-profits, and industry partners. The partnership began with eight partners and now includes 25 partners (as of December 5, 2023) from across the decentralized wastewater sector. One of the MOU's objectives is to improve decentralized wastewater treatment system performance through improved practitioner competency, management practices, research, and technology transfer. The partnership provides facilitated collaboration between the EPA, state and local governments, and national organizations representing practitioners in the industry. The MOU is renewed every three years, most recently in December 2023 (EPA, 2020b).

The EPA's Decentralized Wastewater Management MOU Partnership sponsors periodic webinars to discuss issues of interest to the decentralized community. Recent webinars have included "Using Nationwide and Local Data Sources to Address Decentralized Wastewater Infrastructure Challenges in the Contiguous U.S. and the Caribbean" (2021), "Innovative Technologies and Approaches to Address Decentralized Wastewater Infrastructure Challenges in the Alabama Black Belt" (2021), and "Natural Disaster Preparedness and Recovery for Communities Served by Decentralized Wastewater Systems" (2019). Presentations, transcripts, and speaker lists from each of the webinars are available to the public online at https://www.epa.gov/septic/webinars-about-decentralized-wastewater-treatment.

Wastewater Association Partnerships

The EPA has partnered with wastewater associations to support activities including the Utility of the Future program, workforce development case studies and webinars, and Effective Utility Management

initiatives, which highlight organizational transformations of utilities through supporting innovation and fostering collaboration in the sector. Recordings from the EPA-hosted water sector workforce webinar series are available and highlight how water utilities and organizations are addressing workforce challenges. Since 2016, the Utility of the Future program has recognized over 200 utilities. The EPA has also collaborated with the National Blue Ribbon Commission for Onsite Non-potable Reuse Water Systems, a nationwide group of utilities, state and local public health agencies, and federal agencies interested in advancing the use of onsite non-potable water reuse systems at the building- or district-scale to recycle various types of locally collected water, such as wastewater, source-separated graywater, stormwater runoff, and rainwater.

Interagency Agreement between the EPA and the Indian Health Service for Technical Assistance, Training, and Education for Tribal Wastewater Utilities

Congressional appropriations fund the Clean Water Indian Set-Aside (CWISA) Program at approximately $30 million annually. The appropriations include a provision that up to $2 million of CWISA funds can be used for technical assistance, training, and educational programs related to the operation and management of treatment works for Tribes. Since 2018, the EPA has maintained an Interagency Agreement (IA) with the Indian Health Service (IHS). The IA has provided a total of $8 million to implement the technical assistance, training, and education of Tribal wastewater utilities, including decentralized wastewater systems. Two primary tasks are included in the IA: (1) onsite training and technical assistance; and (2) operator certification and group training. The intent is to build Tribal capacity to manage and operate their systems and provide technical assistance and training when requested by a Tribe. This facilitates certification opportunities for personnel operating wastewater utilities in Indian country. IHS also provides classroom training opportunities to enhance the ability of Tribal management entities to operate and maintain their wastewater facilities. This IA advances the missions of IHS and the EPA to assist the 574 federally recognized Tribes and Alaskan native villages to ensure their built wastewater infrastructure meets its design expectations.

2.2. Use of Alternative Wastewater Treatment and Recycling Technologies by States and Regions

The EPA has played an important role in sharing resources with states, Tribes, and regions on the use of alternative technologies. There is limited data to quantify state- or region-specific use of alternative technologies, but information is provided where available.

Clean Water State Revolving Fund

As described in Section 2.1.2, projects eligible for CWSRF program funding include the construction of POTWs; NPS programs; National Estuary Program projects; decentralized wastewater treatment systems; stormwater management systems**;** water conservation, efficiency, and reuse; watershed pilot projects; and projects that increase energy efficiency. The majority of CWSRF funds go towards

centralized wastewater projects. Appendix B presents the states that have used CWSRF funds for water reuse projects, advanced treatment systems, water efficiency, and decentralized systems. The states using the most cumulative funds between 1988 and 2023 for each category are as follows: water reuse (California; $1,315,773,851), advanced treatment systems (California; $4,065,009,103), water efficiency (Oklahoma; $109,300,257), and decentralized systems (Massachusetts; $136,770,671).

Advanced Treatment:

A level of treatment that is more stringent than secondary treatment or produces a significant reduction in nonconventional or toxic pollutants present in the wastewater treated by a facility. A facility is considered to have advanced wastewater treatment if its permit includes one or more of the following: biochemical oxygen demand (BOD) less than 20 milligrams per liter (mg/L), nitrogen removal, phosphorous removal, ammonia removal, metal removal, and synthetic organics removal. Such facilities may be large or small (EPA, 2017).

The EPA conducted an analysis of CWSRF innovative technology investments in response to a 2023 Congressional Appropriations ask, "*to make it clear through guidance or other means that, where eligible, funding may be used for such innovative technologies and that the Agency encourages applicants to State Revolving Fund programs to utilize technology to optimize water delivery performance, reduce energy consumption, and limit water waste in distribution systems.*" The analysis is summarized in two EPA reports that quantify CWSRF investments in innovative technologies (Figure 1) and in intelligent water systems (Figure 2) by state. The reports are available on the CWSRF reports webpage.

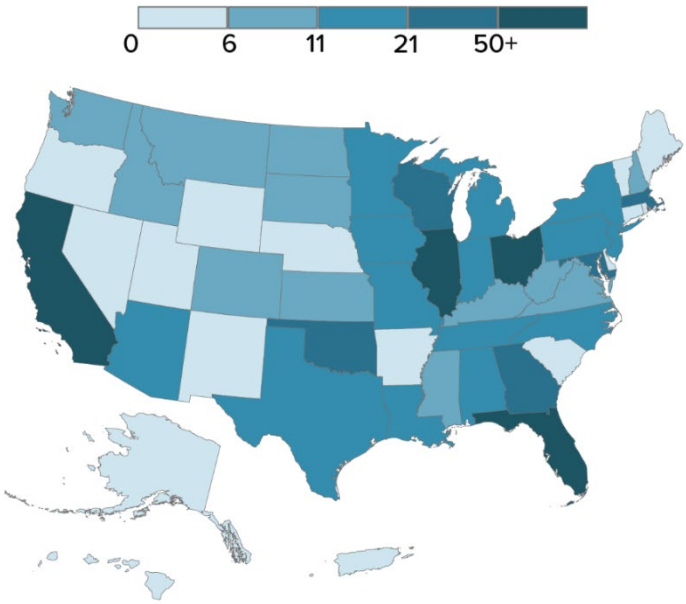

Figure 1. Number of CWSRF-Funded Innovative Technologies, 2013 to 2023. Refer to the report CWSRF: Investing in Communities through Water Innovation for more details.

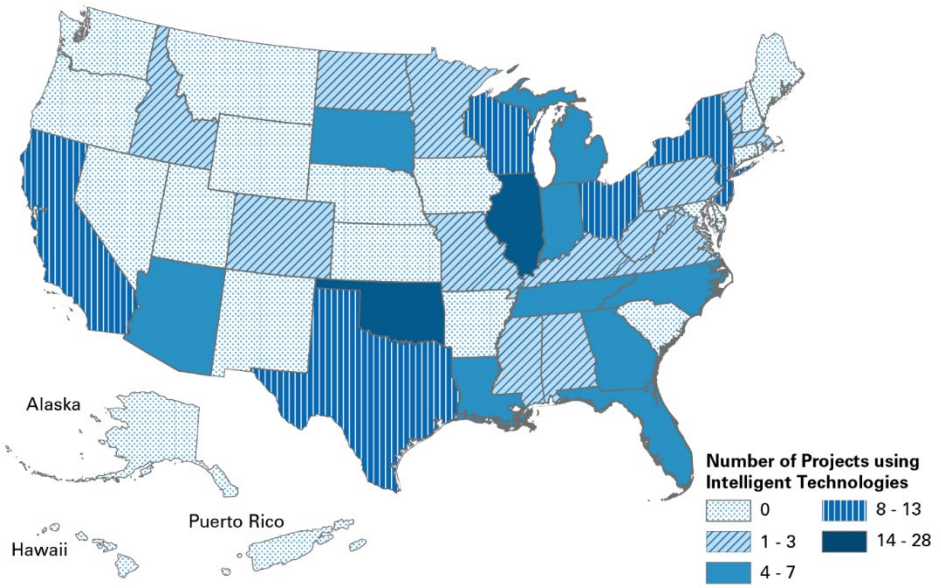

Figure 2. Number of Projects that used CWSRF Funding to Implement Intelligent Technologies, 2013 to 2023. Refer to the report Investing in Intelligent Technology: Facing Today's Wastewater Challenges with the Future in Mind for more details.

The CWSRF's George F. Ames Performance and Innovation in the SRF Creating Environmental Success (PISCES) program recognizes CWSRF assistance recipients for exceptional projects and highlights them nationally. Participating state programs each nominate one project that exemplifies one or more of five evaluation criteria. Eligible projects must have an executed CWSRF assistance agreement and can be operational or in the planning phase. The EPA selects an "Exceptional Project" from the nominations every year for each of the five evaluation criteria categories, with the remaining nominees receiving "Honorable Mention" recognition. Projects recognized in 2022 included the Coalwood Sewer Project – Phase 1 (decentralized systems; McDowell County, West Virginia) and the East County Advanced Water Purification Project (reuse; East San Diego County, California).

Clean Water State Revolving Fund for Emerging Contaminants

As described in Section 2.1.2, the 2021 Bipartisan Infrastructure Law provides a $1 billion appropriation for fiscal years 2022 through 2026 to the CWSRF to address emerging contaminants, such as PFAS, in wastewater, stormwater, and NPS pollution. During fiscal year 2022, CWSRF programs published Intended Use Plans to award $48,482,222 of emerging contaminants funding toward 52 eligible emerging contaminants projects across states and Puerto Rico. Table 4 below presents the number of proposed emerging contaminants projects for each project type in fiscal year 2022, and the approximate amount of CWSRF funding proposed for each type. Eighty-five percent of the fiscal year 2022 projects address PFAS. New challenges like emerging contaminants often utilize innovative technologies or apply well-established technologies in new and innovative ways. For example, a technology pilot project in Orlando, Florida, is implementing supercritical water oxidation and evaluating its effectiveness in destroying PFAS and other emerging contaminants. Additional examples of the proposed projects

include a bioretention project in Seattle, Washington and a membrane filtration and ozone disinfection project in Las Vegas, Nevada. Multiple case studies showcasing CWSRF-eligible emerging contaminants projects across the U.S. are available on the EPA's emerging contaminants website.

Table 4. Proposed Emerging Contaminants Projects for Fiscal Year 2022

Project Type	Fiscal Year 2022 Emerging Contaminants Allotment Amount Utilized by Project Type	Number of Proposed Projects
Wastewater Treatment Facility	$12,640,500	12
Biosolids	$10,397,500	8
Source Water Protection	$8,325,318	8
Landfill	$6,370,682	7
Lab Equipment Purchase	$5,511,222	9
Stormwater	$3,422,000	5
Decentralized	$1,815,000	3
Total Projects	**$48,482,222**	**52**

Closing America's Wastewater Access Gap Community Initiative

In 2022, the EPA and the U.S. Department of Agriculture Rural Development (USDA-RD) began collaborating with the states of Alabama, Kentucky, Mississippi, New Mexico, North Carolina, and West Virginia, as well as with the Tribal nations of Santo Domingo Pueblo and San Carlos Apache on the Closing America's Wastewater Access Gap Community Initiative. Through this initiative, the EPA and USDA-RD are jointly leveraging technical assistance resources to help historically underserved communities identify and pursue federal funding to address their wastewater infrastructure needs. The initiative is being piloted in 11 places that have demonstrated significant need. Key activities of the initiative include conducting community wastewater assessments, developing wastewater community solutions plans (including the identification of suitable technologies), helping underserved communities identify and pursue funding opportunities, and building long-term capacity. In February 2024, the EPA announced that this initiative would be expanded to 150 additional communities across the country.

Project Highlight: *Halifax County/Haliwa-Saponi Tribe Community Wastewater Solutions*

Participating in the Closing America's Wastewater Access Gap Community Initiative has allowed the Halifax County/Haliwa-Saponi Tribe to receive engineering support for tailored alternative wastewater technologies that fit the community needs and affordability requirements. Several options have been developed using decentralized cluster systems and phased approaches that meet the community's economic development goals and their desire to locally own and operate wastewater infrastructure.

Section 319 of the CWA – Nonpoint Source Pollution Program

Section 2.1.2 of this report describes specific Section 319 project eligibilities. From 2002 to 2023 (through October 2023), the Section 319 Grant Program funded 488 distinct projects associated with decentralized wastewater management. Many of these projects had broader watershed-wide goals and objectives and were not solely focused on managing decentralized wastewater treatment systems. For

example, a single project might use Section 319 funds for both agricultural best management practices and septic system repairs or replacements. Table 5 below shows a state ranking by the number of Section 319 projects associated with decentralized wastewater. Figure 3 shows the distribution, by activity type, of all Section 319-funded projects associated with decentralized wastewater treatment systems.

Table 5. Number of Decentralized Wastewater Treatment System Projects Funded by CWA Section 319 by State from 2002 to 2023

State	Number of Projects	State	Number of Projects	State	Number of Projects
Virginia	91	Iowa	13	Hawaii	3
Kentucky	41	North Dakota	13	Louisiana	3
West Virginia	32	Wyoming	13	California	2
South Carolina	29	Oklahoma	12	Connecticut	2
Tennessee	27	North Carolina	11	Delaware	2
Texas	25	Maryland	10	New Hampshire	2
Missouri	22	Minnesota	9	Idaho	1
Florida	21	Rhode Island	9	Montana	1
Indiana	20	Alabama	7	New Mexico	1
Kansas	18	Arizona	6	Ohio	1
Georgia	17	Michigan	5	South Dakota	1
Nebraska	14	New York	4		
Total Number of 319-Funded Demonstration Projects Nationwide = 488					

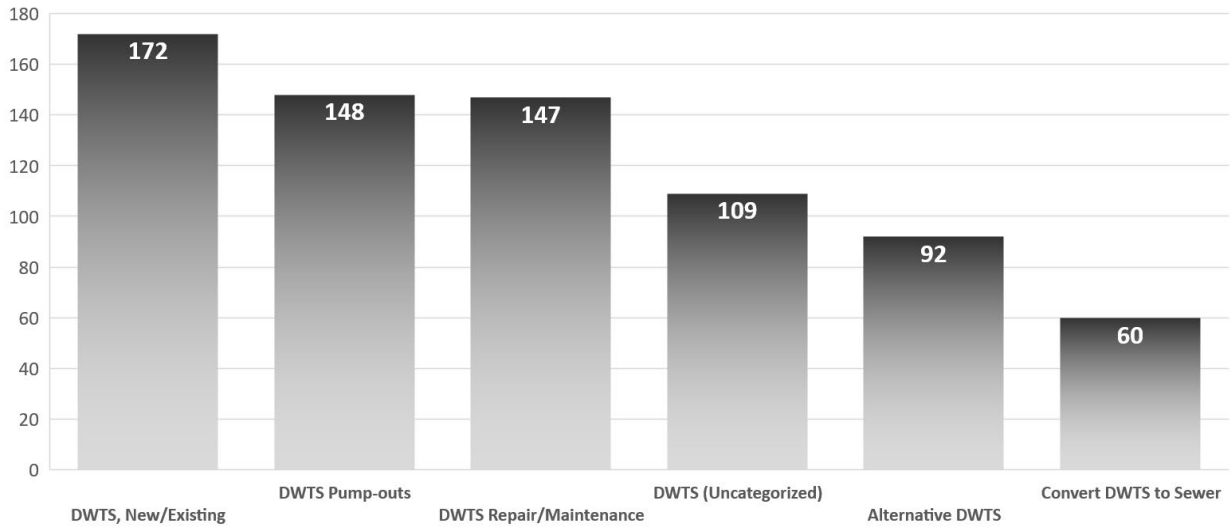

Figure 3. Section 319-Funded Decentralized Wastewater Treatment System (DWTS) Projects by Activity Type, 2002 to 2023

Project data summarized in the Grants Reporting and Tracking System (GRTS) also show that there has been a decrease of Section 319 water reuse projects since 2014. However, there may be additional

reuse projects that are only identifiable through project narratives, and not in GRTS. Water reuse projects that are identified in GRTS include several agricultural water reuse projects, and many cistern projects. Approximately half of the states in the U.S. have funded at least one water reuse project through Section 319.

Water Infrastructure Finance and Innovation Act Program

As described in Section 2.1.2, the WIFIA program began providing loans in 2017 for eligible drinking water, wastewater, and stormwater infrastructure projects in communities across the country. Table 6 below lists total funding amounts of WIFIA closed loans by state through March 2024[3]. While the WIFIA program has broad program eligibilities, a significant number of funded projects have included innovative alternative wastewater treatment and recycling technologies.

Table 6. State Use of WIFIA Program Funding through March 2024

State	Total WIFIA Funding (Closed Loans)
California	$6,955.4 million
Florida	$1,749.6 million
Oregon	$1,623.6 million
Virginia	$1,023.4 million
Illinois	$759.5 million
Kansas	$753.6 million
New Jersey	$721.3 million
Tennessee	$688.0 million
Maryland	$672.8 million
Washington	$637.7 million
Georgia	$611.1 million
North Dakota	$569.0 million
Rhode Island	$514.8 million
Indiana	$436.0 million
Missouri	$377.7 million
Utah	$348.6 million
Louisiana	$275.0 million
Idaho	$263.9 million
Massachusetts	$250.0 million
Wisconsin	$178.7 million
District of Columbia	$156.4 million
Nebraska	$115.0 million
Kentucky	$96.9 million
Michigan	$73.8 million
Pennsylvania	$72.3 million
Texas	$70.0 million
Colorado	$60.0 million

[3] For detailed information on closed WIFIA loans, visit https://www.epa.gov/wifia/wifia-closed-loans. For detailed information on pending loans, visit https://www.epa.gov/wifia/wifia-pending-loans.

State	Total WIFIA Funding (Closed Loans)
New York	$52.8 million
Total	**$20.1 billion**

Project Highlight: *Climate Resilient Water Infrastructure in Hampton Roads, Virginia*

The Hampton Roads Sanitation District in Virginia received over $700 million in WIFIA loans for their Sustainable Water Initiative for Tomorrow (SWIFT) program. The SWIFT program is the first major water reuse initiative along the east coast of the U.S., and includes more than 20 projects across the service area. These projects will upgrade existing treatment works, build wells to inject highly-treated water into the stressed Potomac Aquifer, and improve the quality of the Chesapeake Bay by reducing surface water discharge of treated wastewater by approximately 100 million gallons-per-day (MGD) (90 percent of the District's discharge to the watershed). By utilizing WIFIA financing, Hampton Roads will save nearly $300 million over the life of their loans.

Project Highlight: *Fountain Valley Groundwater Replenishment System Expansion*

The Orange County Water District in California received a $135 million WIFIA loan and approximately $182 million in CWSRF assistance from 2018 to 2020 for its groundwater replenishment system expansion. This important water reuse project expands the District's existing 100 MGD groundwater replenishment system to produce an additional 30 MGD droughtproof drinking water supply for its service area. The project replenishes the Orange County Groundwater Basin and reduces the need for imported water. Treated wastewater from the Orange County Sanitation District Plant 2 is purified using a three-step process that produces high quality water and then stores it in the groundwater basin. The final expansion project, which was completed in 2023, included expanding the existing treatment facility, constructing a pump station, rehabilitating pipelines, and reconfiguring the treatment process. This water reuse project provides several benefits, including an additional 30,000 acre-feet per year drought-proof water supply, a reduction of 40 MGD of secondary effluent discharge, creation of 700 jobs, and more than $100 million in cost savings to the District.

2.3. Actions Taken by the Administrator to Assist States in the Deployment of Alternative Wastewater Treatment and Recycling Technologies

All the information and services provided to assist local government and nonprofits, which are described in detail in Section 2.1, also assist states in the deployment of alternative wastewater treatment and recycling technologies. These EPA actions are summarized below:

- Establishing and maintaining online information-sharing platforms, such as the Searchable Clearinghouse of Wastewater Technology, the Water Finance Clearinghouse, the National Water Reuse Action Plan Online Platform, and the Decentralized Wastewater Program Website (Section 2.1.1)

- Leading programs that catalyze historic investments in innovative wastewater technologies, such as the Clean Water State Revolving Fund, the Clean Water State Revolving Fund for Emerging Contaminants, and the Water Infrastructure Finance and Innovation Act Program (Section 2.1.2)
- Establishing and implementing a robust Water Technical Assistance initiative available to all communities (Section 2.1.2)
- Leading grant programs including the Environmental Finance Center Grant Program, Clean Water Rural, Small, and Tribal Technical Assistance Grant Program, the Innovative Water Infrastructure Workforce Development Grant Program, and the Small Business Innovation Research Program (Section 2.1.2)
- Funding decentralized wastewater treatment system projects through Section 319 of the CWA (Section 2.1.2)
- Providing information, training, and other resources that increase the technical, financial, and managerial capacity necessary for successful green infrastructure implementation (Section 2.1.2)
- Developing guidance and technical resources to assist with implementation of Section 405 of the CWA (Section 2.1.2)
- Developing and implementing action plans related to decentralized and centralized wastewater treatment and reuse, including the National Water Reuse Action Plan, PFAS Action Plan, and Lagoon Wastewater Treatment Action Plan (Section 2.1.3)
- Establishing and maintaining partnerships with the Indian Health Service, decentralized wastewater stakeholders, and wastewater associations (Section 2.1.3)
- Establishing EPA Centers to assist communities with water infrastructure technology and financing, including the Clean Water Technology Center and the Water Infrastructure and Resiliency Finance Center (Section 2.1.3)
- Conducting and publishing an analysis of Clean Water State Revolving Fund projects that implement innovative technologies and intelligent water systems (Section 2.2)

A non-exhaustive list of EPA news releases is also provided below to highlight major EPA actions, milestones, and investments to assist states and communities with the deployment of alternative wastewater treatment and recycling technologies.

- EPA Celebrates $3 Billion in WIFIA Loans, Investing in America's Infrastructure this World Water Day (March 22, 2024)
- EPA Expands Its Water Technical Assistance Program to Help More Communities Access Historic Federal Infrastructure Funding (February 22, 2024)
- EPA Expands Program to Bring Wastewater Services to 150 More Underserved Communities Across Rural America as Part of Investing in America (February 13, 2024)
- EPA Announces $5.8 Billion from Investing in America for Drinking Water, Wastewater and Stormwater Infrastructure Upgrades (February 20, 2024)
- EPA Announces over $278 Million in Funding to Improve Water Infrastructure for Tribes and Alaska Native Villages (June 28, 2023)
- EPA Invests $41 million in New Technical Assistance to Help Communities Address Wastewater Challenges (April 27, 2023)

- EPA Announces $775 Million from Investment in America for Clean Water Infrastructure Upgrades (March 31, 2023)
- EPA Announces $2.4 Billion for Clean Water Infrastructure Upgrades Through the Bipartisan Infrastructure Law (February 24, 2023)
- EPA Announces Selection of 29 EPA Environmental Finance Centers to Help Communities Access Funds for Infrastructure Projects (November 4, 2022)
- EPA Announces Federal Working Group to Strengthen Coordination on Water Reuse and Integrated Water Resources Management Approaches (May 26, 2022)
- EPA Announces Water Infrastructure Funding for States Through the Bipartisan Infrastructure Law, Calls for Prioritizing Underserved Communities (December 2, 2021)

3. Conclusion

Sustainable wastewater infrastructure is essential for environmental protection, financial viability, and economic development of communities across the U.S. For over 50 years, the EPA has played a significant leadership role in the water sector by helping communities protect public health and the environment through the sustainable management of their water systems.

To meet the requirements of AWIA Section 4102(2)(b) and produce this updated Report to Congress, the EPA gathered historical and current data from grant and loan programs and reviewed existing materials. Reports, publications, funding programs, and technical assistance documents were compiled to show the types and amount of information provided to units of local government and nonprofit organizations regarding alternative wastewater treatment and recycling technologies. The EPA provided data on investments awarded to the states through loan, grant, and technical assistance programs funded by the EPA to show which states and regions have made the greatest use of alternative wastewater treatment and recycling technologies. An overview of programs initiated and products developed through the EPA, including grant programs, technical assistance tools, guidance documents, and other resources, were compiled to highlight actions taken by the Administrator to assist states in the deployment of alternative wastewater treatment and recycling technologies.

The EPA continues to support states in the deployment of alternative wastewater treatment and recycling technologies through understanding the available information platforms and identifying gaps in resources and technologies. The EPA provides program support, develops guidance and technical assistance documents, provides funding opportunities, and aligns with sector needs by providing tools to address barriers to technology adoption.

Through collaborations with utilities, states, Tribes, local governments, associations, and other federal agencies, the EPA continues to develop and share resources on the performance and cost effectiveness of innovative and alternative wastewater treatment and recycling technologies.

4. References

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Appendix A: Inactive Programs and Projects Identified in the 2021 Report to Congress

Table A-1: Inactive Programs and Projects from the 2021 Report to Congress

Title	Description
Programs	
Construction Grants Program[4]	This program, together with its implementing regulations, required all communities receiving federal construction grants to consider innovative and alternative technology incentive grants. For projects not performing to design expectations, the program offered the possibility of up to 100 percent modification or replacement grants. As a result, the Construction Grants Program encouraged many facilities to implement innovative and alternative technologies, which led to their adoption as a valid form of treatment. The success of this program led Congress to make it a permanent feature of the Construction Grants Program in 1981. It supported the use of innovative and alternative technologies for both decentralized and centralized wastewater treatment. From 1979 to 1987, 2,100 alternative technology projects were funded by the Construction Grants Program.
Environmental Technology Verification (ETV) Program[5]	A public-private partnership between the EPA and nonprofit organizations involving testing and evaluation. ETV verified the performance of innovative technologies from 1995 to 2014. It provided credible data on nearly 500 technologies, enabling purchasers, regulators, and others to make decisions on the adoption of these new technologies.
National Small Flows Clearinghouse (NSFC)[6]	Funded by the EPA in 1993 to help the nation's small communities and individuals solve their wastewater problems through objective information about onsite, decentralized wastewater collection and treatment systems. The NSFC products and information were the only national resource of its kind at the time that dealt with small community wastewater infrastructure.

[4] Environmental Protection Agency. *IGMS Construction Grants Overview*. [online] Available at: https://www.epa.gov/enviro/igms-construction-grants-overview [Accessed 17 July 2023]

[5] Environmental Protection Agency. *Environmental Technology Verification Program*. Lead. [online] Available at: https://www.epa.gov/lead/environmental-technology-verification-program-environmental-and-sustainable-technology [Accessed 10 August 2023]

[6] West Virginia University National Environmental Services Center. *National Small Flows Clearinghouse (NSFC).* Legacy. [online] Available at: https://www.nesc.wvu.edu/about-actat/national-small-flows-clearinghouse [Accessed 10 August 2023]

Title	Description
Wastewater Operator Training Program[7]	In 1982, through CWA Section 104(g)(1), the EPA implemented a wastewater operator training program. The training program helped small communities protect public health, address noncompliance, maintain water quality standards, and support the development of a qualified wastewater workforce. The program provided grants from 1982 through 2007, assisting over 200 facilities a year meet the NPDES compliance requirements or improve performance.
Projects	
The National Decentralized Water Resources Capacity Development Project (NDWRCDP)[8]	The Decentralized Water Resources Collaborative (DWRC), more formally known as the National Decentralized Water Resources Capacity Development Project (NDWRCDP), was a cooperative effort funded by the EPA to support research and development of decentralized wastewater and stormwater systems. The program supported 70 different research projects during Phase 1 (1997 to 2003) and Phase 2 (2003 to 2010).
The Wastewater Information System Tool (TWIST)[9]	The EPA created TWIST in 2006 as an off-the-shelf, user-friendly management tool for state and local health agencies to catalogue and manage small wastewater treatment systems. TWIST is no longer funded but the tool is still available.
National Community Decentralized Wastewater Demonstration Projects[10]	The EPA responded to a 1997 request from Congress to assess the benefits, costs, and the applicability of decentralized wastewater treatment technology and management to help address the nation's water quality problems by publishing the *Response to Congress on Use of Decentralized Wastewater Treatment Systems*. This report set the stage for several initiatives at the federal level to support advancements in the field and provide guidance to state and local officials and experts across the country, and also resulted in funding a series of National Community Decentralized Wastewater Demonstration Projects in 1999 through congressional earmarks. Congress designated 19 sites, in 14 states, at funding levels ranging from $570,000 to $5.5 million.

[7] Maryland Center for Environmental Training of the College of Southern Maryland. (2000). *1999 National Evaluation of the Wastewater Operation 104(g)(1) Training Program.* NEPIS. [online] Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000454T.PDF?Dockey=2000454T.PDF

[8] Water Research Foundation. *Decentralized Water Resources Collaborative.* [online] Available at: https://decentralizedwater.waterrf.org/ [Accessed 17 July 2023]

[9] Environmental Protection Agency. *The Wastewater Information System Tool (TWIST)*. Septic Systems. [online] Available at: https://www.epa.gov/septic/wastewater-information-system-tool-twist . [Accessed 17 July 2023]

[10] Environmental Protection Agency. (1997). *Response to Congress on Use of Decentralized Wastewater Treatment Systems*. NEPIS. [online] Available at: https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=200047VF.txt

Appendix B: Summary Tables: CWSRF Cumulative Funding (1988 to 2023) for Decentralized and Advanced Treatment Systems, Water Efficiency, and Water Reuse

Table B-1: Cumulative CWSRF Funds Used for Water Reuse (1988 to 2023)

State	Cumulative Fund (1988 to 2023)
California	$1,315,773,851
Florida	$309,448,606
Texas	$135,062,988
Nevada	$112,074,247
Arizona	$86,693,320
Puerto Rico	$41,390,828
North Dakota	$41,315,359
Washington	$33,519,545
Hawaii	$30,483,277
Virginia	$23,221,483
Idaho	$19,702,209
Georgia	$19,323,139
New Mexico	$17,098,185
North Carolina	$14,819,575
Oklahoma	$13,674,000
Michigan	$7,468,484
Oregon	$6,933,372
Tennessee	$4,844,027
Massachusetts	$4,622,776
Rhode Island	$3,676,250
New York	$3,030,000
Colorado	$2,000,000
Ohio	$1,909,681
Louisiana	$1,559,288
South Dakota	$1,390,946
Delaware	$1,051,620
New Jersey	$918,303
Wyoming	$875,000
New Hampshire	$600,000
Minnesota	$201,807
Kansas	$70,500
Nebraska	$45,250
Total	**$2,254,797,917**

Table B-2: Cumulative CWSRF Funds Used for Advanced Treatment (1988 to 2023)

State	Cumulative Fund (1988 to 2023)
California	$4,065,009,103
Florida	$2,210,426,445
Iowa	$1,603,265,950
Texas	$1,601,406,725
Virginia	$1,434,952,193
North Carolina	$1,368,079,273
New York	$1,296,884,464
Indiana	$1,261,622,686
Ohio	$1,223,643,480
Maryland	$1,196,810,212
Minnesota	$1,150,276,953
Georgia	$1,140,767,020
Illinois	$1,134,676,939
Connecticut	$857,193,541
Massachusetts	$817,371,365
Oklahoma	$698,671,136
South Carolina	$697,113,202
Colorado	$696,728,362
New Jersey	$680,634,722
Alabama	$491,059,088
Tennessee	$470,409,045
Pennsylvania	$469,087,521
Wisconsin	$421,581,514
Arizona	$419,325,333
Washington	$412,521,172
Kansas	$409,858,996
Missouri	$342,284,834
Mississippi	$317,285,453
Arkansas	$314,102,426
Montana	$305,608,062
South Dakota	$291,204,845
Utah	$289,295,500
Louisiana	$282,092,225
Rhode Island	$259,961,893
New Hampshire	$259,560,329
Nebraska	$227,796,222
Idaho	$217,864,614
West Virginia	$195,352,660
Delaware	$180,162,407

State	Cumulative Fund (1988 to 2023)
Nevada	$166,529,007
Kentucky	$165,384,766
Michigan	$158,417,939
Puerto Rico	$145,390,240
New Mexico	$134,055,859
Vermont	$90,137,787
Hawaii	$75,356,797
North Dakota	$55,421,023
Oregon	$53,632,917
Maine	$25,383,912
Wyoming	$21,191,021
Alaska	$6,665,018
Total	**$32,809,514,196**

Table B-3: Cumulative CWSRF Funds Used for Water Efficiency (2017 to 2023)

State	Cumulative Fund (2017 to 2023)
Oklahoma	$109,300,257
California	$91,178,899
New Jersey	$61,878,394
Texas	$47,635,000
Arizona	$10,100,000
New York	$10,035,000
Louisiana	$7,694,592
Massachusetts	$3,843,783
Nebraska	$2,781,130
Georgia	$2,654,462
Puerto Rico	$2,000,000
West Virginia	$1,982,850
South Dakota	$1,902,718
Alaska	$1,250,000
New Mexico	$1,181,275
Pennsylvania	$721,112
New Hampshire	$685,246
North Dakota	$542,000
Idaho	$480,707
Ohio	$465,121
Florida	$220,000
Oregon	$59,614
Total	**$358,592,160**

Table B-4: Cumulative CWSRF Funds Used for Decentralized Systems (1988 to 2023)

State	Cumulative Fund (1988 to 2023)
Massachusetts	$136,770,671
Minnesota	$114,648,404
Ohio	$98,136,265
Washington	$53,171,180
West Virginia	$22,483,539
Iowa	$21,044,480
Pennsylvania	$19,558,418
Rhode Island	$19,068,282
Connecticut	$18,616,681
Missouri	$13,722,715
Virginia	$10,802,384
Delaware	$10,566,876
Hawaii	$9,830,789
Alabama	$8,724,825
California	$7,202,669
Vermont	$6,009,700
Tennessee	$3,925,000
Oregon	$3,860,150
Maine	$2,731,522
Arkansas	$2,000,000
Indiana	$1,777,395
Idaho	$700,000
Oklahoma	$700,000
Maryland	$502,518
Utah	$469,000
Texas	$422,027
New York	$402,345
New Hampshire	$301,539
Alaska	$122,100
New Mexico	$63,000
Total	**$588,334,474**