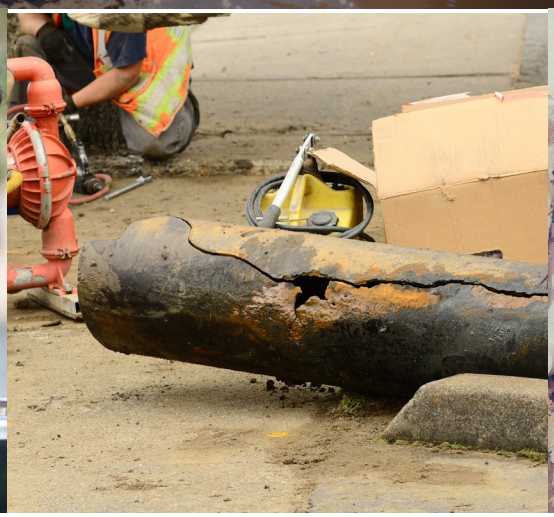
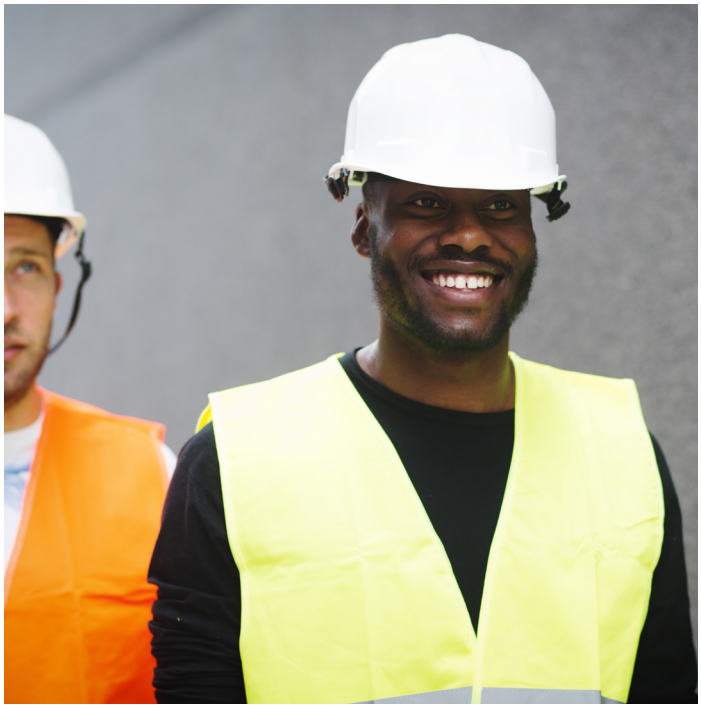
BLUEGREEN ALLIANCE

WATER WORKS:

The Job Creation Potential of Repairing America's Water Infrastructure





INTRODUCTION

Our nation's drinking water, wastewater, and stormwater infrastructure is vital to the protection, treatment, and distribution of clean water resources. Yet age, strain from population growth, lack of investment, and emerging threats from climate change have increased the burden on the current water infrastructure system. The nation's wastewater and drinking water infrastructure received grades of "D+" and "D" from the American Society of Civil Engineers (ASCE), respectively.[1]

U.S. cities rely on pipes that are, on average, a century old. These pipes leak 6 billion gallons of clean drinking water daily—approximately 14% of treated water—wasting energy and water and disrupting businesses and communities. Additionally, there are an estimated 240,000 water main breaks per year in America—a rate of approximately 700 per day.[2]

All that waste from ineffective water distribution systems adds up to a lost $2.6 billion dollars a year in the United States, or enough water for 68 million Americans.[3,4] Estimates suggest aggressive action to remedy our ailing water systems could save $1.7 billion, and a 2009 Chicago State University study showed that, reducing the amount of water leaked annually in the U.S. by only 5% would save enough energy to power 31,000 homes for a year and cut 225,000 metric tons of CO2 emissions.[5, 6]

Health impacts due to aging infrastructure are pervasive. More than 27 million Americans get their water from systems that violate health standards, and low income communities and communities of color are disproportionately impacted by contaminated water.[7,8] Improperly managed water exposes communities to harmful chemicals such as lead, arsenic, and polyfluoroalkyl substances (PFAS). Children and infants are particularly at risk; the Centers for Disease Control and Prevention (CDC) states that "young bottle-fed infants who consume mostly formula mixed with tap water can receive 85% of their exposure to lead from drinking water," putting them at risk for lifelong, irreversible negative impacts to their cardiovascular and nervous systems.[9]

Climate change is further straining our nation's water infrastructure. Shifting precipitation patterns, sea level rise, and extreme weather events throughout the country contribute to flooding, shifts in farming seasons due to excessive or not enough rainfall, and increasingly severe and frequent wildfires around the country. One study estimated that states will need an additional $448 to $944 billion dollars by 2050 to reengineer water systems to cope with sea level rise, droughts, and floods.[10]

Significant investments and upgrades in water infrastructure are necessary for communities to maintain access to safe drinking water, adequately treat storm and wastewater, and adapt to the effects of climate change.

DRIVING JOB GROWTH

Advancing our nation's water infrastructure investment will create numerous family-sustaining jobs. Investing now to repair our failing water infrastructure will boost our economy, create and sustain thousands of jobs, ensure communities have safe and affordable water, and reduce pollution while combating climate change.

BlueGreen Alliance research has found that by investing 105 billion dollars over ten years, we could improve our drinking and clean water systems to a "B" grade and create 654,000 job-years across the U.S. economy. [11] With strong labor and procurement standards, among other policies, we can make sure that these jobs are good jobs.[12]

Good jobs can be created through the replacement and upgrade of pipes, treatment plants, storage tanks, and the installation of green infrastructure projects. Gray water systems, water reuse-recycling, hot-water circulating systems, and rainwater catchment systems help conserve water and the energy used to treat and transport it, and create jobs in the industries supplying these technologies. Investments in water recapture, reuse, and transport will save water and energy, improve water safety, reduce carbon dioxide emissions from pumping water, and create jobs to improve our nation's water infrastructure.

If all levels of government, as well as utilities, make efforts to improve hiring, training, and retention efforts, we will see growth in jobs such as plumbing, pipefitting, steam fitting, pipe laying, and other related jobs. The plumbing, pipefitting, and steamfitting industry currently employs 324,500 workers and is expected to see job growth around 15.6% between 2016 and 2026.[13] Similar job growth will occur in other water infrastructure jobs—pipelayers will see a 17.2% increase above the current 33,810 jobs, and other related jobs will see an 18.6% increase.[14]

Investments in infrastructure would greatly benefit the construction industry, but job growth would be accelerated in every sector of the economy. This means increased numbers of steelworkers, utility workers, and other union workers to manufacture and maintain these systems. We will also need robust jobs to operate and maintain the improved infrastructure. Utility workers are key to ensuring that drinking water is clean and wastewater is treated and made safe for the public and the environment.

In building the water infrastructure of the future, Congress must also ensure that workers are well-trained. Worker training programs such as Occupational Safety and Health Administration (OSHA) Susan Harwood Training Grants must be fully funded. These grants fund critical training programs that help ensure workers and employers in high-hazard industries maintain safety and worker protection in the workplace. Well-trained workers are safer workers and, in turn, are better equipped to ensure communities receive the best possible service. This is especially important in sectors like water that provide vital services to communities. When a community is depending on a water utility to provide them with clean water, a service interruption due to an avoidable worker injury not only causes harm to the worker, but to the community as well.

Infrastructure investments also drive job growth in the manufacturing sector, especially when infrastructure spending is coupled with policy that incentivizes domestic content. Buy America procurement requirements have a long-standing history of maximizing the return on investment to taxpayers and the American economy. Requiring domestic content in infrastructure projects has the potential to boost American workers and manufacturers, and create broad economic growth while spurring domestic manufacturing. According to a 2009 report by the Alliance for American Manufacturing, Buy America provisions lead to a 33% increase in manufacturing jobs per dollar of public spending.[15] Further, a GAO report found that water projects subject to Buy America provisions in the American Recovery and Reinvestment Act of 2009 were lower in cost than estimated, refuting the common argument that Buy America provisions lead to delays and higher project costs.[16]

In the long-run, offshoring to companies with lower labor and environmental standards perpetuates on our dependence on foreign products, instead of ensuring that we build it here, reinvesting taxpayer money back into local communities and employing hard-working Americans.

KEY AREAS OF OPPORTUNITY

GREEN INFRASTRUCTURE

An estimated 10 trillion gallons a year of untreated stormwater runs off roofs, roads, parking lots, and other paved surfaces, often passing through sewage systems before spilling into rivers and streams that serve as drinking water supplies and sites for recreation.[17] This untreated runoff increases health risks, degrades ecosystems, and damages tourism economies. The EPA calls runoff "the leading source of pollutants causing water quality impairment related to human activities in ocean shoreline waters and the second leading cause in estuaries across the nation. Urban runoff is also a significant source of impairment in rivers and lakes."[18]

As development covers land with impermeable surfaces, the volume of stormwater running off buildings, streets, and parking lots into nearby waterways increases. Pollutants carried within this stormwater degrade the quality of local and regional waterways.[19]

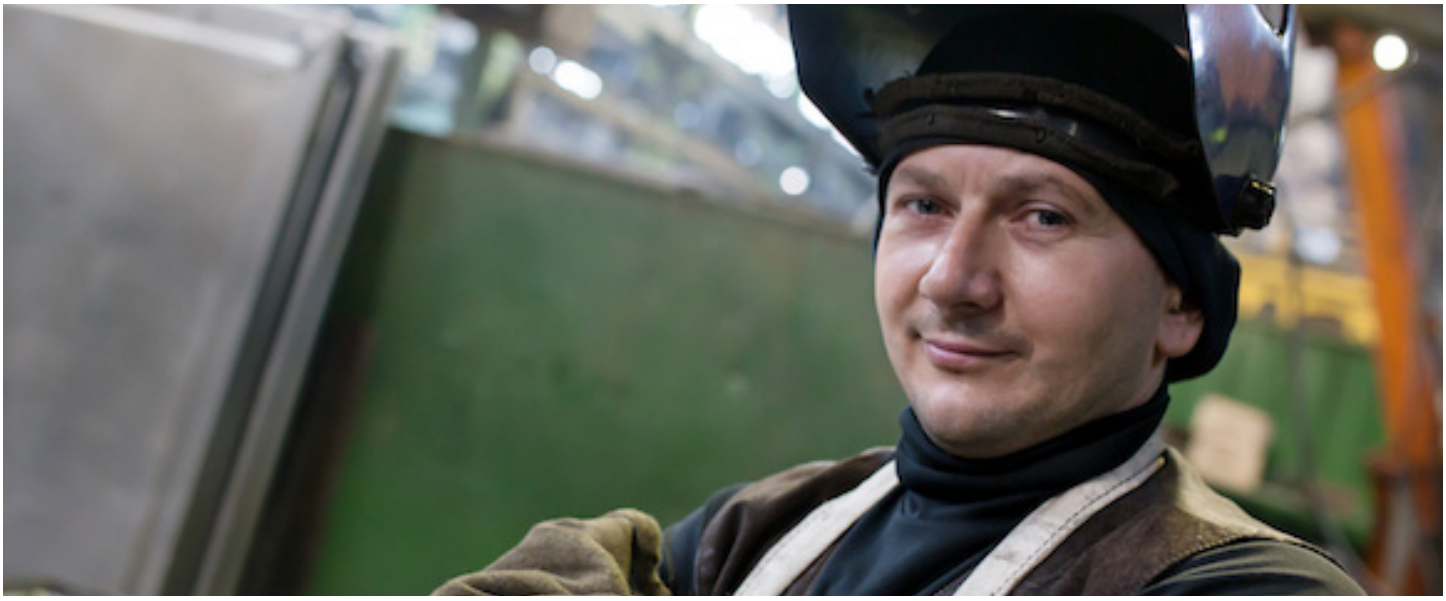
During dry periods, combined sewer systems (CSSs) carry sewage and stormwater to municipal wastewater treatment plants, where the mixture is treated prior to discharge. However, during downpours, the system is designed to discharge untreated sewage and stormwater directly to nearby water bodies through outfalls. These combined sewer overflows (CSOs) carry untreated sewage and other pollutants directly into local waterways.[20]

CSSs are employed in 772 communities nationwide, which are home to more than 40 million Americans.[21] According to the most recent CSO assessment from 2004, 43,000 overflow events occur per year, discharging 850 billion gallons of raw sewage and stormwater annually.[22] In June 2019, a month's worth of rain—over 3 inches—fell in the Washington, D.C. area in just one hour. In the one-third of the city served by combined sewers, a mix of rain and raw sewage spilled into the Anacostia and Potomac Rivers, as well as Rock Creek. The D.C. government warned residents against contact with their local waterways for at least 72 hours because bacteria and trash had contaminated the water.[23]

Under the National Pollutant Discharge Elimination System (NPDES) program, CSSs are required to implement measures that increase capture and treatment capacity during rain storms, and reduce the volume of runoff entering the system. As of 2004, one-fifth of CSSs lacked plans to reduce their sewage overflows or to separate their sewer systems into stormwater and sewage pipe networks. Those CSSs with plans are frequently years, and some decades, from full implementation.[24, 25]

Green infrastructure helps stop runoff pollution by capturing rainwater and storing it, or letting it filter back into the ground to replenish vegetation and groundwater supplies. Examples of green infrastructure include green roofs, street trees, parks, rain barrels, rain gardens, and permeable pavement. These solutions have the added benefits of increasing biodiversity, improving outdoor recreation in urban neighborhoods, reducing urban heat island effects, heat-related illnesses and asthma, lowering heating and cooling energy costs, stimulating local investment, and supporting American jobs.

Because of the health, ecological, and economic benefits of green infrastructure, cities across the country, including Seattle, Chicago, New York City, Philadelphia, and Nashville have embraced these techniques as part of their stormwater infrastructure programs.[26] In Nashville, a citywide green infrastructure plan identified potential runoff reductions of 3.5 billion gallons of water a year—a



huge improvement for an area that annually sees 756 million gallons of sewer overflow into surrounding rivers and streams. The city is implementing projects on a public high school, farmer's market, neighborhood street right of way, high-rise public housing for seniors, parks facility, and a public works complex, with estimated runoff reductions ranging from 340,000 to over 6 million gallons a year.[27] New York City keeps its water supply clean by protecting forest land in the Delaware River Watershed, thereby avoiding construction of a new water treatment plant that would have cost billions to build, operate, and maintain.[28] In the western United States, where wildfires are a concern for watershed health and clean water supplies, Denver Water successfully deployed From Forests to Faucets, which has invested in 48,000 acres of forest restoration across its watersheds.[29]

These cities' investments are also supporting local economies by creating jobs. Green infrastructure, like all water infrastructure, must be installed and maintained correctly to be effective. Skilled workers are needed to ensure the installation and construction of green infrastructure projects are effective and maintain water quality standards. In addition, green infrastructure, along with traditional water systems, requires routine maintenance and upkeep to function optimally, thus sustaining job creation and employment opportunities.

A case study assessment of green infrastructure best practices across site development factors—pervious pavements, roofing, lawns and landscaping, and natural runoff systems—established a per-acre cost of conventional stormwater management techniques, along with green infrastructure/LID techniques, across a set of implemented projects. This cost per acre was evaluated both in terms of site construction as well as operations and maintenance costs over time, assuming the full array of these approaches were implemented to achieve retention of rainwater from all but the strongest of storms.

Comparing the approaches, green infrastructure/LID had slightly lower estimated development costs—approximately $400 less per acre than conventional stormwater/CSS construction—while also being more cost-effective, providing more relief to existing stormwater systems per dollar than traditional management strategies.[30] This is in line with additional research on the subject, which found green infrastructure/LID, when compared to conventional approaches, costs approximately 17 cents less per gallon in mitigating combined sewer overflows.[31]

The estimates had more pronounced differences between conventional and green approaches when it comes to operations and maintenance costs. The case study assessment predicted an annual cost increase of $4,700 per acre in the initial years of green/LID implementation versus conventional. However, over time these annual costs decrease and break even around year 12 of the system's operations.[32] This difference is largely due to higher energy expenses

of traditional infrastructure, which are not needed by green infrastructure.

Overall, if the full array of green infrastructure techniques were adopted at a nationwide scale for new construction projects above one acre in size, the job creation potential is estimated at approximately 84,000 direct, indirect, and induced jobs created and supported throughout the U.S. economy per year.[33] The job effects would largely be due to the labor-intensity of ongoing operations and maintenance activities for well-functioning green infrastructure. Even though there are no federal regulations requiring the use of green infrastructure, if we increase funding for these projects we could both reduce pollution and create jobs.

This represents a unique opportunity to better and more equitably manage polluted stormwater runoff and protect our communities' clean water supplies. Cost-effective green infrastructure practices, combined with investment in conventional stormwater mitigation efforts (i.e. increasing sewage/wastewater capacity) have the potential to provide wide-ranging benefits to communities nationwide. Green infrastructure can also contribute to climate resilience in multiple ways by reducing flooding and pollution, conserving and replenishing water supplies, increasing biodiversity, and protecting community health by reducing urban energy costs and heat-related illnesses.

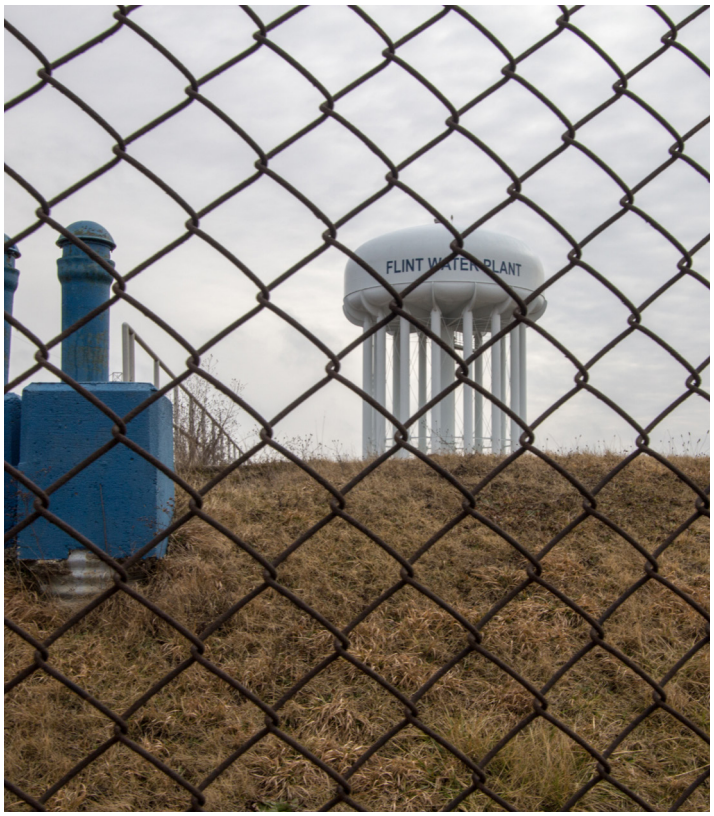
LEAD SERVICE LINE REPLACEMENT

The water crisis in Flint, Michigan, is a tragic example of the problem of lead service lines—pipes that carry water from utilities' water main into private homes—and how they can affect thousands of people without their knowledge. When Flint's water supply was switched from Lake Huron to the Flint River, residents started to complain about the water's smell, taste, and appearance. But it wasn't until 18 months after the city switched the water supply that physicians found extremely elevated lead levels in children. Today, more than five years after Flint's water was switched, over 100,000 residents have been exposed to dangerous levels of lead via their tap water.[34] Flint residents have only recently been advised that their city water is safe to bathe in, while still being encouraged to filter their water before drinking it.[35, 36]

This crisis is even more devastating as the residents had no control over the situation or the permanent health effects that result from the exposure. Lead is a toxic metal that harms the brain and nervous system and is especially harmful during pregnancy and infancy, when it can decrease IQs, diminish academic abilities, and increase attention deficits and problem behaviors.

The Centers for Disease Control and Prevention (CDC) uses a reference level of 5 micrograms of lead per deciliter of blood to identify children whose blood lead levels are much higher than most children's levels and recommend initiation of public health actions. Approximately 500,000 children ages one to five years exceed the reference level, which is based on the U.S. population of children in that age range who are in the highest 2.5% of children when tested for lead in their blood. However, no safe blood lead level in children has been identified.[37] Even the lowest blood lead levels can affect the developing brain and central nervous system, and the effects can never be reversed.

Unfortunately, while Flint was the most visible example, across the country, many homes, schools, and other buildings still have service lines and other fixtures that contain lead. There are an estimated 6.5 to 10 million homes with lead service lines serving 15 to 22 million Americans and millions of older buildings



with lead solder.[38] As these materials corrode, lead can enter the drinking water supply. Individuals and communities across the country are therefore at risk to the host of health and societal problems associated with lead exposure. Communities of color and lower-income communities bear the disproportionate burden of lead water contamination.[39, 40]

Eliminating lead exposure in our water systems can not only keep communities safe and healthy, but also create family-sustaining jobs, and boost local economies across the country, particularly if members of the impacted communities themselves are hired to do this work. The ASCE estimates that replacing lead service lines nationwide will cost $30 to $40 billion.[41]

The Environmental Defense Fund (EDF) has recognized states and communities that have taken the initiative to replace their lead service lines. There are currently 16 states that have proactive policies to support lead service line removal, 106 communities that have set goals for removal, 50 communities that have taken initial steps in removal, and 7 communities that have completed the replacement of lead service lines within their communities. Such communities include Framingham, MA; Lansing, MI; Madison, WI; and more that have all successfully removed lead service lines from their communities.[42]

WATER AFFORDABILITY

Maintenance and improvement of water infrastructure are becoming increasingly difficult for communities to afford. As these costs are passed on to consumers, existing affordability problems are exacerbated for many communities and individuals across the country.[43] The cost of water and wastewater services have more than doubled in the past twenty years, at the same time that incomes of low and moderate income households have essentially remained unchanged.[44, 45, 46] Communities of color and low-income communities are disproportionately affected by the hazards of lead water, failing water infrastructure, and unaffordable water rates. Now more than ever it is important to keep in mind how reinvestments into water and wastewater systems will affect these communities; we must keep essential uses of water affordable.

Federal water infrastructure funding can address this problem by directing assistance to the communities that need it most—like those facing large gaps between their infrastructure needs and their ability to pay. Congress should establish and promote the use of low-income assistance programs to mitigate water and sewer costs for low-income households. At the same time, water affordability must also be a top priority for state and local entities. Cities and utilities must revisit the rate structure for their water and sewer systems, to create rates that not only charge each resident fairly but also encourage sustainable water management practices.[47]

Policymakers should understand that medium-income households are an imperfect point of reference for water affordability. This is because water usage often increases as income rises.[48] Cities and utilities should utilize tactics such as more equitable and efficient rate designs, consumption based fixed charges, elimination of flat non-volumetric charges for sanitary sewer services, and stormwater fees based on impervious areas. The goal of these tactics is to eliminate penalization to lower income households while issuing fair rates to all consumers, while still allowing for revenue for management needs as necessary.[49] While important, the current patchwork of local efforts is not enough to make water more affordable for communities. Ultimately, federal intervention is needed to ensure that all drinking water and wastewater systems provide safe and affordable service to everyone in their communities.

OVER-ARCHING PRINCIPLES

Create family-sustaining jobs:

- Ensure all projects built with public resources are subject to Buy America standards that maximize the return to taxpayers and the American economy;
- Enforce Davis-Bacon provisions that ensure workers are paid prevailing wages;
- Utilize project labor agreements (PLAs), community benefit agreements, local hire, and other provisions and practices that prioritize improving training, working conditions, and project benefits, including respect for collective bargaining agreements and workers' organizing rights such as neutrality, majority sign-up, and first contract arbitration;
- Ensure these requirements and benefits extend across infrastructure projects and to manufacturing of infrastructure related equipment and technology; and
- Maintain and grow jobs in the public sector necessary to maintain and operate assets, and ensure compliance and project quality.

Reduce pollution and make our communities more resilient:

- Drive forward-looking planning and investments that meet environmental standards and build resilient infrastructure systems and communities; and
- Ensure that we Buy Clean and prioritize use of the most efficient, resilient, and cleanest materials and products with the lowest carbon and toxicity footprints.

Maximize benefits to our workers and communities, especially those most in need:

- Enhance and enforce workforce training and development programs to expand the number of skilled workers in new and existing industries;
- Enhance and enforce hiring and procurement policies that benefit low-income communities, people of color, and women;
- Increase economic opportunities for communities and local workers, especially for people of color and low income communities; and
- Ensure that affordability policy is focused on equity for marginalized communities.

Ensure high-road standards apply to all infrastructure policies:

- Ensure we maximize the benefits of our infrastructure investments for communities, the environment, and workers.

POLICY RECOMMENDATIONS

1. Increase, Improve, and Expand Water Infrastructure Funding

- Triple funds for the Clean Water and Drinking Water State Revolving Funds (SRFs);
- Permanently extend the Buy America provision for the Drinking Water SRF;
- Create grant programs at the EPA to assist low-income households with water and sewer services; and

- Create a clean water trust fund that dedicates $35 billion a year to our nation's critical water infrastructure projects, prioritizing investments to communities most in need, ensuring that all communities can begin making a feasible plan to update their water and wastewater systems.

Relevant Legislation:

- **H.R. 1497** – Water Quality Protection and Job Creation Act of 2019 (DeFazio) (116th)
- **H.R. 535** – PFAS Action Act of 2019 (Dingell) (116th)
- **H.R. 1647** – Water Infrastructure Trust Fund Act (Blumenauer) (115th)
- **H.R. 939** – Buy America for Drinking Water Extension Act of 2017 (Bustos) (115th)
- **S. 2687** – Low-Income Water Customer Assistance Programs Act (Cardin) (116th)

2. Support Green Stormwater Infrastructure

- Through its wastewater programs, the federal government should promote low-impact development (LID) techniques like permeable pavements, vegetated roadside swales, and rain gardens that can reduce stormwater pollution while also lowering management costs and enhancing aesthetic character;
- The federal government could better support LID projects by providing them with priority funding under federal programs, and by increasing CWSRF's Green Project Reserve to boost the percentage of CWSRF funds used on green infrastructure projects;
- Leverage existing investments in federal transportation projects to improve water quality by incentivizing the inclusion of green infrastructure or other innovative technologies to capture and treat stormwater generated by a project's footprint; and
- Support grants for water quality protection projects for centralized and decentralized wastewater treatment (including replacement of combined sewer/stormwater systems), nonpoint source pollution control, and watershed and estuary management.

Relevant Legislation

- **S. 1137** – Clean Safe Reliable Water Infrastructure Act (Cardin)
- **H.R. 3906/S 1695** – Innovative Stormwater Infrastructure Act (Heck/Udall)
- **H.R. 3275** – Water and Energy Sustainability through Technology Act (McNerney)
- **H.R. 6944** – Clean Water through Green Infrastructure Act (Heck)
- **H.R. 5596** – Water Infrastructure Resiliency and Sustainability Act (Carbajal)

METHODOLOGY

The statistics in this report come from a comprehensive study conducted by the BlueGreen Alliance in its development of the 2017 report, *Making the Grade 2.0: Investing in America's Infrastructure to Create High-Quality Jobs and Protect the Environment*. That report delves into the economic impacts of accelerating infrastructure investment across all sectors (power and the electric grid; roads and transit systems; airports; water; schools; dams, levees, waterways, and marine ports; outdoor economy; and solid and hazardous waste). *Making the Grade 2.0* finds that the need for infrastructure investment is greater than ever.

Estimates developed for this report are based on an input-output analysis. The model is based on the core data from the 2015 U.S. national model of the IMPLAN group, with modifications for productivity trends and other factors. We relied on data from the *ASCE 2017 Infrastructure Report Card*, for estimates of the total investment requirements needed to bring the overall grade for the U.S. infrastructure up to a "B."

We allocated expenditures across individual economic sectors using a combination of the pre-defined IMPLAN industry spending patterns for various types of infrastructure investments. We assumed that the

expenditures would take place over 10 years, starting slow and ramping up to a peak in the final year of the simulation.

Because the federal government operates at a net deficit, we assumed that all of the funding required for the investment would be financed over 20 years using the 10-year Treasury bond rate, as projected by the Energy Information Administration (EIA) in its 2017 Annual Energy Outlook, with a fixed spread of 0.34 to account for longer-term bond. We imposed a balanced budget constraint by accounting for the principal and interest payments required to support the bond financing throughout the simulation, modeled as increased federal taxes.

Following Leduc and Wilson (2013), we accounted for the increase in overall economic productivity resulting from improvements in the infrastructure using a modified multiplier effect. Leduc and Wilson found evidence of both near—and long-term impacts on GDP resulting from infrastructure improvements. We used their lower bound estimate of the GDP impact of infrastructure expenditures beginning five years after the investment, and dissipating after three years. The productivity impact only appears in the second half of our 10-year simulation meaning that only a relatively small share of the total economic productivity benefits is reflected in our simulation results. We also did not account for the increased tax revenues associated with this accelerated GDP growth this would have decreased the need for increased taxes and resulted in greater economic benefits.

To estimate the economic impacts of bringing our infrastructure up to a "B" grade, we examined a scenario in which the additional $2 trillion in investment was undertaken over the next 10 years. We modeled expenditures in the 16 different infrastructure classes examined by the ASCE in their most recent *Infrastructure Report Card* (2017). We modeled both the stimulus impact of the expenditures and the impact on the overall long-term GDP that would result from the investments.

Note that the job estimates reported here are more appropriately called "job-year equivalents." Each "job" represents an increase in demand for employment sufficient to employ an individual person for one full year. With a tight labor market, it is possible that a significant number of jobs created will be workers hired away from other jobs, so not all of the jobs created will be net new employment.

ENDNOTES

1. American Society of Civil Engineers, *2017 Report Card for America's Infrastructure*, 2017. Available online: http://www.infrastructurereportcard.org/.
2. American Society of Civil Engineers, *Infrastructure Report Card: Drinking Water*, 2017. Available online: https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Drinking-Water-Final.pdf.
3. U.S. Environmental Protection Agency, *Aging Water Infrastructure Research Program: Addressing The Challenge Through Innovation*, 2007. Available online: https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=185093.
4. ITT Corporation, *Value of Water Survey*, October 2010. Available http://www.itt.com/News/Releases/2010/ITT-s-Value-of-Water-Survey-reveals-that-Americans/.
5. Water in the West, *Water and Energy Nexus: A Literature Review*, 2013. Available online: http://waterinthewest.staford.edu/sites/default/files/Water-Energy_Lit_Review_0.pdf.
6. Chicago State University, *The Carbon Footprint of Water*, 2009. Available online: http://www.csu.edu/cerc/researchreports/documents/CarbonFootprintofWater-RiverNetwork-2009.pdf.
7. Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, 56 Fed. Reg. 26,460, 26,468 (June 7, 1991) (codified at 40 C.F.R. Part 141 Subpart I) ("Lead and Copper Rule")
8. Clean Water For All, *Water, Health, and Equity: The Infrastructure Crisis Facing Low-Income Communities & Communities of Color – and How to Solve It*, October 2018, Available online: https://www.nrdc.org/sites/default/files/media-uploads/cwfa_infrastructure_health_equity_white_paper_-_oct_2018.pdf.
9. Ibid.
10. National Association of Clean Water Agencies (NACWA), *Confronting Climate Change: An Early Analysis of Water and Wastewater Adaptation Costs*, 2009. Available online: https://www.amwa.net/galleries/climate-change/ConfrontingClimateChangeOct09.pdf.
11. BlueGreen Alliance, *Making the Grade 2.0*, 2017. Available online: http://bluegreenalliance.org/wp-content/uploads/2017/09/MakingTheGrade-2.pdf.
12. Ibid.
13. Bureau of Labor Statistics, "The employment outlook for occupations tasked with building America's infrastructure," 2018. Available online: https://www.bls.gov/opub/btm/volume-7/the-employment-outlook-for-occupations-tasked-with-building-americas-infrastructure.htm?view_full.
14. Brookings, *Metropolitan Policy Program, Renewing the Water Workforce*, June 2018. Available online: https://www.brookings.edu/wp-content/uploads/2018/06/Brookings-Metro-Renewing-the-Water-Workforce-June-2018.pdf.
15. Alliance for American Manufacturing, *How Infrastructure Investments Support the U.S. Economy: Employment, Productivity, and Growth.* January 2009. Available at http://s3-us-west-2.amazonaws.com/aamweb/uploads/research-pdf/Infrastructure_2009.pdf.
16. GAO, "Clean Water Projects Are Underway, but Procedures May Not Be in Place to Ensure Adequate Oversight," May 2010. Available at: https://www.gao.gov/assets/130/124764.pdf.
17. Natural Resources Defense Council, *Rooftops to Rivers II*, 2013. Available online: http://nrdc.org/sites/default/files/rooftopstoriversII-update.pdf.
18. U.S. EPA, "Urban Stormwater Preliminary Data Summary," 2015. Available online: http://epa.gov/sites/production/files/2015-10/documents/usw_b.pdf.
19. Natural Resources Defense Council, *Rooftops to Rivers II*, 2013. Available online: http://nrdc.org/sites/default/files/rooftopstoriversII-update.pdf
20. U.S. EPA, "Report to Congress. on Impacts and Control of Combined Sewer Overflows and Sanitary Sewer Overflows," 2004. Available online: https://www.epa.gov/sites/production/files/2015-10/documents/csossortc2004_full.pdf.
21. U.S. EPA, "CADDIS Volume 2: Sources, Stressors, and Responses," 2004. Available online: https://www3.epa.gov/caddis/ssr_urb_ww2.html.
22. U.S. EPA, "Report to Congress on Impacts and Control of Combined Sewer Overflows and Sanitary Sewer Overflows," 2004. Available online: https://www.epa.gov/sites/production/files/2015-10/documents/csossortc2004_full.pdf.
23. Natural Resources Defense Council, "With More Big Storms, We Need More Infrastructure Funding," July 9, 2019. Available online: https://www.nrdc.org/experts/becky-hammer/more-big-storms-we-need-more-infrastructure-funding.
24. Ibid.
25. New York Times, "E.P.A. Is Letting Cities Dump More Raw Sewage Into Rivers for Years to Come," January 24, 2020. Available online: https://www.nytimes.com/2020/01/24/climate/epa-sewage-rivers.html.
26. Natural Resources Defense Council, *Rooftops to Rivers II*, 2013. Available online: http://nrdc.org/sites/default/files/rooftopstoriversII-update.pdf.
27. American Society of Landscape Architects, "2013 Professional Awards: Green Infrastructure Master Plan," 2013. Available online: https://www.asla.org/2013awards/410.html.
28. On the Commons, "How New York City Kept Its Drinking Water Pure—And Saved Billions of Dollars," October 24, 2012. Available online: https://www.onthecommons.org/magazine/how-new-york-city-kept-its-drinking-water-pure-and-saved-billions-dollars.
29. Denver Water, "Watershed Protection & Management." Available online: https://www.denverwater.org/your-water/water-supply-and-planning/watershed-protection-and-management.
30. American Society of Landscape Architects, *Banking on Green*, 2012. Available online: https://www.asla.org/uploadedFiles/

CMS/Government_Affairs/Federal_Government_Affairs/Banking%20on%20.
31. University of New Hampshire, "The Economics of Low Impact Development." Available online: http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/FTL_Chapter3%20LR.pdf.
32. City of New York, "NYC Green Infrastructure Plan," 2010. Available online: https://www1.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/nyc-green-infrastructure-plan-2010.pdf.
33. BlueGreen Alliance, Natural Resources Defense Council, and Duke University Center for Globalization, Governance and Competitiveness estimated this economic impact in an unpublished report.
34. NBC News, "Common Lead Test May Be Wrong, FDA and CDC Say," 2017. Available online: http://www.nbcnews.com/storyline/flint-water-crisis/common-lead-test-may-be-wrong-fda-cdc.
35. Phys.org, "Scientists say Flint water quality OK for bathing, showering," 2016. Available online: https://phys.org/news/2016-05-scientists-flint-quality-showering.html.
36. New York Times, "Lead Levels in Flint Water Drop, but Residents Still Can't Drink It," 2017. Available online: https://www.nytimes.com/2017/01/24/us/flint-michigan-water.html.
37. President's Task Force on Environmental Health Risks and Safety Risks to Children, *Key Federal Programs to Reduce Childhood Lead Exposures and Eliminate Associated Health Impacts*, 2016. Accessed online: https://ptfceh.niehs.nih.gov/features/assets/files/key_federal_programs_to_reduce_childhood_lead_exposures_and_eliminate_associated_health_impactspresidents_508.pdf.
38. U.S. EPA, "Lead and Copper Rule Revisions White Paper," 2016. Available online: https://www.epa.gov/sites/production/files/2016-10-documents/508_lcr_revisions_white_paper_final_10.26.16.pdf
39. U.S. EPA. "3Ts for Reducing Lead in Drinking Water in Schools," 2018. Available online: https://www.epa.gov/ground-water-and-drinking-water/3ts-reducing-lead-drinking-water-toolkit#:~:text=The%20goal%20of%203Ts%20testing,may%20include%20a%20remediation%20level.
40. Environmental Defense Fund, "EDF considers potential health equity impacts of partial lead service line replacement," January 2019. Available online: http://blogs.edf.org/health/2019/01/10/health-equity-partial-lead-service-line-replacement/.
41. American Society of Civil Engineers, *Failure to Act*, 2016. Available online: http://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-Failure-to-Act-2016-FINAL.pdf.
42. Environmental Defense Fund, "Recognizing Efforts to Replace Lead Service Lines." Available online: https://www.edf.org/health/recognizing-efforts-replace-lead-service-lines.
43. Clean Water For All, *Water, Health, and Equity: The Infrastructure Crisis Facing Low-Income Communities & Communities of Color – and How to Solve It*, October 2018, Available online: https://www.nrdc.org/sites/default/files/media-uploads/cwfa_infrastructure_health_equity_white_paper_-_oct_2018.pdf.
44. Brookings, "Striking a Better Balance between Water Investment and Affordability," Sept. 12, 2016, Available online: https://www.brookings.edu/blog/the-avenue/2016/09/12/striking-a-better-balance-between-water-investment-and-affordability/.
45. Circle of Blue. "Price of Water 2016: Up 5 Percent in 30 Major U.S. Cities; 48 Percent Increase Since 2010," 2016. Available online: https://www.circleofblue.org/2016/world/price-water-2016-5-percent-30-major-u-s-cities-48-percent-increase-since-2010-2/.
46. Pew Research Center, "For Most U.S. Workers, Real Wages Have Barely Budged in Decades," August 7, 2018. Available online: http://www.pewresearch.org/fact-tank/2018/08/07/for-most-usworkers-real-wages-have-barely-budged-for-decades/.
47. ASCE, *2017 Infrastructure Report Card: Drinking Water*, supra note 6.
48. Brookings, "Striking a Better Balance between Water Investment and Affordability," Sept. 12, 2016, Available online: https://www.brookings.edu/blog/the-avenue/2016/09/12/striking-a-better-balance-between-water-investment-and-affordability/.
49. Ibid.
50. BlueGreen Alliance, *Making the Grade 2.0*, 2017. Available online: http://bluegreenalliance.org/wp-content/uploads/2017/09/MakingTheGrade-2.pdf.
51. Sylvain Leduc & Daniel Wilson, 2013. "Roads to Prosperity or Bridges to Nowhere? Theory and Evidence on the Impact of Public Infrastructure Investment," NBER Macroeconomics Annual, University of Chicago Press, vol. 27(1), pages 89-142.

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