FROM THE GROUND UP:

A guide to replacing the nation's toxic lead pipes over the next decade

Photo credit: Casey Lahgan

ENVIRONMENTAL POLICY INNOVATION CENTER

BlueConduit

CENTER FOR GEOSPATIAL SOLUTIONS

WaterPIO ALWAYS ON CALL

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Acknowledgements:
The authors wish to thank Marie Caiola, Dunrie Greiling, Katy Hansen, Jessie Mahr, Tim Male, Mike McGill, John Paul Miller, Jeremiah Muhammad, Janet Pritchard, Joelle Regovich, Kevin Reilly, Ian Robinson, Denise Schmidt, Sridhar Vedachalam, and Rebecca Wright for providing valuable insights, examples and case studies, and feedback for this report.

Thank you to Jeff Allenby, Jarion Bradley, Shavaun Callahan, Nya Dreyfuss, Maureo Fernandez y Mora, Damon Garrett, Jonathan Flowers, Tamsin Hollo, Sheela Lal, Mike McGill, John Paul Miller, Jorman Mota, Troy Nemmers, Brady Powers, Joelle Regovich, Ian Robinson, Dante Sawyer, Eric Schwartz, Kalaya Thomas, Tee Thomas, Sean Tondre, Sydney Trieu, Wayne Vradenburgh, Jared Webb, and Rebecca Wright for participating in various stages of the Lead-Free Water Challenge from 2021 to 2022.

Thanks to BlueConduit, Center for Geospatial Solutions, and WaterPIO for lending countless hours of expertise and collaboration on the Lead-Free Water Challenge. Additional thanks to the City of Chelsea, MA; Village of Hazel Crest, IL; City of Fairmont, MN; and City of Newburgh, NY for their ongoing leadership on lead service line replacement in their municipalities.

The authors also wish to thank Howard Crofoot of Platteville, WI; Lane Berg of Eau Claire, WI; Dean Martilli of North Providence, RI; Greg Giasson of Providence, RI; Kristin Epstein of Trenton, NJ; Brenda Santoyo of Little Village Environmental Justice Organization; Kareem Adeem and Tiffany Stewart of Newark, NJ; Kevin Reilly of LIUNA; Gary Brune of New Jersey Future; Tom Neltner of EDF; Joelle Regovich of Abonmarche; the team at WaterNow; and the members of the Lead Service Line Replacement Collaborative for additional expertise and insights provided over the last two years, as well as 120Water who is lending additional expertise on the ground in Chelsea, MA.

This report is supported by a grant from the Robert Wood Johnson Foundation. The views expressed are those of the author(s) and do not necessarily reflect the views of Robert Wood Johnson Foundation.

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Suggested Citation:
Cunningham, M., Egorov, O., Gonzalez, B. (2022) *From the ground up: A guide to replacing the nation's toxic lead pipes over the next decade*. Environmental Policy Innovation Center.

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List of Abbreviations

AL	Action Level
ARPA	American Rescue Plan Act
AWIA	America's Water Infrastructure Act
BIL	Bipartisan Infrastructure Law
CBO	Community-Based Organization
CBP	Community-Based Partnerships
CCTV	Closed-Circuit Television
CDBG	Community Development Block Grant
CRA	Community Reinvestment Act
CWSRF	Clean Water State Revolving Fund
CWIA	Clean Water Infrastructure Act
DAC	Disadvantaged Community
DWISNA	Drinking Water Infrastructure Survey and Needs Assessment
DWSRF	Drinking Water State Revolving Fund
EDF	Environmental Defense Fund
EPIC	Environmental Policy Innovation Center
EGLE	Michigan Department of Environment, Great Lakes, and Energy
FY	Fiscal Year
GPR	Ground Penetrating Radar
HUD	United States Department of Housing and Urban Development
IIJA	Infrastructure Investment and Jobs Act
IUP	Intended Use Plan
LCR	Lead and Copper Rule
LCRI	Lead and Copper Rule Improvements
LCRR	Lead and Copper Rule Revisions
LIUNA	Laborers' International Union of North America
LMI	Low Moderate Income
LSL	Lead Service Line
LSLR	Lead Service Line Replacement
LVEJO	Little Village Environmental Justice Organization
LWSAP	Local Water System Assistance Program
MSA	Metropolitan Statistical Area
MWBE	Minority Women-Owned Business Enterprises
MWRA	Massachusetts Water Resources Authority
NRDC	Natural Resources Defense Council, Inc.
OSHA	Occupational Safety and Health Administration
P3s or PPP	Public Private Partnerships
PENNVEST	Pennsylvania Infrastructure Investment Authority
ppb	parts per billion
PPL	Project Priority List
PWSID	Public Water System Identification Number
SDWA	Safe Drinking Water Act
SLFRF	State and Local Fiscal Recovery Fund
SRF	State Revolving Fund
USDA	United States Department of Agriculture
EPA	United States Environmental Protection Agency
WIFIA	Water Infrastructure Finance and Innovation Act
WIFTA	Water Infrastructure Fund Transfer Act
WIIN	Water Infrastructure Improvements for the Nation

Executive Summary

In the hundreds of years since lead pipes were first employed to carry drinking water—needlessly risking our health and wellbeing in the process—there has never been a better moment than now to replace them once and for all. The moment is bookmarked by several developments over the past year and a half: President Biden's repeated goal of replacing 100 percent of the nation's lead pipes; the new federal Lead and Copper Rule (LCR) regulations with additional "improvements" on the way; the American Rescue Plan Act (ARPA) funding which a growing number of municipalities are using for lead service line replacement; and the passage of the Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Act or BIL, with $15 billion for addressing lead in drinking water. Despite this encouraging momentum, without key changes in policies, procurement, data management, and practices, we may miss the potential of this moment.

There has also never been more urgency to replace lead service lines than now. Though the US Environmental Protection Agency (EPA) Action Level (AL) is 15 parts per billion (ppb), there is no amount of lead that is safe for human health—and therefore, no reason another generation of children and millions of other Americans should face this unnecessary risk. Lead poisoning causes long-term developmental health effects in children, and detrimental health effects for adults too. A 2021 study showed that half of American children under the age of six have lead in their blood,[1] and Black children are even more likely to have lead poisoning.[2] An analysis of US EPA data showed that 186 million people in the United States relied on drinking water with lead levels that exceeded one ppb of lead and more than 61 million relied on drinking water with lead levels that exceeded 5 ppb.[3] Studies reflect that avoiding lead contamination can create a more productive and healthy society—and potentially save the country billions in health benefits, adding up to $22,000 per pipe or $205 billion cumulatively in benefits related to reduced cardiovascular deaths for adults alone.[4] Knowing that the solution is within our reach, the urgency of this moment is palpable: we have an incredible opportunity today to ensure the next generation of Americans is raised in a world with lead-free drinking water.

Despite an advantageous mix of funding, regulations, new technology, public opinion, and attention at the highest level of government, is there enough momentum to rid the country of a century-old problem? If, as estimates suggest, 11,000 communities across the country have lead lines, how do we ensure more are on a path to lead-free drinking water? What are the policies, practices, partnerships, procurement practices, and innovations that need to be put in place to ensure that toxic lead pipes become a thing of the past?

1 Hauptman, M., Niles, J.K., Gudin, J. and Kaufman, H.W. (2021). Individual- and Community-Level Factors Associated With Detectable and Elevated Blood Lead Levels in US Children: Results From a National Clinical Laboratory. JAMA Pediatrics, [online] 175(12). doi:10.1001/jamapediatrics.2021.3518.

2 Teye, S.O., Yanosky, J.D., Cuffee, Y., Weng, X., Luquis, R., Farace, E. and Wang, L. (2021). Exploring persistent racial/ethnic disparities in lead exposure among American children aged 1–5 years: results from NHANES 1999–2016. International Archives of Occupational and Environmental Health, 94(4), pp.723–730. doi:10.1007/s00420-020-01616-4

3 Pullen Fedinick, K. (2021). Millions Served by Water Systems Detecting Lead. [online] NRDC. Available at: https://www.nrdc.org/resources/millions-served-water-systems-detecting-lead

4 Neltner, T. (2020). Every Lead Service Line Replaced Yields an Estimated $22,000 in Reduced Cardiovascular Disease Deaths. [online] Environmental Defense Fund. Available at: https://blogs.edf.org/health/2020/02/20/lslr-reduced-cardiovascular-disease-deaths/

This report explains best practices for municipalities, utilities, and policymakers based on lessons learned from municipal water utilities, consultants, service providers, technology groups, engineering firms, community-based organizations (CBOs), labor representatives, and state and federal officials over the past two years. This report draws on EPIC's work on the Lead-Free Water Challenge—a partnership project with BlueConduit, Center for Geospatial Solutions, and WaterPIO as well as four communities and two consulting/engineering firms who initially applied for assistance on lead service line replacement. **The following represent our top recommendations:**

1. **Elevate and support lead-free water champions.**
2. **Locate and map lead service lines quickly—and replace as you go.**
3. **Embrace new and emerging technologies to replace lead service lines.**
4. **Make information accessible to the public—before there's a crisis.**
5. **Engage and make joint decisions with community partners.**
6. **Focus on equity and prioritizing at-risk populations in replacement efforts.**
7. **Develop a multi-year financing plan, taking advantage of multiple funding sources.**
8. **Advance equity, innovation, and efficiencies through contracting and better procurement.**
9. **Advance policy changes to ensure a more equitable distribution of funds.**
10. **Match the pace of lead pipe replacement with the urgency of the problem.**

These best practices involve policy and practice at all levels of government, with the community, and ultimately, an embrace of this 'all hands on deck' moment to replace lead pipes.

Photo credit: Márcio Cabral de Moura

INTRODUCTION

Photo credit: Samad Deldar

Introduction

Two cities tell the story of toxic lead pipes in this country, which we hope is the end of this story. The first, Flint, Michigan, began a decade ago when the city's dire financial status[5] led the state to install the first of several emergency managers to oversee city operations, which in turn led the city down the path of transitioning its source water to the Flint River in 2014 to save money—leading to lead-contaminated water and raising awareness of this issue for all Americans. The other city is Newark, New Jersey. In 2018, the New York Times called Newark an echo of Flint,[6] initiating comparisons between these two cities. But the comparisons were soon shut down. Newark's Mayor Ras Baraka called comparisons to Flint, MI almost insulting,[7] and soon after, helped launch the most aggressive—and indisputably successful—lead service line replacement (LSLR) program in the country to date. The success started with a $120 million municipal bond made possible by the Essex County Municipal Authority in 2019 and ended when Vice President Kamala Harris arrived in the city to celebrate the last of over 23,0000 pipes replaced in early 2022. Newark's lessons learned and best practices should be replicated to put more cities on a similar path to lead-free water.

In addition to the success like Newark, there is more promise on the horizon:

- *New and emerging technologies:* Technologies are available to estimate, locate, and map lead lines, as EPIC has highlighted in two recent reports, Results and Recommendations from the 2021 Water Data Prize and Menu of Options: Data and Technology to Replace Lead Pipes Faster. In some cases, technology companies have grants to offer these tools free to municipalities, or are developing open-source tools.

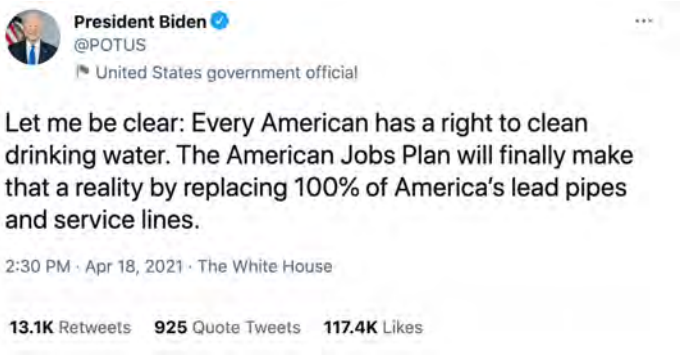
- *Greater involvement of community-based organizations (CBOs):* CBOs across the country are mobilizing to help their communities respond to lead-contaminated water, from Little Village Environmental Justice Organization in Chicago, IL, the Newburgh Clean Water Project in Newburgh, NY, and Mississippi Communities for Prosperity to partnerships like the one between Heart of the City Neighborhoods, Open Buffalo, and Citizen Action of New York in Buffalo, New York.

- *Innovative contracting and procurement:* Innovative contracting and procurement strategies are available, as EPIC outlined in a 2021 report, Replacing Toxic Lead Pipes Faster: Innovative Procurement and Financing Approaches Are Just as Important as Federal Funding. Innovative financing was used in the City of Newark to replace the last of its 23,000 lead lines using impact bonds and in successful Public Private Partnerships (PPPs or P3s) in Maryland and Wisconsin to address other water issues. More innovation is needed to replace 100 percent of the nation's lead pipes.

- *Federal, state, and local government leadership and policy:* President Biden expressed his intent to replace 100 percent of the nation's lead pipes in an April 2021 tweet as well as in several subsequent remarks which set a ten-year time frame and in the Biden-Harris Lead Pipe and Paint Action Plan published on December 16, 2021. Vice President Harris, too, has echoed this sentiment, when she attended an event in Newark in February 2022 to mark the replacement of 100 percent of the city's lead pipes. The Environmental Protection

5 Dixon, J. (n.d.). How Flint's water crisis unfolded. [online] Detroit Free Press. Available at: https://www.freep.com/pages/interactives/flint-water-crisis-timeline/ [Accessed 3 Jun. 2022].
6 Leyden, L. (2018). In Echo of Flint, Mich., Water Crisis Now Hits Newark. The New York Times. [online] Available at: https://www.nytimes.com/2018/10/30/nyregion/newark-lead-water-pipes.html [Accessed 4 Jun. 2022].
7 Rahman, R. (2019). On Flint, Newark Officials Want No Comparison. [online] Tap into Newark. Available at: https://www.tapinto.net/towns/newark/sections/newark-water-crisis/articles/on-flint-newark-officials-want-no-comparison [Accessed 3 Jun. 2022].

Agency (EPA) under the Biden-Harris administration finalized the first revisions to the Lead and Copper Rule (LCR) in 30 years at the end of 2021, and has since issued guidance in August 2022 and an inventory template for water systems to complete by the October 16, 2024 federal deadline. Among EPA's recommendations include encouraging the use of emerging methods and new technologies, including predictive modeling; digitizing tap cards or paper records; employing environmental justice metrics in mapping; replacing all lead service lines regardless of usage or ownership; and prioritizing vulnerable populations in replacement efforts. Some states like New Jersey, with an estimated 350,000 lead pipes, are moving faster than others, by passing legislation aimed at advancing inventory deadlines and setting a ten-year timespan to get the job done. Municipalities are also forging ahead by setting deadlines and passing ordinances, in addition to prioritizing LSLR inventories and programs.



- *Public funding:* The EPA has been vocal about how states should allocate these funds, by issuing guidance on IIJA funding in March 2022 and guidance on inventories in August 2022; Congress, too, has held hearings to facilitate the distribution and equitable allocation of this funding. States' Intended Use Plans (IUPs) are now being published, with many advocates weighing in on how their states are allocating this funding to ensure an equitable distribution of these funds to the communities who need them most.

- *Public opinion:* Even public opinion is in favor of replacing lead pipes. New polling by NRDC shows that seven in ten Americans say lead pipes in drinking water systems are either a crisis or a major problem, and there is also a majority of Americans who support updating an EPA rule requiring water utilities to replace all of their lead pipes within ten years, ensuring no one has unsafe levels of lead in their drinking water, and prioritizing water infrastructure investments in underserved communities. In a June 2022 national water poll of voters by Water Hub, 60 percent of respondents pointed to lead in their drinking water as the highest contaminant of concern coming out of their faucets, adding to a March 2021 poll by Black Millennials for Flint, BlueGreen Alliance, and Environmental Defense Fund (EDF) indicating that 80 percent of bipartisan voters favor replacing lead pipes.

At EPIC, where our mission is speed, we believe faster LSLR is possible while maintaining trust and equity as priorities. It is not only possible but needed—and also urgent—to ensure the next generation of children and their children no longer have to face the threat of lead in drinking water. This report explains our top ten recommendations to ensure more communities around the country are on a path to replacing their lead pipes quickly, efficiently, and equitably—and over the next decade.

TOP TEN BEST PRACTICES FOR MUNICIPALITIES, UTILITIES, AND POLICYMAKERS TO REPLACE TOXIC LEAD SERVICE LINES

Photo credit: Scott Graham

Top ten best practices for municipalities, utilities, and policymakers to replace toxic lead service lines

1 Elevate and support lead-free water champions.

There are several actions local elected officials and other water sector leaders can do to advance lead service line replacement in their communities, many of which are mapped out in this report, such as:

- Making a commitment to replace lead pipes over the next decade
- Adopting a lead-free water resolution or proclamation to build momentum
- Setting goals and timelines for the four pillars of a strong program—finalizing a lead service line inventory, prioritizing equity, engaging the public and the community, and developing a financial plan
- Codifying full service line replacement and other aspects of an equitable LSLR program through local laws and ordinances
- Removing administrative and bureaucratic barriers at the local level (e.g. paving moratoriums, permitting, etc.)

The municipalities that have been most successful in replacing their lead lines rely on leaders—elected officials and utility managers—who make this a priority. In Newark, for example, both Mayor Ras Baraka and Water Department Director Kareem Adeem led the way to a successful LSLR program.

Some mayors are also stepping in with their own deadlines, like Mayor Malik Evans of Rochester, NY who recently said he is aiming to replace all lead lines by 2030. Others are taking steps towards becoming a lead-free city by pledging to replace lead pipes within a decade, including the City of Edgerton Council in Wisconsin, which passed a resolution on November 7, 2022. EPIC and the Great Lakes and St. Lawrence Cities Initiative are calling for even more mayors around the country to make a commitment to replace lead pipes over the next decade.

CASE STUDY

A mayoral champion in North Providence, Rhode Island[8]

Growing increasingly concerned about lead contamination while watching the news coming out of Flint, Mayor Charles Lombardi of the Town of North Providence, Rhode Island became an early local champion for lead pipe removal by launching a program, ultimately winning an EPA Children's Health Award in 2018 for his leadership. Mayor Lombardi applied for funding through the Community Development Block Grant (CDBG) Program, which funded the town's private-side lead line replacement for low-moderate income (LMI) households and enabled the town to replace lead service lines for many of these residents over a three-year period.

CASE STUDY

A water utility leader in Chelsea, Massachusetts

Rebecca Wright is the former Assistant City Engineer within the Department of Public Works for Chelsea, Massachusetts, a diverse city outside of Boston with a population of roughly 39,690 in addition to a large number of undocumented residents and a significant number of residents born outside of the United States. Rebecca took initiative in her city to spearhead a lead service line replacement program, demonstrating leadership as well as an openness to new tools, avenues, and technologies to speed up the process—and even produced a video to help residents identify lead pipes. Rebecca helped the city secure funds from the Massachusetts Water Resources Authority (MWRA) Lead Loan Program (LLP). Through her work, Rebecca reduced the amount of lead exposure in the community by leading the effort to replace lead service lines. The program also includes full service line replacement, thereby ensuring even the poorest residents who cannot afford to pay for replacement for the private side of the lead lines can have their pipes replaced too. Rebecca Wright was the winner of the 2022 WaterNow Emerging Leader award for her leadership on lead service line replacement in Chelsea.

Rebecca Wright. ***Photo credit: EPIC***

2 Locate and map lead service lines quickly–and replace as you go.

The EPA has estimated that the United States has six to ten million lead pipes; EDF estimates that 11,000 communities across the country have them; and some estimates at the state level are available.[9] Overall, though, we lack water system-level inventories across the country, and this lack of information can lead to inertia, a lack of acknowledgment that lead pipes are a problem, and a failure to secure funding while it's available.

8 Cunningham, M. and Egorov, O. (2021). How small cities are tackling lead service line replacement. [online] American City & County. Available at: https://www.americancityandcounty.com/2021/02/25/how-small-cities-are-tackling-lead-service-line-replacement/

9 Olson, E. and Stubblefield, A. (2021) Lead Pipes Are Widespread and Used in Every State. [online] Natural Resources Defense Council. Available at: https://www.nrdc.org/resources/lead-pipes-are-widespread-and-used-every-state#:~:text=After%20conducting%20a%20survey%20of,that%20claim%20to%20have%20none

Finding and mapping lead service lines (LSLs)—through inventories—is therefore one of the first steps in developing a successful lead service line replacement program.

Inventories to locate lead service lines are essential to understand the scope of the problem, set tangible goals, put together a financial plan, and incorporate the issue in the political agenda. Inventories yield an estimate of the total replacement cost as well as inform efforts to advance equity by prioritizing vulnerable residents and neighborhoods.[10]

The Lead and Copper Rule Revisions (LCRR) promulgated in a 2021 mandate that all water systems complete an inventory by October 16, 2024, with some states like New Jersey moving forward on a faster timetable. The Biden-Harris Lead Pipe and Paint Action Plan from December 2021 also cited "the importance of rapid progress on inventories." The US EPA's Guidance from August 2022 outlines several recommendations for water systems to complete inventories, and notably recommends that water systems complete inventories at the same time as replacement efforts and 'as soon as possible.' EPIC supports this emphasis on speed, as the IIJA funding, in particular, will be distributed over just five years.

States can also use DWSRF set aside funds to help water systems develop and maintain inventories, in addition to other LSLR pre-construction activities. (See Recommendations 7 and 9 for more information on funding and policy respectively).

CASE STUDY

Good record keeping, as a first step[11]

Newark—notorious for its replacement of 23,000 LSLs in three years—had up-to-date records in place when it launched its LSLR program. With a strong assessment of its needs through a comprehensive inventory, Newark was able to demonstrate financial needs and secure funding, enabling the city to rapidly remove lead service lines. Newark officials credit its "old-timers" in the water department for keeping accurate records of past lead service line replacements and existing lead lines, modeled after nearby New York City. These records enabled the water department, faced with a lead contamination crisis, to move forward with their replacement program in record time. Knowing where and how many LSLs there are facilitates the necessary number-crunching needed to budget for it. Without this clear picture, many municipalities are playing a guessing game—making it hard to line up the necessary funding and implement a clear solution.

10 Vulnerable communities include children (e.g. areas with a high percentage of childcare facilities) and environmental justice neighborhoods.

11 Cunningham, M. (2022). Echoing Newark: How American Cities Can Replicate Newark's Success in Replacing Over 23,000 Lead Pipes in Under Three Years. [online] Environmental Policy Innovation Center. Available at: https://www.policyinnovation.org/blog/echoing-newark-how-american-cities-can-replicate-newarks-success-in-replacing-over-23000-lead-pipes-in-under-three-years

CASE STUDY

Good data management practices[12]

As explained by Center for Geospatial Solutions, when building lead inventories, it is important for municipalities to have a complete picture of their existing data. Their data may be incomplete or inadequate, but understanding what gaps exist is a critical first step. Every municipality should conduct a lead service line data audit to determine who has what in terms of data and create a "single source of truth" which is often a geocoded billing roster. It is important to flag any physical records, as they will need to be converted to a digital format—a challenge many municipalities face. And maintaining and updating the inventory is also important. There are several areas where innovation is particularly helpful including mobile data field inspections, community outreach, progress dashboards, lead service line predictions, and much more. Read more about the Center for Geospatial Solutions' best practices in this blog.

CASE STUDY

State policy to speed up inventories and replacement efforts

Policy changes at the state level can also expedite the inventorying process for cities, pushing for earlier deadlines than the federal requirements to ensure that cities can tap into funding options. In the State of New Jersey, for example, the legislature passed a LSLR Law that expedites the process of removal at the state level. Per the requirements of the legislation, every water system must develop a full inventory of both public and private lines, and replace all lead service lines within ten years. Each municipality was expected to submit an initial lead service line inventory by January 22, 2022 unless the water system serves under 3,300. Michigan passed a similar requirement through its revised Lead and Copper Rule in 2019, requiring an initial inventory by January 1, 2020 to identify all service materials in the distribution system.

CASE STUDY

Where are the nation's lead pipes?

The Natural Resources Defense Council (NRDC) has published state-level lead pipe estimates showing which states have the most LSLs total and the most LSLs per capita. In 2021, they also published a county-level lead risk analysis. In the case of New Jersey, the state has also been able to provide a statewide look of their lead service lines. This state-wide view of the scope and scale of the problem is an important policy tool that would be helpful to see in all lead-burdened states. Despite these tools, we still have much uncertainty over the number and location of lead pipes in this country. New tools, like predictive modeling, can help map out water system-level predictions of where lead lines are located, as BlueConduit has done, using Public Water System Identification Number (PWSIDs). EPIC and BlueConduit are collaborating on a new project we hope to launch to track progress of lead service line replacement nationwide, which will be presented live and kept up-to-date in BlueConduit's LeadOut map and scorecard.

12 Miller, J. (2022). Lead-Free Water Challenge: What We Learned About Data Management and Lead Service Line Inventories. [online] Environmental Policy Innovation Center. Available at: https://www.policyinnovation.org/blog/lead-free-water-challenge-what-we-learned-about-data-management-and-lead-service-line-inventories

3 Embrace new and emerging technologies to replace lead service lines.

Replacing lead pipes is a problem that benefits from technology and data management—and new innovations in these areas. Many utilities—especially smaller and medium-sized ones—still rely on paper records and outdated technologies, and generally may have less access to the newest technologies. Nonetheless, better technologies and innovations exist and are emerging, including digitizing paper records used for recordkeeping, using predictive analysis to create inventories, and relying on ground-penetrating radar to locate lead lines. In its August 2022 guidance, the EPA points to new technologies and innovation that could help municipalities in LSLR programs, referencing predictive modeling, ground penetrating radars, web maps, field applications, and closed-circuit television (CCTV) inspections. As much as possible, public water systems should embrace these new technologies and innovations, which often have several benefits, including saving time and money, especially when these products are offered free of charge or as open-source tools.[13]

CASE STUDY

Predictive modeling to develop inventories[14]

While field inspections are the most reliable way to determine service line material at an individual location, it is not always feasible to inspect every residence, especially at the start of a program, or in municipalities with thousands of lead pipes. Machine learning and artificial intelligence can be used to predict where lead service lines are likely to exist—or not—based on information about the properties (e.g. building date and type), historical information on local plumbing standards, information on other relevant work done in the vicinity, and most importantly, the ground truth discovered from inspections (or replacements). Information about the actual pipe material at a representative sample of homes is needed to ensure that they are free of statistical biases. As more information is collected and as more pipes are replaced, the analysis produces better models, becoming an iterative cycle that provides more clarity and certainty as time goes on. Results can help municipalities estimate their level of effort, the funds needed, and where to target future field inspections. When using predictive modeling, it is essential to follow best practices in data science to make sure that the predictions are accurate. Companies such as BlueConduit, 120Water, and others highlighted in EPIC's Menu of Options: Data and Technology to Replace Lead Pipes Faster and Results & Recommendations for Water Utilities and Regulators from the 2021 Water Data Prize offer expertise in this type of prediction. More detailed information on this modeling approach and data considerations can be found in Principles of Data Science for LSLR programs and in this blog by BlueConduit on best practices.

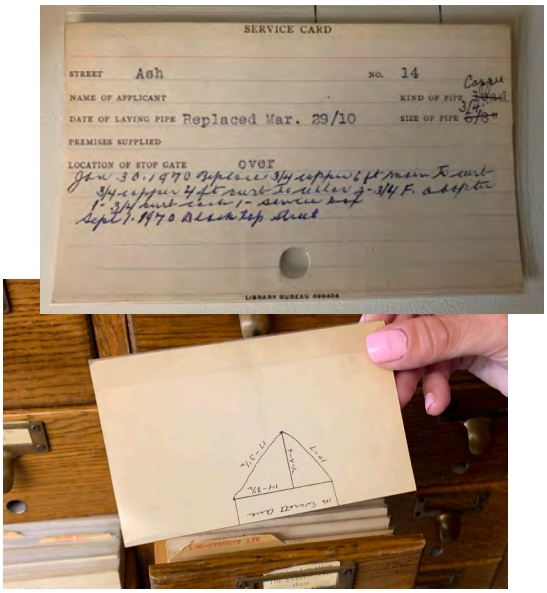
13 Abernethy, J. and Schwartz, E. (2021) Statistical Modeling In Support Of Lead Service Line Identification, Inventory, And Replacement. [online] Water Online. Available at: https://www.wateronline.com/doc/statistical-modeling-in-support-of-lead-service-line-identification-inventory-and-replacement-0001

14 Greiling, D. and Robinson, I. (2022). Lead-Free Water Challenge: What We Learned About How To Prepare Your Inventory Without Knowing Everything Yet. [online] Environmental Policy Innovation Center. Available at: https://www.policyinnovation.org/blog/what-we-learned-about-the-lead-free-water-challenge-and-working-with-small-and-medium-sized-municipalities-how-to-prepare-your-service-line-material-inventory-without-knowing-everything-yet

CASE STUDY

Digitizing paper records[15]

In 2022, we don't expect to find paper records, called tap (or tie) cards by water utilities, as the main form of record-keeping, but in fact, many utilities across the country lack digitized records. One of the biggest challenges for cities, therefore, and particularly under-resourced and small to medium-sized ones, is converting physical records to digital. Transitioning to digital records can be time-consuming and resource intensive, but is a necessary step. In one municipality, the process was painstakingly slow, with tap cards entered into a spreadsheet manually by a junior staff member. Technology groups like 120Water are attempting to speed up this process through digitization technologies that quickly scan and categorize the paper record. The resulting digital system offers several advantages in terms of discoverability, security, compliance, transparency, and convenience.



Paper tap cards showing service line composition.

CASE STUDY

Mobile field verification applications[16]

Often the most reliable way to verify lead service lines is to inspect a residence in the field. Field inspections are traditionally done with paper forms and a camera, which needs to then be manually transcribed to update the "single source of truth." Mobile data field applications, such as ESRI's Field Maps or Fulcrum, make this process nearly seamless. Data validation can be used to standardize data collection, and updated information can be directly connected to the single source of truth. Timestamps and editor fields can record when and who made changes, and photos can be associated with an asset. This technology can dramatically increase the effectiveness and efficiency of field inspections, which are one of a municipality's most valuable tools.

CASE STUDY

Ground-penetrating radar (GPR)

A technology that has been gaining traction for identifying LSLs is using remote sensing through ground penetrating radar. As per the August 2022 EPA guidance, this is a tool that communities can use to avoid the strenuous process of manually exposing the pipe to determine where LSLs are located. Ground-penetrating radar makes an assessment of buried pipes' diameters to determine service line material, by comparing them to other known pipes in a locale.

15 Miller, J. Lead-Free Water Challenge: What We Learned About Data Management and Lead Service Line Inventories.
16 Ibid.

CASE STUDY

Closed-circuit television (CCTV)

The use of CCTV cameras to visually inspect service lines is another non-invasive method of identifying LSLs. As described in the August 2022 EPA guidance, this is done either internally or externally by inserting the camera into the curb stop box to find visual markers that a service line is made of lead. While less invasive than exposing the service line completely, it relies on the assumption that the curb stop is made of the same material as the rest of the line. If the curb stop has previously been replaced, but the remainder of the service line has not, then it could lead to a missed lead service line.

4 Make information accessible to the public—before there's a crisis.

Nearly 60 million Americans do not trust their drinking water and many have resorted to bottled and filtered water in recent years and especially since the Flint lead contamination crisis. This is playing out as a result of the crisis in Jackson, Mississippi too. Once lost, trust is much harder to regain, as many cities with water crises have realized. Proactive communications is therefore required to maintain trust—and communications can ideally begin before LSLs are located and mapped.

Water utilities must also establish themselves as the main source of information and education about lead in drinking water and LSLR from the onset, along with other water quality issues, even if people are not asking for the information and in absence of any crisis. Since many water utilities do not have communications departments, they need to be proactive and step into this communications role, or work with a communications company like WaterPIO or Raftelis who have expertise with water communications and water crisis communications.

As the main source of communications, utilities need to communicate earlier, better, and at every milestone that occurs in their program, and work with other stakeholders like elected officials to ensure the message is being shared.

Information should be available online, updated regularly, and repeated across social media platforms. Utilities need to take the extra step to conduct better outreach to communities, bringing the information to where residents are and in the form and language they need.[17] (See Recommendation 5 for more information on community engagement).

Finally, with inventories on the way, utilities should think ahead about what this information will mean for the public, and how best to anticipate the questions and information the public will have about lead in drinking water and any plans to address this threat. Read more about WaterPIO's best practices blog on proactive communications, or read about some of EPIC's Water Data Prize winners in the communications category.

17 McGill, M. (2022). Lead-Free Water Challenge: What We Learned About Proactive Communications Around Lead Service Line Replacement. [online] Environmental Policy Innovation Center. Available at: https://www.policyinnovation.org/blog/lead-free-water-challenge-what-we-learned-about-proactive-communications-around-lead-service-line-replacement

CASE STUDY

Using lead dashboards to communicate to the public

It is important for municipalities to engage with their communities and provide outreach regarding decisions and progress to help build trust from the public. This can be accomplished in many ways and a public facing website with maps and data is particularly helpful. ArcGIS Hub can provide a public place to access data and mapping products. It also provides a forum for lead service line replacement, tracking feedback and concerns. This tool and others like it can even be configured in a way that allows users to create events, a calendar, discussion forums, and be notified by updates from the municipality. Examples of lead dashboards can be found in Image 1, 2 and 3.

Image 1: Example of lead dashboard from Benton Harbor, Michigan

Image 2: Example of lead dashboard from Platteville, Wisconsin.

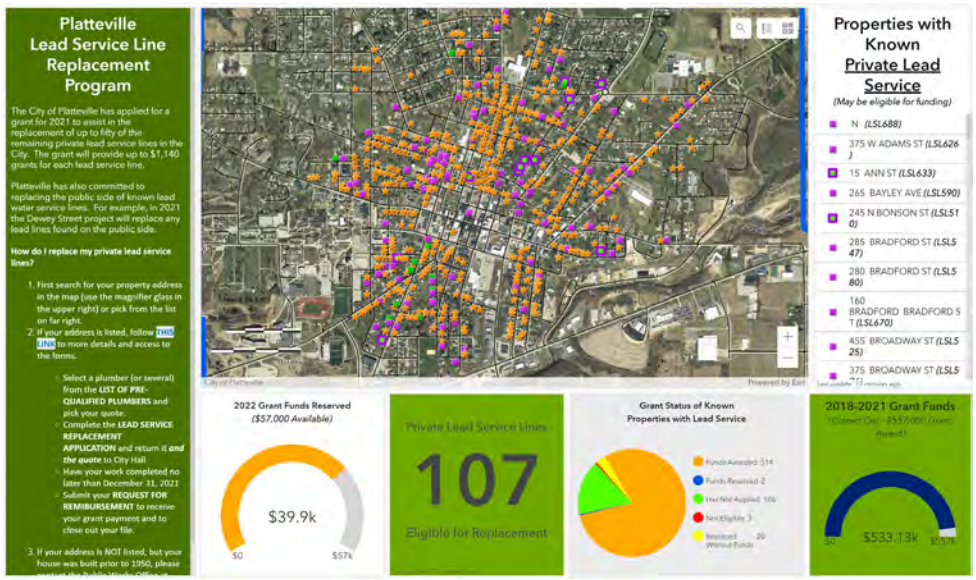


Image 3: Example of lead dashboard from Newark, New Jersey.

5 Engage and make joint decisions with community partners.

While the utility holds the keys to several aspects of lead service line replacement—funding opportunities available to municipalities, the contracting and procurement process, the ownership of the public side of the lead pipes, the historical and real-time customer data, and ties to staff, laborers, and contractors—there is an important role for the community to play in the design and implementation of a municipal LSLR program. Utilities should be proactive in engaging community groups, CBOs, faith-based groups, homeowner associations, residents, and other local groups. These stakeholders can and should play an important and active role in partnership with the utility, as those most affected by lead in drinking water, helping ensure the focus remains on equity and on the most vulnerable residents, working in tandem with the utility in getting the word out, asking residents to check their service lines and submit their findings, distributing effective point-of-use or pitch filters certified for lead removal, and ensuring the public notifications from the utility are in the appropriate format (e.g. written, audio, video, etc.) and language, and are accessible to residents who may not all receive information the same way (e.g. online versus in person). Public awareness and participation can also boost the process of collecting data on service line composition from homeowners, and put additional advocacy pressure on state and federal officials to allocate funding and ensure faster replacement rates.

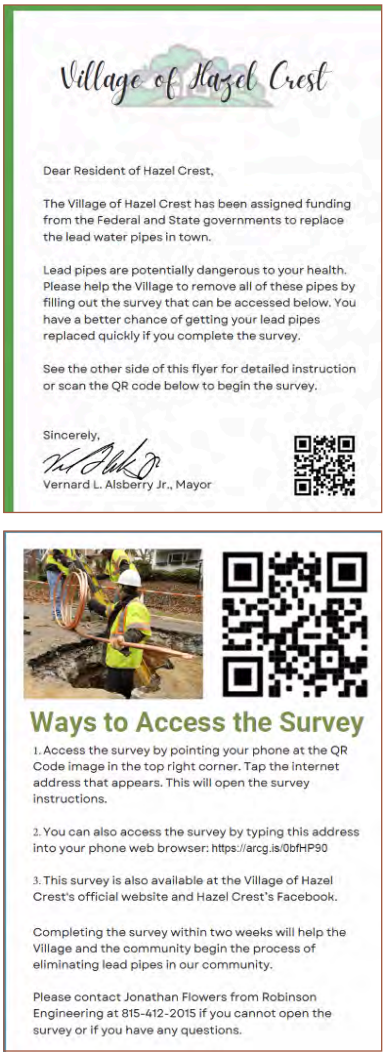
In Benton Harbor, MI, the CBO, Benton Harbor Solutions, hosts a community-led radio show that highlights various organizations and their initiatives within the community. This radio show has been successful in sharing information in a non-traditional way to the community while simultaneously aiming to build trust between external entities and the community. For example, in November and December 2021, the EPA completed three separate water filtration studies to ensure the efficacy of the removal and reduction of lead in drinking water. Once the results were released in March 2022, Benton Harbor Solutions hosted EPA staff to convey the results effectively.

The Newburgh Clean Water Project is an example of a community group that is doing door-to-door outreach, spreading education around the city's LSL program and helping collect information from residents, in collaboration with the city and with the utility manager. Clean Water Action is another example of a group with a history of working in partnership with the City of Chelsea, Massachusetts.

Community members and groups are also instrumental in the mapping and inventory process. With proper graphics and instruction, residents can report the material of service lines from inside their homes, which is particularly helpful in scenarios where a service line is marked as unknown in city records. Water utilities and the community they serve can work together to cross-reference available data and determine unknown service lines. The Village of Hazel Crest has been using this strategy from the onset of its LSL program, and has put out information with a QR code linked to a survey to its residents.

Connecting communities to technology can also be powerful.

Digital surveys applications, like ESRI's Survey123 or Microsoft's PowerApps, can also help by linking survey results to a lead dashboard, so municipalities can view the public's responses in real time. Areas with low response rates can be identified for additional outreach. Community groups in many areas have also been instrumental in distributing filters to residents.



Village of Hazel Crest

Dear Resident of Hazel Crest,

The Village of Hazel Crest has been assigned funding from the Federal and State governments to replace the lead water pipes in town.

Lead pipes are potentially dangerous to your health. Please help the Village to remove all of these pipes by filling out the survey that can be accessed below. You have a better chance of getting your lead pipes replaced quickly if you complete the survey.

See the other side of this flyer for detailed instruction or scan the QR code below to begin the survey.

Sincerely,

Vernard L. Alsberry Jr., Mayor

Ways to Access the Survey

1. Access the survey by pointing your phone at the QR Code image in the top right corner. Tap the internet address that appears. This will open the survey instructions.

2. You can also access the survey by typing this address into your phone web browser: https://arcg.is/0bfHP90

3. This survey is also available at the Village of Hazel Crest's official website and Hazel Crest's Facebook.

Completing the survey within two weeks will help the Village and the community begin the process of eliminating lead pipes in our community.

Please contact Jonathan Flowers from Robinson Engineering at 815-412-2015 if you cannot open the survey or if you have any questions.

Hazel Crest letter to residents.

Residents can also be engaged in collecting data from testing their own water at home to using point-of-use filters. NRDC has another resource available, What to do if you have lead in your water to help residents navigate with the risks of lead in drinking water.

CASE STUDY

Community group instrumental in distributing filters and information[18]

In Chicago, the community known as Little Village has had a number of construction projects, potentially disturbing lead service lines. In 2020, just at the start of the COVID-19 pandemic, there was also an implosion of the Crawford Coal Plant. Based on EPA research, the disturbance of lead pipes (often due to construction) can result in elevated lead levels and ultimately pose the threat of lead poisoning in all age groups, even if water is flushed thoroughly. Though it is unclear whether LSLs were impacted, the implosion sparked the Little Village Environmental Justice Organization (LVEJO), a community-based nonprofit, to respond by distributing bottled water during the early months of summer along with multilingual posters that explained the dangers of lead in drinking water. In October 2020, LVEJO began with a second distribution of bottled water, along with Zero Water filters. The city assisted with testing and found that the lead pipes may not have been directly disturbed by the implosion, yet there was a secondary concern with the malposition of valves that changed the taste, smell, and appearance of residents' tap water. LVEJO staff viewed the water filters they were distributing as a temporary, short-term solution, and they hoped to see a more long-term solution implemented by local officials, including the removal of all lead pipes in the community on both the public and customer-owned service lines.

6 Focus on equity and prioritizing at-risk populations in replacement efforts.

Lead pipe replacement is a somewhat unique water quality problem, because often at least half of the service line is located on private property and therefore owned by a resident rather than the public utility. This has historically created inequities in whether and how soon lead pipes are replaced, with the disparities clearly apparent along socioeconomic and racial lines. When the financial burden of replacement falls on the homeowner, there are distributional effects in which households who have access to information and resources get their pipes replaced first, and low income residents are more likely to get left behind. Much of this inequity is addressed if the full service line is mandated and fully paid for by the utility, which many public funding sources not only allow but now recommend. To ensure equity, therefore, utilities need to move towards covering the full cost of replacement for all residents, with the priority on low income households and at-risk populations and neighborhoods. The IIJA funding, as well as other public funding sources, covers both the public and the private side of lead lines. In addition, states can—and should—still mandate full replacement with all public funds, as New Jersey did.

Because lead pipes are often located in the oldest housing stock in the oldest parts of municipalities, low income populations are often most at risk, which is then compounded with other health risks and environmental injustices these residents face, including other household sources of lead contamination such as lead-based paint. Water utilities should recognize these compounding risks that their residents face, and work to ensure at-risk, low income, and socially vulnerable populations, neighborhoods, and communities are prioritized first in replacement efforts.

18 Egorov, O. (2021) A temporary solution: the personal water filtration system. [online] Environmental Policy Innovation Center. Available at: https://www.policyinnovation.org/blog/a-temporary-solution-the-personal-water-filtration-system?rq=filters

In addition to proactive communications and engagement with the community and residents, utilities can implement other measures to ensure more equitable replacements of LSLs. Outreach should embrace different formats, venues, and languages to be truly accessible to all residents, including online and written notices, in person contact, door-to-door outreach, and bringing information to places where residents gather.

Another tool that utilities can use to ensure greater attention to equity is through the use of demographic and other metrics. For example, New Jersey Future and Jersey Water Works, who won EPIC's 2021 Water Data Prize for equity, provided a visualization of metrics such as the number of lead service lines, the utilities with Action Level exceedances for lead, and the percentage of households in a utility service area that are likely to be unable to afford their utility bills. The use of social vulnerability indexes (SoVI) like these—and others such as proximity to other environmental hazards or Superfund sites, lead poisoning, and severity and prevalence of poverty—can help overlay various parameters that can be used to ensure a focus on equity and at-risk populations. Ultimately, these tools can also reduce the harm that residents face due to the risk of lead pipes in combination with other social, environmental, and economic factors.

NRDC and partners from throughout the country, including EPIC, also developed key principles to help communities craft an equitable lead service line replacement program, covering aspects such as engaging and communicating with the community, prioritizing at-risk communities, ensuring full service line replacement including lead connectors (e.g. goosenecks and pigtails), paying prevailing wage rates, prioritizing immigrant justice, providing safe drinking water during replacements, and not requiring homeowner consent for right of entry. These principles are an important guide for utilities to understand what key priorities are in building an equitable program. Other resources are available on the Lead Service Line Collaborative's equity page.

Photo credit: Casey Langan

CASE STUDY

Focusing on equity in New Jersey

Approximately $4.8 million people in New Jersey live in water systems that are likely to have lead service lines, which is more than half of the state's population. Due to this, and the public health threat that lead in drinking water poses, the State of New Jersey has set an ambitious requirement that all water systems must meet statutory obligations to replace lead service lines in ten years. To help meet these needs and ensure that replacements are done through an equity lens, New Jersey Future has created two tools—New Jersey Watch Check and New Jersey Water Risk & Equity Map.

Jersey Water Check is a user-friendly website where residents and decision makers can track progress on lead service line identification and replacement at multiple scales including at the utility level and at the state wide level. Along with this, users can also look at metrics including water affordability stress. The New Jersey Water Risk and Equity Map is connected to New Jersey Water Check and allows for users to visualize where the lead service lines are being identified and replaced. Users also have the option to overlay this data with other factors such as flood risk and income levels which can help highlight where concentrated water and equity risks exist.

As these tools continue to develop, New Jersey Future plans to add the ability to identify where lead service lines replacement progress is being made and where it is stalling by demonstrating the "geographic footprint" of three metrics—percentage of household with water affordability stress, the number of lead service lines per utility, and the number of Action Level exceedances per utility.

7 Develop a multi-year financing plan, taking advantage of multiple funding sources.

Securing funding is a key step in the LSLR process, especially for water utilities which have thousands or hundreds of thousands of lead pipes. A combination of factors led to Newark's 100 percent replacement, but financing through municipal and social impact bonds, for example, helped jumpstart their program and ultimately lead to success.

Costs to replace lead pipes vary drastically across the country, as low as $1,200 in some parts of the Midwest and up to $25,000-$27,000 in Chicago. EPA stated that $4,700 was the national average in 2019, though inflation has most likely increased replacement costs throughout the country.[19] Along with securing funding, municipalities can also play a role in reducing costs.

Timing replacement with already scheduled and funded municipal improvements—like maintaining water and sewer mains, street paving, and sidewalk repair—is more efficient. Removing administrative barriers such as permitting and paving moratoriums and strategically planning for block by block, rather than home by home replacements, also reduces costs.

19 Strategies to Achieve Full Lead Service Line Replacement. (2019). [online] US Environmental Protection Agency. Available at: https://www.epa.gov/sites/default/files/2019-10/documents/strategies_to_achieve_full_lead_service_line_replacement_10_09_19.pdf

Water systems finance many infrastructure upgrades, including LSLR, with loans from the municipal bond market and other sources of revenue, including collecting revenue from their customers or ratepayers to fund projects. Since full service line replacement includes a private portion of the service line owned by homeowners—and EPIC recommends using public funds for full service line replacement—there are other sources municipalities can turn to aside from raising rates, and to reduce the burden on customers, including securing grants, loans, and private investment such as P3s and pay-for-success financing.

There are several state and federal programs that fund LSLR, including federal funds from State Revolving Funds (SRFs), Water Infrastructure Finance and Innovation Act (WIFIA), and Water Infrastructure Improvements for the Nation (WIIN) administered by the EPA, as well as other programs administered by the US Department of Agriculture (USDA) and Department of Housing and Urban Development (HUD). In many cases, states also have programs to fund LSLR. Several case studies on the EPA website describe how communities utilize these programs and other creative financing mechanisms to avoid passing the cost of replacement onto homeowners and ratepayers.

Funding lead service line replacements may require securing capital from different sources to complete the work. Municipalities should explore all funding options. Water utilities—and their elected leaders—should reach out to all funding sources to piece together their best options for financing. The best sources of capital may differ depending on whether a municipality is a disadvantaged community (DAC), their capacity to take on additional debt, their credit score, and other factors. Water utilities need to be persistent with program administrators to get the answers they need. In addition to identifying multiple funding sources, utilities should use a multi-year budget that is integrated into their capital plans to fully replace all lead lines over the next ten years.

Photo credit: Casey Langan

Federal Funding

Drinking Water State Revolving Funds (DWSRFs)
The Drinking Water State Revolving Fund (DWSRF) provides federal funds to states, who then provide financial assistance through loans and grants to water systems. DWSRFs finance water infrastructure projects to help water systems comply with the Safe Drinking Water Act (SDWA). The Infrastructure Investment and Jobs Act (IIJA) was passed by the 117th Congress to authorize funds for federal aid for highways, transit, broadband, water infrastructure, and other purposes. IIJA dedicated $43 billion to states for water infrastructure through the SRF programs, $15 billion of which is specifically designated for lead service line replacement. IIJA requires states to allocate an unprecedented percentage of funds as additional subsidies for disadvantaged communities—"...forty-nine percent of the funding will be administered as grants and completely forgivable loans." Water systems must apply for SRF funds. States then rank applications according to their statutes and administrative procedures and set the terms of assistance (e.g. size, length, and interest rate of loan). The state agency that administers the SRF program publishes a Project Priority List (PPL), often as an appendix to the Intended Use Plan (IUP), that outlines the projects they intend to finance.

Water Infrastructure Improvements for the Nation (WIIN) Act
Water Infrastructure Improvements for the Nation (WIIN) Act awards fund public water systems in small, underserved, and disadvantaged communities to meet Safe Drinking Water Act (SDWA) requirements. There are four WIIN grant programs: for small, underserved, and disadvantaged communities; a school and child care lead testing and reduction program; reducing lead in drinking water; and America's Water Infrastructure Act (AWIA) 2018 Grants. The Reducing Lead in Drinking Water grant program was established in 2022, awarding funding to disadvantaged communities to reduce lead in drinking water through infrastructure and treatment improvements, and remediation in schools and day care facilities. Reducing Lead in Drinking Water grants are awarded on a competitive basis. The EPA has waived the statutory 20 percent cost share for all applicants due to the financial constraints caused by the COVID-19 pandemic. To date, communities such as Fall River, Massachusetts; Trenton, New Jersey; Detroit, Michigan; and Benton Harbor, Michigan have received WIIN grants for lead service line replacement efforts.

Water Infrastructure Finance and Innovation Act (WIFIA)
The Water Infrastructure Finance and Innovation Act (WIFIA) of 2014 is a federal credit program to provide long-term, low-cost supplemental loans for eligible water and wastewater infrastructure projects administered by the EPA. WIFIA provides loans that support both LSLR and corrosion control improvements, with the minimum project size for small communities of $5 million and $20 million for large communities. Englewood, Colorado is using $38 million in WIFIA loans to modernize its water system, create more resilient infrastructure, and conduct its LSLR program. Chicago is about to move forward with $336 million in WIFIA loans to add to other funding for its LSLR program.

Water Infrastructure Fund Transfer Act (WIFTA)
Congress passed the Water Infrastructure Fund Transfer Act (WIFTA) in 2019. This law, first introduced in Congress by Sen. Cory Booker of New Jersey (and is sometimes referred to as the 'Booker Law'), allowed states to transfer up to five percent of their cumulative Clean Water State Revolving Funds (CWSRFs) to their Drinking Water State Revolving Funds (DWSRFs) for pre-determined lead-related drinking water projects, including lead service line replacement. States specified how the funds would be used before the transfer, which had to be completed by October 4, 2020. WIFTA was not new funding but rather granted states greater flexibility to allocate existing SRF funds. Under EPA guidance issued in 2020, states have two to three years

after receiving capital from the federal appropriation to enter into agreements with water systems and five years to spend the funds. This may be a program worth replicating so that more states can use this funding for LSLR.

States had to apply to participate in WIFTA. In its guidance, EPA mandated "to the extent possible" that states identify specific WIFTA projects—with associated project descriptions, project costs,and the rationale behind the transfer—in their Intended Use Plans.

Nine states participated in the WIFTA program: New Jersey, Illinois, Michigan, Pennsylvania, Wisconsin, Massachusetts, Ohio, Vermont, and Rhode Island, transferring a cumulative $549 million for lead-related projects. Only five states, New Jersey, Illinois, Michigan, Pennsylvania, and Wisconsin, delegated the maximum possible transfer. Of the nine states, five of them are in the top ten in the country for the total number of lead lines. New Jersey—fifth in the nation with an estimated 350,000 lead service lines (LSLs) and also home to WIFTA's sponsor, Senator Booker—transferred the largest amount, a total of $113,035,320.

American Rescue Plan Act (ARPA) State and Local Fiscal Recovery Fund (SLFRF)

The American Rescue Plan Act (ARPA), a $1.9 trillion dollar package passed in March 2021 in the midst of the COVID-19 pandemic, provided emergency grants, loans, and investment to provide economic relief to struggling families, restaurants, workers, and local governments. The ARPA State and Local Fiscal Recovery Fund (SLFRF) provides $350 billion in funding to state, local, territorial, and tribal governments. These funds can be used "to make necessary investments to water, sewer, or broadband infrastructure," including for lead service line replacement, which EPIC has urged more communities to do. The final rule took effect on April 1, 2022, and broadened the eligible infrastructure investments, stating "recipients may fund a broad range of water and sewer projects, including those eligible under CWSRF and DWSRF and certain additional projects, including a wide set of lead remediation, stormwater infrastructure, and aid for private wells and septic units."[20] The final rule broadened the eligibility to include lead testing, installation of corrosion control treatment, lead service line replacement, as well as water quality testing, compliance monitoring, and remediation activities, including replacement of internal plumbing and faucets and fixtures in schools and childcare facilities. Local governments have until December 2024 to designate these funds and until December 2026 to expend them. An overview of the final rule can be found on the US Department of Treasury website.

The Brookings Institute and the National Conference of State Legislatures both host databases to track how municipalities are using the ARPA SLFRF dollars. Many cities across the country are launching their lead service line replacement programs with ARPA dollars, including EPIC's Lead-Free Water Challenge partner, Newburgh, NY. The city is using $1 million in ARPA funds for its lead service line replacement program. Other cities are doing the same, such as Pittsburgh, Pennsylvania's investment of $17.5; Toledo, Ohio's investment of $10 million; and Bloomfield, New Jersey's investment of $2 million. Missouri is investing $412 million of its ARPA funds in water infrastructure improvements and lead service line replacement. The state has an online dashboard to track funding allocations and more information on lead in drinking water on the way.

US Department of Agriculture

The Water and Waste Disposal Loan & Grant Program is housed under the United States Department of Agriculture (USDA) Rural Development Program, and was approved by the 115th Congress through the enactment of the Consolidated Farm and Rural Development

20 United States Department of Treasury (2022). Coronavirus State & Local Fiscal Recovery Funds: Overview of the Final Rule. [online] Available at: https://home.treasury.gov/system/files/136/SLFRF-Final-Rule-Overview.pdf

Act in 2018. This program is geared towards economically-distressed rural communities including rural municipalities with populations of less than 10,000, rural tribal communities, or eligible colonias. While this program is geared towards smaller communities, state and local governmental entities, private nonprofit organizations, and federally-recognized tribes can apply on behalf of the community. According to USDA Rural Development Program requirements, allocated funds can be used for "...clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and storm water drainage to households and businesses in eligible rural areas." Communities can apply for USDA Water and Waste Disposal Loan and Grant Program funds to assist their lead service line replacement initiatives. If selected, applicants will receive funds in the form of a long-term, low-interest, fixed rate loan, or if additional funds are available, a supplemental grant will be allocated. In 2021, the City of Bloomer, Wisconsin was awarded $27.6 million in loans and grants through this program to kickstart their LSL program, enabling them to replace 4.6 miles of lead service lines.

HUD Community Development Block Grant (CDBG)

The Community Development Block Grant (CDBG), operated by the Department of Housing and Urban Development (HUD), was authorized in 1974 under the Housing and Community Act to strengthen partnerships, build technical assistance capacity, and empower communities, especially for low and moderate-income people. CDBG grants can address a large range of community development needs, including lead in drinking water. Eligible applicants include: principal cities of Metropolitan Statistical Areas (MSAs); other metropolitan cities with populations of at least 50,000; qualified urban counties with populations of at least 200,000 (excluding the population of entitled cities); and states and insular areas. HUD determines the amount of grant funding using a statutory formula that measures community needs (e.g. the extent of poverty, population, housing overcrowding, age of housing, and population growth lag). Activities must include one of the following: benefits to low and moderate-income people; prevention/elimination of slums or blight; or community development needs having a particular urgency because existing conditions pose a serious and immediate threat to the health or welfare of the community for which other funding is not available.

The Town of North Providence, Rhode Island launched a LSLR program using CDBG funds in partnership with Providence Water. Toledo, Ohio chose a different strategy by using a mix of funds: CDBG funds in addition to funds from ARPA, an EPA Environmental Justice Grant, and the Ohio EPA Water Replacement Loan Program. In 2020, the CIty of Chicago applied for CDBG funds to help initiate its Equity Lead Service Line Replacement Program.

Photo credit: Tim Brown

State Funding

Aside from federal programs, some state programs also fund lead service line replacement. For example the Pennsylvania Infrastructure Investment Authority (PENNVEST) has created pools of capital in recent years (2018, 2021, 2022) and Vermont's Drinking Water Capacity Development Program was launched in 2017. Below is a snapshot of several other state programs around the country:

Massachusetts
Announced in 2016, the Massachusetts Water Resources Authority (MWRA) made $100 million available to its member communities in the form of 10-year, no-interest loans for full lead service line replacement. MRWA created this Lead Service Line Replacement Loan Program or Lead Loan Program (LLP) as an enhancement to its Local Water System Assistance Program (LWSAP). From the launch of the program in Fiscal Year (FY) 2017 through March 2022, MWRA distributed a total of $34 million in Lead Service Line Replacement Loan Program funds to 14 communities. EPIC's partner, Chelsea, Massachusetts, was one of the recipients of this funding.

Michigan
As part of the Michigan Clean Water Plan, Governor Gretchen Whitmer allocated $700 million to water infrastructure needs starting in 2020. Of that, the $207 million for drinking water includes $102 million for lead service line replacement in disadvantaged communities. Under this program, Benton Harbor received an initial $18.6 million of a $45 million grant specifically for LSLR, in addition to a $5.5 million WIIN grant, $3 million from the SRF program (through WIFTA), and a $10 million grant from the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

New York
Governor Andrew Cuomo and the New York State Legislature created the Water Infrastructure Improvement Act (WIIA) in 2015, which provides grants to local governments to fund both drinking water and wastewater infrastructure projects. Since then, WIIA has been providing significant water infrastructure investments in New York. In 2017, Governor Cuomo and the State Legislature created the Clean Water Infrastructure Act (CWIA), to fund a number of clean water initiatives from the 2017 state budget, including an initial $20 million for lead service line replacement in the ten regions of the state; this was also the first tranche of funding the City

Photo credit: Luis Tosta

of Newburgh received, in the amount of $500,000 to start their program. In November 2022, voters in New York State approved a $4.2 billion Clean Air, Clean Water, Green Jobs Bond Act, which includes $650 million for water quality improvements including $200 million in funding for lead service line replacement, which will be allocated through the CWIA.

Ohio

In 2019, Governor Mike DeWine launched a program called H2Ohio, a water quality program that includes a focus on lead contamination. In August 2022, the H2Ohio initiative announced an investment of an additional $1.5 million in a second round of funding to help local communities identify, inventory, and map lead service lines in the state, building on $2.1 million in the first round of this funding announced earlier in the year to help 48 public water systems in 31 counties develop inventories through grants of $50,000 each. Prior to this, the program awarded six communities with almost $2.2 million to remove and replace a total of nearly 500 lead service lines, with additional funds focused on replacement efforts at childcare facilities in Cincinnati and Cleveland.

CASE STUDY

Connecting communities to funding through the Funding Navigator

EPIC's research, published in 2021 with the University of Michigan, indicated that only 7.1 percent of eligible systems have accessed the Drinking Water State Revolving Funds (DWSRFs) over the last decade, and small and racially diverse communities were even less likely to access this funding. The nearly $50 billion for State Revolving Funds (SRFs) in IIJA—in addition to other public funding—represents a once-in-a-generation opportunity to enhance equity and resilience by ensuring these funds reach utilities that serve overburdened communities and finance climate resilient and community centered projects—and projects that replace lead pipes quickly and equitably. EPIC and our national partners (Anthropocene Alliance, Communities Unlimited, Greenprint Partners, Moonshot Missions, and Southwest Environmental Finance Center) launched a Funding Navigator in 2022 to help communities seek and secure SRF and other water infrastructure funds, focusing primarily on three regions—Southern Region in Arkansas and Mississippi, Midwest Region in Illinois and Michigan, and Mid-Atlantic Region in New Jersey and Pennsylvania. In November 2022, EPIC was selected by the EPA as a national Environmental Finance Center which will expand our collective efforts to connect more communities to the funding they need to advance equity and resilience.

CASE STUDY

Three cities—and three different funding sources

Three cities EPIC has partnered with have all secured funding through different sources, and continue to explore other sources. This piecing together of different funding sources is a strategy many other municipalities will most likely have to follow, especially to ensure infrastructure costs are not passed on to ratepayers. Chelsea, Massachusetts secured funds from the Massachusetts Water Resources Authority (MWRA) Lead Loan Program (LLP), supplemented by the city's capital improvement funds. As one of the 47 eligible communities for the MWRA funding, Chelsea received $100,000 in FY2019 to launch its lead service line replacement program, $300,000 in FY2020, $300,000 in FY2021, $300,000 in FY2022 ($1 million total), with another application in the pipeline. Newburgh, New York received initial funds from the state, and this year, took the initiative to use $1 million of their ARPA funds for lead service line replacement. The Village of Hazel Crest, Illinois received word in 2022 that it is on the state's intended funding list to receive $4 million of principal forgiveness loans to launch their LSLR program, which was part of the Illinois WIFTA transfer of $108 million to the state's DWSRF, and begin to replace their estimated 2,700 lead service lines at a total estimated cost of $22 million to 27 million.

CASE STUDY

Financing through bonds

There are several kinds of bonds—municipal bonds, green bonds, and environmental and social impact bonds. The advantage of municipal bonds, called "munis," is that the interest earned is usually exempt from federal and state income taxes, and therefore represents a low-cost source of capital that are commonly used by local governments for capital water infrastructure improvements. A perceived barrier that municipalities may see for using these funds for lead service line replacement is whether and how to use municipal bonding in connection with private property—in particular private side replacements. WaterNow explains in its Tap Into Resilience Toolkit and video how municipalities may be able to use municipal bonds for distributed infrastructure, including LSLR on private property, using an often overlooked accounting measure called General Accounting Standards Board (GASB) #62.

In addition to municipal bonds, impact bonds represent a borrowing and procurement structure that could help maximize private sector and municipal bond financing—and supplement other public funding sources. Municipal bond investors are increasingly interested in the triple bottom line and the positive externalities associated with social and health benefits such as lead-free water. Though the City of Newark initially planned to replace their lead pipes in a decade, the Essex County Improvement Authority in 2019 decided to bond $120 million to speed up the process. There are additional policies and factors that led to Newark's success, but the funding played a major role. A combined muni/impact bond or a muni bond/SRF funding approach could provide a municipality with an immediate way to get dedicated capital flowing into LSLR programs.[21]

21 Cunningham, M. Echoing Newark: How American Cities Can Replicate Newark's Success in Replacing Over 23,000 Lead Pipes in Under Three Years.

CASE STUDY

Role of the banking sector in LSLR

The role of banks in LSLR is an important one, due to their role in community development financing. The Federal Reserve Bank of Chicago, in particular, has stepped up its efforts to leverage its expertise in public policy, finance, and community economic development to address this issue, through a series of blogs and other materials, including encouraging advocacy earlier in the year around the Community Reinvestment Act (CRA) which addresses redlining and other systemic inequities in access to credit, investment, and banking services faced by low and moderate income communities. Read this EDF blog on a recent convening on LSLR organized by the Federal Reserve Bank of Chicago for more information.

8 Advance equity, innovation, and efficiencies through contracting and better procurement.

The process of contracting and procurement is an important opportunity to advance policy change and ensure a break from past policies that have not necessarily benefited communities.

Establishing bid criteria

As a key part of the contracting and procurement process, bid documents include the plans, specifications, and estimates to describe all of the elements of the project, and serve as the contract between the municipality and the contractor, and monitoring and compliance to adhere to a range of federal, state and local laws and regulations. The procurement process and bid documents drafted and circulated by a municipality dictate the how, when, where, and who of the lead service line replacement program, and therefore dictate much of how the program will unfold.

The contracting and procurement process can ensure a focus on everything from guaranteeing prevailing wages for contractors and ensuring a focus on local workforce training and development to prioritizing local, women, and minority-owned businesses where state procurement law permits, cost-saving measures, and aggressive timetables. That said, many states take a narrow approach to establishing eligible bid criteria, the specific information upon which a bid can be evaluated in addition to the lowest bid. The parameters of state requirements need to be understood thoroughly when attempting to set local and equity targets.

CASE STUDY

Setting policy through procurement

Contract deadlines and length of contracts: The length of contracts can be shortened over time to push contractors to do the job faster, which can also reduce costs.

Bid design: Several contracts can be out at the same time or within a shorter period of time, to ensure competitive bids.

Workforce goals: When permitted by the state and further strengthened when codified in state policy, bid documents can set goals for a local labor force and include the minority and women employee workforce as well as minority and women-owned business enterprises (MWBE). Such programs exist in most states. Chelsea, Massachusetts, for example, required that "the bidder shall make positive efforts to achieve (1) a minority employee workforce hour goal of 10.00 percent, (2) a woman employee workforce hour goal of 6.90 percent, (3) a goal of 7.24 percent participation of Minority owned Business Enterprises (s), and (4) a goal of 3.60 percent participation of Women-owned Business Enterprise(s) within project contracts" according to their bid documents. If permitted by state law, these goals can—and should—be set higher, to ensure the workforce is more representative of the community it serves. The BlueGreen Alliance has user guides for both the Bipartisan Infrastructure Law and the Inflation Reduction Act on how to improve the workforce without sacrificing environmental progress.

Safety and training standards: Municipalities generally have the authority to establish basic safety or training standards for contracts for specialized work in order to ensure bidders have the skilled workers to complete the job successfully. These might include Occupational Safety and Health Administration (OSHA) 40 certifications for workers, or for contractors, proof of participation in a training or registered apprenticeship program.

Contract scale: To encourage economies of scale and attract experienced contractors while also allowing for smaller MWBE business participation, municipalities may consider creating tranches of work at different scales. Some contracts may solicit bids for a large number of units (e.g. 2500 or more) while a few contracts solicit bids for a smaller number of units (e.g. 500 or less).

Wage standards: Bid documents should ensure contractors are aware of the locally required prevailing wage rates which will in part be the basis of their bids. Federally-assisted water infrastructure construction is subject to the Davis-Bacon Act. Currently, 26 states also have a state prevailing wage requirement for public works that include state funds.

Contract incentives: Incentives to do the work faster can also be included in bid documents. For example, Benton Harbor established an incentive program in which a contractor was paid an additional $1000 per day for up to 100 days for each zone that was finished before April 19, 2022, which was earlier than the 18-month timeline set by the state.

CASE STUDY

Apprenticeship and workforce development partnership with labor[22]

Finding the necessary workforce who can help replace the nation's six to ten million lead pipes is no small feat, but is possible with groups like the Laborers' International Union of North America (LIUNA) at the national level poised to make this happen. In Newark, for example, the city was faced with six percent unemployment when it launched its lead service line replacement program. City leaders established a special training program to prepare dozens of local residents for the work—and to ensure more of the laborers were representative of a city that is a majority Black (50 percent) and Latino/a/x (36 percent). The residents were trained as laborers in partnership with LIUNA Local 472. The city also focused on hiring minority and women-owned business enterprises (MWBE) in contracts. These actions not only helped the community—by hiring local workers, ensuring funding stayed in the community, and creating a figurative pipeline to future careers—but also helped build greater trust with the community. In a January 2021 interview with Newark Water Department Director Kareem Adeem, he said that it also made the actual work easier because local laborers often knew the residents with whom they were dealing and the houses where they were trying to gain entry.

CASE STUDY

Contracting and procurement in Benton Harbor, Michigan

In the case of Benton Harbor, Michigan, the city's engineer divided the city into 12 sections and ultimately chose five contractors, who were required to complete work simultaneously across the 12 city sections. Due to the speed in which Benton Harbor aimed to replace its lead pipes, originally an 18-month timeline established by the state, speed was favored over local contracts: Only one contractor was local to Benton Harbor while one was from Wisconsin and three were from other Michigan cities. Benton Harbor was, however, able to replace nearly 100 percent of their lead service lines at the time of this report, partially due to having experienced contractors who worked in several zones around the city.

22 Cunningham, M. Echoing Newark: How American Cities Can Replicate Newark's Success in Replacing Over 23,000 Lead Pipes in Under Three Years.

Photo credit: CMU Public Broadcasting

Innovative strategies for contracting and procurement

Lead pipes exist in an estimated 11,000 communities across the country, managed by thousands of public (and private) water utilities. This decentralization is a challenge for smaller and overburdened utilities that are already confronted with a range of other water quality impairments and supply issues—in addition to lead pipes. For these 11,000 communities to prepare and submit individual applications for funding and undergo individual contracting and procurement processes is highly inefficient, and could add years—if not decades—to the goal of replacing the nation's lead pipes in the next decade. Smaller municipal water utilities may have only a few lead pipes, in unknown locations, making it especially difficult for them to justify the work of submitting a complicated and costly funding application for a small amount of funding to cover the costs of locating and replacing those few pipes.

Since many of the communities around the country may not have the enormous number of pipes like we see in big cities and may in fact have a much smaller number of pipes, we encourage communities to self-aggregate to replace pipes under one procurement contract, which would create efficiencies of scale and cost savings.

As outlined in EPIC's 2021 report, Replacing Toxic Lead Water Pipes Faster, additional procurement and financing approaches are needed to complement traditional State Revolving Fund and other publicly-funded projects. Public Private Partnerships (P3s) and Community-Based Partnerships (CBPs) are a procurement approach that could more effectively target lead service lines in disadvantaged communities, overcome application and administration barriers that small water utilities face in dealing with SRF loans and grants, and speed the immediate deployment of capital to replace lead pipes faster. Pay for Success or Outcome Contracting authority and initiatives are needed in more states to allow contractors to be paid cost-effective rates for documented replacement of lead pipes. Like P3s, Pay for Success contracts can be set up to reward and prioritize pipe replacement in overburdened communities. They can also help create positive price pressure to ensure that new funding goes as far as possible. In order to use these tools, bureaucratic hurdles need to be removed and policymakers need to enable states to make multi-system applications eligible and accessible so that entities can self-aggregate to replace pipes under one SRF loan/grant, which would create efficiencies of scale and cost savings in the long run.

CASE STUDY

Can Public Private Partnerships (P3s) and Community-Based Partnerships (CBPs) be applied to lead service line replacement?[23]

P3s and CBPs are a procurement approach used in other sectors that could more effectively target lead pipes in disadvantaged communities, help water systems overcome administrative barriers, and speed up the immediate deployment of capital. An example of a successful P3 in the water sector is the Clean Water Partnership in Prince George's County, where 24 municipalities were brought together starting in 2014 under one project with Corvias to address stormwater regulations, creating efficiencies and cost savings through economies of scale in addition to providing additional community and environmental benefits. Perhaps just as important as addressing the environmental and regulatory requirements for stormwater management, roughly 81 percent of the work has been carried out by county residents, going to local and minority owned firms (as opposed to 20-25 percent for most projects). EPIC would like to see this kind of innovative partnership be applied to help aggregate multiple communities in a region who all need their lead pipes replaced in a single, third-party contract.

CASE STUDY

Using 'pay for success' for lead pipe replacement[24]

Pay for success contracting is a mechanism that can be set up to reward and prioritize lead pipe replacement in burdened communities and create positive price pressure and agreed-upon fixed costs for identification and replacement to ensure that new funding goes as far as possible. A lead pipe pay for success contract could establish a fixed price for any pipe replacement, leaving contractors and subcontractors to manage all aspects of finding and replacing pipes. The contract could also be used to support development of an inventory of service lines and cost effectively finding or predicting service lines made of toxic lead. For example, a city could use a pay for success contract with a company using a model to predict the location of lead service lines but link payments to the company to the successful identification of those lines, confirmed when replacement activities take place.

23 Male, T. et al. (2021). Replacing Toxic Lead Pipes Faster: Innovative Procurement and Financing Approaches Are Just as Important as Federal Funding. [online] Environmental Policy Innovation Center. Available at: https://www.policyinnovation.org/publications/replacingtoxicleadwaterpipesfaster

24 Ibid.

Photo credit: Markus Winkler

9 Advance policy changes to ensure equitable distribution of funds.

Effective and equitable lead pipe replacement requires strong policies at all levels of government. The following are some key policy changes and legislation that municipal, state, and federal policymakers can enact.

Local and State Policy

Passing local legislation through ordinances can help pave the way for proactive, faster, and more equitable lead pipe replacement—and ensure enforcement of the policies that are then codified in local law and not subject to volatility related to utility management or electoral politics. A few aspects in municipal ordinances are especially important, such as mandating full service line replacement, granting the right of entry to a property even if the owner does not grant it (especially in communities with high numbers of renters), ensuring lead pipe replacement at the time of real estate or tenant transfer, and coupling the ordinance with a program that reimburses homeowners with 100 percent of the replacement costs.
Using Newark as a model, EPIC created a template for cities to develop ordinances that can be found here. NRDC also has a model ordinance found here. EPIC's version includes information on the city including the number of lead service lines, and the cost of the program while NRDC's is more concise. However, they both include vital information such as allowing tenants to give consent to replace lead service lines.

A handful of states have taken proactive approaches to completing requirements under the Lead and Copper Rule, serving as models for others. And still others have legislation in the pipeline.

Photo credit: Pixabay

CASE STUDY

Examples of municipal ordinances[25]

- **Newark, New Jersey:**[26] Newark's ordinance was passed by its City Council in 2019, at the start of their lead service line replacement program. In the first provision after definitions, the ordinance declares, "It is hereby established that the existence of lead service lines is prohibited in the City of Newark." The ordinance requires homeowners to either register in the city's lead service line replacement program at zero cost or to independently replace the lead service line within 90 days of the ordinance's effective date. The ordinance includes a provision that allows the city to enter a home to inspect or replace the service line, regardless of whether a homeowner approves replacement. In a city where the homeownership rate is only 22.3 percent, this was important to ensure an occupant of a property would be held harmless and not penalized for allowing the right of entry. The ordinance also requires proof of replacement at the time of real estate transfer or sale. In sales of city-owned properties, the buyer is responsible for replacing the lead pipe within 90 days by enrolling in the city program or replacing the line on their own and at their own expense. The Newark ordinance was later backed by state-level enabling legislation in New Jersey, which allowed municipalities throughout the state to adopt an ordinance to enter properties to perform LSLR.
- **Eau Claire, Wisconsin:** The City of Eau Claire, Wisconsin—like a handful of other small to medium cities—also passed an ordinance on mandatory lead service line replacement, declaring that "the city's water service is an interconnected system and lead in any service line is a potential contaminant throughout the system." Milwaukee also has a city ordinance, which requires full service line replacement under certain conditions and to prevent partial replacements. A number of other cities in Wisconsin such as Madison and Menasha have also passed ordinances.
- **Malden, Massachusetts:** The focus of an ordinance in Malden, Massachusetts is primarily during real estate and tenant transfers or during larger construction projects. Property owners are required to provide a certificate from the city that they have a lead-free service line prior to the sale of the property or when someone applies for a building permit for a project with a value of over $30,000. Similarly, the property owner has to provide the certificate of a lead-free service line in addition to performing a water test when renting a property or when there is a transfer of tenants in an owner non-occupied multi-family property. According to their website, the city offers no-interest loans to homeowners who qualify for the program.
- **Benton Harbor, Michigan:** Benton Harbor passed an ordinance in February 2022, mandating lead service line replacement across the city. Benton Harbor had been grappling with a water crisis with elevated lead levels in their samples, forcing water customers to rely on bottled water. The ordinance replicated the Newark ordinance nearly verbatim, with a few minor changes, including extending the replacement time from 90 days to 180 days if an owner chooses to opt out of the city program, and with different penalties for noncompliance.

25 Egorov, O. and Cunningham, M. (2022). A policy role cities can play in replacing lead pipes faster and equitably. [online] Environmental Policy Innovation Center. Available at: https://www.policyinnovation.org/blog/a-policy-role-cities-can-play-in-replacing-lead-pipes-faster-and-equitably

CASE STUDY

New Jersey LSLR legislation[26]

In July 2021, the New Jersey Governor signed A5343 into law to dramatically reduce lead exposure. The legislation sets a 10-year target for water systems to replace their lead lines, with several mandates already underway. The law sped up the window for inventories outlined in the Lead and Copper Rule Revisions (LCRR) by requiring several stages of information to be sent to the state in a tighter timespan, giving public water systems only 60 days to submit an initial count of the number of lead service lines and unknown service lines. Along with this, the water systems are required to submit an initial lead service line inventory including information about the line's composition and location within six months that is intended to be updated within the first year and re-updated every two years until all lead service lines are replaced. Within a year of the law, water systems must use their inventories to create an initial plan for replacing all service lines between 10 and up to 15 years. Additionally, notification requirements in this new law for systems serving over 3,000 customers include making the most recent inventory available on the water system's website or otherwise publicly available in smaller systems. The law also requires that within 30 days of submitting an initial inventory to the state, water systems must notify all customers and off-site property owners through written notice. Landlords are required to provide a hard copy of the notice to their renters and post the notice in a common area of the building. For municipalities where a primary language other than English is used by ten percent or more of the residents, the water system is required to provide the notice in English as well as those additional languages. The law further bans partial lead service line replacements, except during an emergency or water main replacement, and partial lead replacements do not count towards the replacement rate.

CASE STUDY

Michigan LSLR legislation[27]

In June 2018, the State of Michigan updated their Lead and Copper Rule, intending to minimize lead levels at an expedited speed, and the law's provisions mandate a submission of a preliminary inventory by January 1, 2020 with a final inventory submission by January 1, 2025 updated every five years. Michigan reduced the lead Action Level of 15 ppb to 12 ppb, effective January 1, 2025. Michigan strengthened requirements for LSLR, including the ban of partial lead service line replacement.

CASE STUDY

Illinois LSLR legislation[28]

The Lead Service Line Replacement and Notification Act (Public Act 102-0613) went into effect on January 1, 2022, requiring more stringent guidelines on lead service line replacement, including mandating LSLR replacements during water main replacements, and mandating that inventories be developed by 2022 and submitted by 2023 and LSLR plans submitted by 2024 and annually after that.

26 Egorov, O. and Gonzalez, B. (2022). States act to get the lead out faster: Will they be better poised to access federal funding? [online] Environmental Policy Innovation Center. Available at: https://www.policyinnovation.org/blog/states-act-to-get-the-lead-out-faster-will-they-be-better-poised-to-access-federal-funding

27 Ibid.

28 Ibid.

Policy Reforms

Since IIJA was signed into law in late 2021 and EPA issued its initial guidance, Memorandum: Implementation of the Clean Water and Drinking Water State Revolving Fund Provisions of the Bipartisan Infrastructure Law in March 2022, EPIC has continued to highlight the need for several policy reforms to ensure that the new federal funding is utilized most efficiently and equitably.

EPIC continues to highlight several aspects of policy and regulation to be strengthened and clarified at the federal, state, and local level with regard to LSLR:

- *Encourage the use of all funding to cover 100 percent of private side replacement costs:* EPIC encourages all funding entities to unequivocally enable private side replacements at no cost to property owners, to eliminate the disparities that arise when homeowners are burdened with some or all of the costs.
- *Expand the definitions of lead:* EPIC believes that lead connectors and galvanized steel that has been downstream of a lead pipe—which can be up to several feet in length—must be replaced, since they can also pose a danger to drinking water. On the policy side, this expanded definition should be included in the forthcoming Lead and Copper Rule Improvements (LCRI). On the funding side, though EPA clarified that lead connectors are eligible expenditures with the IIJA funding, state policymakers should also clarify to SRF applicants that LSLR funding can be used to replace galvanized steel that has been downstream of a lead pipe. While SRF funds cannot be used to replace internal plumbing fixtures, these remain a risk to human health even when LSLs are replaced, and states and localities should begin to identify funding to help replace them too.
- *Allocate LSLR funding equitably across states:* LSLR and other infrastructure funding through DWSRFs is allotted to each state via a formula based on periodic Drinking Water Infrastructure Survey and Needs Assessments (DWISNA). While the DWISNA in 2020 included for the first time an assessment of LSL needs, the EPA used the DWISNA from 2015 to allot LSLR funds from IIJA to states. As a result, the state allocations of LSLR funds do not correspond to states' true lead pipe burden. This disparity is demonstrated in this table prepared by the Metropolitan Planning Council, which shows how allotments for lead service line replacement could be restructured if based on the actual number of lead pipes per state. Illinois, for example, has the highest number of lead lines of any state with 730,000, but the $565.5 million planned allotment to the state represents only a fraction of the need (based on EPA's average cost of $4,700 per pipe replacement). EPIC believes that EPA should be using the data from the most recent DWISNA and adjust the allotment formula for the remainder of the IIJA LSLR funds accordingly. State advocates (e.g. New Jersey's congressional delegation) are also making this case for the allocations of the LSLR funds to match the LSL burden.

In addition to these recommendations on lead, EPIC is also working on state SRF policy reform, and submitting public comments on state Intended Use Plans (IUPs) in collaboration with state advocates. IUPs are important policy documents in which states set out the policies that determine how they will allocate SRF funds, including which kinds of projects and communities are prioritized for additional subsidies such as principal forgiveness and grants, interest rates, and other terms for SRF loans. EPIC's key recommendations related to IUPs include:

- *Offer a zero percent interest rate:* States should offer a zero percent interest rate on SRF loans for all LSLR projects, which would greatly facilitate faster LSLR around the country, at a lower cost for communities that need to repay LSLR loans.
- *Reform how disadvantaged communities are eligible for SRF principal forgiveness* and grants as well as other policies that determine how principal forgiveness is distributed. IIJA requires states to issue 49 percent of LSLR funds to "disadvantaged communities" as forgivable loans or grants. How "disadvantaged communities" are defined is determined by state policy. States also make other choices about how principal forgiveness is distributed, including how projects are ranked for the distribution of principal forgiveness and caps on the amount of principal forgiveness each community can receive. These policies, which go to the heart of the equitable distribution of SRF funds, are outlined in state IUPs. Accordingly, these state policies are a primary focus of EPIC's advocacy related to the distribution of SRF assistance, which is starting to yield important policy reforms in some states, such as Wisconsin. Further work, though, is needed to ensure all relevant state policies are fully aligned with equity objectives.
- *Allow the census blocks served by LSLR projects to qualify as "disadvantaged communities."* Typically, disadvantaged community criteria are applied to the whole service area of the water system applying for SRF assistance. For large metropolitan water systems that serve affluent areas as well as relatively impoverished areas, this might have the effect of rendering low-income urban neighborhoods—which in many cases have the oldest water infrastructure and highest lead burdens—ineligible for principal forgiveness. To rectify this problem, states should consider their disadvantaged community criteria in relation to the census blocks for which the LSLR project is proposed, rather than to the whole service area of the water system.

EPIC has continued to highlight the need for several policy reforms to ensure that the new federal funding is utilized most efficiently and equitably.

Photo credit: Giambra

- *Maximize the use of set aside funds for LSLR pre-construction tasks:* LSLR pre-construction tasks can include developing inventories, creating criteria for prioritization of replacement efforts, designing and planning projects (including procurement of supplies and contractors), conducting outreach to building owners and tenants, drafting and adopting municipal ordinances to regulate the LSLR work, and supporting the development of a local workforce to undertake LSLR projects. States can set aside up to 26 percent of their federal grants for LSLR pre-construction tasks, and they should be encouraged to do so—using the full LSLR set asides for these critical tasks. This, in turn, can reduce the project costs to be covered by SRF loans and principal forgiveness and create further efficiencies. Using set asides for LSLR pre-construction can also improve the principal forgiveness versus loan ratio, thus ensuring municipalities have to borrow less. This will reduce the burden of LSLR for ratepayers who would otherwise have to repay loans for LSLR. Since some communities may be reluctant to borrow funds for LSLR, this will also ensure broader take-up of the LSLR funding.
- *Track funding:* In collaboration with Environmental Defense Fund (EDF) and the Massive Data Institute (MDI) at Georgetown University, EPIC launched an effort to monitor and track the new influx of IIJA funding for LSLR to understand how states intend to prioritize their state allocations through IUPs and which communities are on states' Priority Project Lists (PPLs). Over the long term, though, EPIC would like to see improvements in the way states and the EPA report back to the public on this data. Specifically, we urge EPA to ask states to track their own data for each SRF project—especially noting whether the funding is principal forgiveness or loans—and make this information publicly available in each state. Further, if EPA required standardization of this information and encouraged states to provide their Project Priority Lists in the form of excel or csv files instead of PDFs, it would be most cost effective for EPA to collect and share data at the national scale.

10 Match the pace of lead pipe replacement with the urgency of the problem.

Some critics have said that replacement of the nation's lead pipes will take a much longer time than the ten years that many have proposed, particularly with regard to inadequate inventories, the slow nature of government bureaucracy, and a supposed lack of plumbers and construction workers. Some of the recommendations in the report, we recognize, do take time—specifically the attention that is needed to build trust with communities, especially in places which have experienced water contamination crises in the past, and to develop meaningful and intentional partnerships to do this important work. It's certainly possible that it will take longer, especially when one sees the slow start in a city like Chicago—with 80 percent of households with lead pipes, the highest number of lead pipes in the country, and more lead pipes than New York which has 360,000 across the whole state. Despite this, Chicago's replacement rate has been staggeringly slow, replacing only 154 of their 400,000 lead pipes in a year—a pace that will ensure lead pipes will stay in the ground for a long time in the city. By comparison, Newark replaced 23,000 pipes over three years, averaging at about 21 replacements per day; Madison, Wisconsin replaced 8,000 pipes over ten years, averaging at about two replacements per day; Lansing, Michigan replaced 12,000 pipes over 12 years, averaging at about three replacements per day; and Benton Harbor, on the cusp of completing replacements at the time of this report, is averaging approximately 11 replacements per day. Newark, Benton Harbor, and other cities have shown that faster is possible, when momentum and best practices are in place.

With a recent analysis showing that one in 20 tap water tests performed for thousands of Chicago residents with lead above EPA action levels, the price of stagnation—and the price of slow—is simply too high, especially when we have the solution within reach. Unfortunately, Chicago is not alone in this—there are likely numerous cities across the country with elevated lead levels. The public health costs related to these elevated levels are not something we can ignore; lowered IQs, increased heart disease, lowered economic activity, higher welfare costs, and higher criminal justice system costs have all been linked to prolonged lead exposure and poisoning.[29] The additional health and societal benefits of replacing lead pipes likely amounts to billions of dollars.

Today, the momentum is on the side of faster, more efficient, and more equitable lead service line replacement—a momentum we have not seen before in our lifetimes. Even the federal government is talking about acceleration in everything from permitting to procurement, design to construction. Though slow is the easiest path forward, we cannot afford to see our children and our most vulnerable residents—or anyone in this country—dealing with the devastating effects of lead poisoning when the solutions are at hand. We need to seize this momentum and these available solutions, and ensure the next generation lives in a country with safe, lead-free drinking water for all.

29 Muennig, P. (2016). The Social Costs Of Lead Poisonings. [online] Health Affairs. Available at: https://www.healthaffairs.org/doi/10.1377/hlthaff.2016.0661

Photo credit: Kerem Karaarsian