

# REPLACING TOXIC LEAD WATER PIPES FASTER

Innovative Procurement  
and Financing Approaches  
Are Just as Important  
as Federal Funding

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**Acknowledgement:** The report benefitted from comments and feedback from Sridhar Vedachalam, PhD, and Katy Hansen, PhD.

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**Suggested citation:** Timothy Male, Maureen Cunningham, Sean Agid, Eric Glass, Shawn Kerachsky, Sanjiv K Sinha, and Tee Thomas. 2021. “Replacing Toxic Lead Water Pipes Faster: Innovative Procurement and Financing Approaches are Just as Important as Federal Funding” Environmental Policy Innovation Center, Washington D.C.

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Support for this report was provided by the Robert Wood Johnson Foundation. Views expressed here are those of the authors and do not reflect the policy or positions of the Robert Wood Johnson Foundation.

# Executive Summary

No one has produced an estimate for how many lead service lines—drinking water pipes made from the toxic metal lead—are being replaced per year today. Our back-of-the-envelope estimate, based on the handful of cities and water utilities that have provided data publicly, is that there are fewer than 100,000 lead pipes being replaced per year. If there are roughly 10 million lead pipes across the United States, at this rate, it will take 100 years to replace them. If the goal is to replace them all in 10 years, as some policymakers have promised, we must figure out how to ramp up from 100,000 pipes replaced per year to one million pipes very quickly.

Expansive and generous new federal funding for lead pipe replacement proposed by the Biden-Harris administration and Congress is a big step forward. However, the federal funding—as it is structured now—does not guarantee that the money will reach the communities who need it most and does not guarantee that lead pipe replacement will happen any faster.

In addition to federal funding and policy, we believe that at least three other procurement and financing tools are critical to rapidly accelerate the speed of lead pipe replacement to take advantage of soon-to-be-available and currently available funding:

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**Procurement is the set of processes by which the government acquires the goods and services it needs from businesses.**

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- Statewide or regional **Public Private Partnerships (P3s) and Community-Based Partnerships**, operating across dozens of small to mid-sized cities and water utilities, is 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 State Revolving Fund (SRF) loans and grants, and speed the immediate deployment of capital to start replacing lead pipes now.
- **Pay for Success or Outcome Contracting authority and initiatives** are needed in more states to allow businesses from individual plumbers to major construction companies to be paid a predictable and cost-effective rate for documented replacement of lead pipes. Like P3s, Pay for Success contracts can be set up to reward and prioritize pipe replacement in burdened communities. They can also help create positive price pressure to ensure that new funding goes as far as possible and make it more likely that average replacement costs are closer to the \$5,000 per pipe replacement cost the Biden administration used to estimate needed funding than the [\\$27,000](#) that some cities have considered in pricing replacement services.
- **Environmental and Social Impact Bonds** are a borrowing and procurement structure that could help maximize the private sector and municipal bond financing contribution that could operate side-by-side with new federal State Revolving Fund (SRF) appropriations to greatly increase the available capital to replace more lead service lines in more neighborhoods and schools, while also providing an overlapping set of benefits to P3s and Pay for Success contracting.

Each of these tools are complimentary to new federal revolving fund appropriations or other state financing, but all need more encouragement from Congress, the Biden-Harris administration, and state leaders. If that encouragement comes, there is a bright future ahead for America's efforts to eliminate the lead risk faster from drinking water in millions of homes and schools.



# Introduction

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Millions of toxic lead pipes carrying our drinking water have no place in the modern world.

Acknowledging this problem, President Biden has made [their removal](#) a priority, which entails replacing [6-10 million lead pipes](#) dispersed across an estimated [11,000 communities](#), many of them in low income communities and communities of color. Even with this top-level commitment, however, the challenge is how to make these promises a reality.

Until we replace them, these pipes—composed of the neurotoxin lead—remain a public health hazard. Lead contamination crises have already happened in Flint, Michigan, Washington, DC and Newark, New Jersey. However, lead risks affect many more communities. And the public health cost of inaction is 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.

Lead pipe removal is an economic win. A mere \$5,000 investment in replacing one lead pipe can yield up to [\\$22,000](#) per pipe or \$205 billion cumulatively in benefits related to reduced cardiovascular deaths for adults alone. These figures do not take into account additional health and societal benefits, which is likely billions more.

On top of the public health costs is the related decline in public trust in water supplies, that has a difficult cost to evaluate: nearly [60 million Americans](#) have stopped trusting their drinking water, a third of them since the Flint lead contamination crisis, and many have resorted to drinking bottled and filtered water in recent years. Many people have stopped drinking their tap water even when there are no lead pipes in their home or community, simply because crises elsewhere have destroyed their trust in tap water.

It is likely that more taxpayer-backed loans and grants are coming soon. However, new federal funding is only part of the solution—two other aspects are important. First, how to help thousands of smaller water utilities who might have only a few lead pipes and have never used these complex-to-apply-for sources of federal funding. Second, even for communities well-placed to tap into new funding, getting lead pipes replaced faster is a public health opportunity but faces the obstacles of often-slow public procurement processes.

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Water policy and management in the United States remains highly decentralized, overseen by upwards of 50,000 water utilities, compared to just 3,300 electric utilities nationwide. This decentralization places a burden on smaller and under-resourced utilities that are already weighed down by other water quality impairments and supply issues. In addition, contracting and procurement at an individual utility level for likely thousands of water utilities with lead service lines will inevitably be inefficient, the end result being decades before we see the last of toxic lead pipes in our country based on current and estimated rates of replacement. Another problem is that many water utilities don't know if they have lead lines, where they are, and how to remove them. And at times, they probably don't want to know, realizing that this will only add to the list of unfunded water infrastructure upgrades needed in their communities, which adds up to a whopping [\\$472.6 billion](#) up to [\\$1 trillion](#) for utilities across the country. The lead service lines that need to be replaced often include a portion owned by a homeowner or landlord in addition to the portion owned by the utility, further complicating the otherwise straightforward task of replacing lead pipes. And lastly, a lengthy revision process on a federal [EPA Lead and Copper Rule](#) which will have been delayed and is now to be [put into effect in December 2021](#) is creating uncertainty and slowing proactive investment in lead pipe mapping and removal: essentially the government is dangling the carrot but has temporarily put down the stick.

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**It's conceivable that replacing all lead pipes in this country could take an entire lifetime or more.**

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Under current conditions, it's conceivable that replacing all lead pipes in this country could take—not a decade as some have said—but in fact in an entire lifetime or more. So, how do we ensure lead service line replacement happens faster, so people no longer have to drink water contaminated by lead? How do we drive efficiencies so that we don't have to wait so long to solve a problem that has a relatively straightforward solution? What efficiencies can we put in place, in addition to the funding, that have been proven to be effective in other spheres, like procurement and contracting reforms, public private partnerships and the use of intermediaries, pay for success contracts, impact investing, and others? How do we encourage other innovations that can also help speed up lead pipe replacement? This paper addresses some of the mechanisms that we believe can speed up lead service line replacement, some already in place and ready to go if we can just make them happen.

# State Revolving Funds: Why More Money Isn't Enough

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Much of the federal money, including an estimated [\\$11.7 billion from the bipartisan infrastructure package](#), will likely be distributed through the Drinking Water State Revolving Fund (DWSRF) loan program, which is the largest pot of federal funding designated for drinking water systems in the US. While the fund typically awards loans, approximately half of that funding must be made available as grants (that do not require payback).

A number of states already prioritize the use of State Revolving Fund (SRF) funding to pay for lead service line replacement, and many communities have made substantial progress in doing so. For example, after \$550 million in new funding became available in 2019,<sup>1</sup> in Wisconsin several cities are on their way to becoming lead-free in drinking water. [Green Bay](#) and [Eagle River](#) have removed the last of their pipes, Viroqua and Clintonville are aiming to remove all of their lead pipes this year, and [other cities](#) around the state are moving in this direction. Vermont, which transferred \$11 million, allocated this funding to help the [City of Bennington](#) cover roughly two-thirds of the estimated \$16 million needed to replace its lead service lines, but acknowledges that more is needed for other municipalities.

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**The complexity of program requirements make it difficult for small communities and water systems to qualify.**

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While federal infrastructure funding is certainly helpful for addressing the problem of lead in drinking water, federal and state practices in implementing the SRF program impose potential hurdles that will likely slow the pace of many projects to remove lead service lines and the complexity of program requirements make it difficult for small communities and water systems to qualify for and administer funding received.

For example, in a [newly-released report](#) with the University of Michigan, we evaluated over \$25.3 billion in aid provided to drinking water systems in the past decade through the SRF and found that only 7.1 percent of eligible drinking water systems have received assistance over the last decade. And low income communities and communities of color were less likely to receive assistance. We believe that more SRF funding is almost certain to increase the pace of lead pipe replacement in big cities and suburbs, but it's less clear that loans and grants will reach many of the smaller places that also have lead water pipes.<sup>2</sup>

1 The source of funds was the [Water Infrastructure Fund Transfer Act \(WIFTA\)](#) of 2019 which authorized a one-time transfer by states between the Clean Water State Revolving Fund (CWSRF) to the DWSRF for lead service line replacements.

2 Key changes to the DWSRF program or state legislation authorizing their programs would help, including expanding technical assistance to drinking water systems with limited fiscal capacity and limited ability to apply for funding, increasing the amount of additional subsidies distributed by states, and prioritizing projects – with technical assistance—in high poverty and historically under-invested communities. States and EPA could also consider designating communities with high percentages of lead service lines as disadvantaged, enabling those communities to automatically be eligible for principal forgiveness loans. Also, states could choose to take on the whole debt for lead service line replacement in their states, and amortize the replacement by frontloading the work with the power of the SRF, using grant payments as repayments on the loan.

In addition to many municipal and small water systems missing out on SRFs due to the complexity of application and eligibility process and program requirements, we worry about three other limitations of an SRF-only approach:



**Costs:** Available estimates of per lead line replacement cost vary from roughly \$2,000 to \$27,000 per pipe. State or federal SRF policy currently lacks any incentives or controls to ensure that replacement costs are reasonable and thus that new federal funding goes as far as possible toward replacing millions of pipes.



**Speed:** Every day that a family drinks water from a lead pipe that leaches any amounts of lead into drinking water is a hazard because experts have found there is no safe level of exposure to lead. The process of funding going from Congress and the US Treasury to the first groundbreaking for a lead line replacement is long. States must secure federal funding, issue and take public comment on new intended use plans, and award loans or subsidized assistance to water systems. Water systems, in turn, must use a public procurement process (i.e. contracting) to hire engineering, construction, or plumbing companies to replace lead lines, select winning bidders, and get contracts in place before replacements can start.



**Needle-in-a-haystack problems:** Communities with populations smaller than 50,000 to 75,000 may have only a few lead pipes, in unknown locations, making it difficult for them to justify the work of an SRF application for a small amount of funding to cover finding and replacing those few pipes.

There is no simple solution for any of these challenges, but we believe that additional procurement and financing approaches are needed to compliment traditional SRF-backed projects and can help minimize the impacts of each on the success of America's aggressive effort to eliminate lead from our drinking water systems.





# Innovative Procurement and Financing Solutions

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Although the State Revolving Loan Funds are a key piece of the puzzle, especially with a big increase in grant funding and much-needed changes to how those funds are distributed, more tools are needed to speed up the process of lead service line replacement and reach all communities and families exposed to them. Three additional procurement and financing tools being used in other environmental projects—public-private partnerships, pay for success contracts, and environmental impact bonds – can be applied to help communities replace lead pipes. These approaches take advantage of private interest in lead pipe replacement and impact capital, focus on replacement for burdened and under-resourced communities, and drive cost-effective investments. We believe these three strategies would transform the speed of lead pipe removal, especially across small and medium-sized water utilities and municipalities.

## Public Private Partnerships (P3s) and Community-Based Partnerships (CBPs)

Public private partnerships (P3s) and community-based partnerships (CBPs) have demonstrated their effectiveness in simultaneously achieving environmental and public health co-benefits while driving economies of scale and cost efficiencies, streamlining implementation, and enabling the public entity to transfer as much of the financial and performance risk to the private partner as desired. P3s and CBPs exist in many forms, but most involve a different negotiated mix of financial and project management roles and responsibilities and stronger incentives to achieve public health, environmental, or other outcomes.

The best P3 example relevant to lead pipe replacement is the partnership formed in 2014 between [Corvias](#) and Prince George's County, Maryland, called the [Clean Water Partnership \(CWP\)](#). Initially intended to address an unmet regulatory obligation under the county's MS4 permit, the Partnership has gone on to deliver over \$200 million in stormwater work at one-third of pre-partnership documented costs and is continuing to expand its scope over its 30-year term. To date, installed projects are expected to provide annual pollutant load reductions of nearly 60,000 pounds of nitrogen, more than 8,000 pounds of phosphorous, and 5.4 million pounds of suspended solids. Perhaps just as important as addressing the environmental and regulatory requirements for stormwater management, roughly 81 percent of the work was carried out by the county residents and went to local and minority-owned firms (as opposed to 20-25 percent for most projects).

A second example of a Community-Based Partnership is the [Fresh Coast Protection Partnership \(FCPP\)](#) in Milwaukee, Wisconsin, launched by the Milwaukee Metropolitan Sewerage District (MMSD) and Corvias. Kicked off in 2020, the intent of this partnership was to utilize green infrastructure as



an affordable alternative to grey infrastructure as a means of addressing combined sewer overflows and basement backups, while employing similar socioeconomic metrics as the CWP for the utilization of local and minority-owned small businesses to complete the work. With the pilot phase capturing roughly 8.5 million gallons of stormwater runoff, the FCPP aspires to capture roughly 750 million gallons over a 10-year period. The program has socioeconomic goals including that 50 percent of the projects will be prioritized in low-to-moderate income areas and 50 percent of construction and project activities will be contracted to local, small disadvantaged businesses.

Outside of big cities and suburbs, the work of replacing lead pipes is more likely to fall to a mix of small businesses—plumbers, excavators, and local construction companies—than to major construction firms. None of these firms may individually have the capacity to manage lead pipe replacement for the entire community. Having EPA, states or individual cities, towns and water utilities set up—collectively—tens of thousands of contracts is a procurement nightmare that itself could consume 10-30 percent of any federal funding and create many months of paperwork delays. A P3, such as the Clean Water Partnership, can bundle work across dozens of small water utilities and by dozens of contractors. In the case of the CWP, Corvias carried out work on behalf of 24 separate municipalities and Prince George’s County, enabling each of them to take advantage of the economies of scale and aggregation to achieve optimized pricing, performance guarantees, and other contractual benefits that they would never have been able to achieve on their own.

One of the real strengths of a P3 is for the public entity to be able to contractually mandate that the private partner train, work with, and support dozens or even hundreds of contractors to deliver the actual lead pipe discovery and replacement work. The CWP not only created contractor capacity to address the significant gaps that existed within the Prince George’s County workforce, but also trained and upskilled 39 firms through their mentor-protégé program and contracted with more than 160 other mostly minority-owned small businesses. These firms used the CWP as a catalyst to grow their business beyond that specific program and have gone on to support other major infrastructure programs in the region such as the Purple Line expansion of the Washington DC Metro.

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A P3 partner can also smooth out contract payment schedules. It might take a public agency anywhere from 60 to 180 days to pay contractor invoices – a delay that can be crippling to many small businesses. In the P3s in Prince George’s County and Milwaukee, the private partner provides all of the working, internal capital to ensure that the subcontracts are paid within 30 days, and holds the costs of waiting for public contract repayment on its own balance sheet.

***Imagining a Lead Pipe Replacement Public Private Partnership:***

*The state SRF-managing agency or another statewide agency enters into a performance-based contract with a private partner to deliver on the removal of 10,000-30,000 lead pipes over five years (i.e. \$50-150 million contract) in partnership with any public utilities that agree to work with the partnership. The public agency uses SRF grant funds to cover the contract and only releases payments as independent 3<sup>rd</sup> parties certify each pipe replacement. Further, in order to impact the most underserved communities, the program ensures that 50 percent of the pipes slated for replacement must be located in burdened communities and 50 percent of the work must be performed by local, minority, and woman-owned businesses.*

## Pay for Success Contracting

Pay for success or outcomes-based contracts are another procurement tool that should be used to facilitate and speed lead service line replacement. [Pay for Success \(PFS\)](#) is a way of binding government agencies and providers together in a multi-year effort to improve service delivery around a problem whose solution has identifiable metrics. These contracts have been used to address everything from [homelessness to criminal justice reform](#), but have not been used to reward successful lead service line replacement, to our knowledge.

In 2016, the State of California issued a Request for Proposals for a large-scale coastal marsh habitat creation project in part of San Francisco Bay and awarded \$12 million in contracts to carry out the work. The contract was structured such that the contractors would be paid as they successfully delivered on various milestones established by the state around the success of restoration, with 50 percent of payments reserved after construction is complete and ecological success criteria are met. This approach helped California avoid numerous costs and risks associated with using multiple contracts to first pay and then install projects and incentivized and was contracted at a lower price than other procurement approaches the state has used.

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**Lead pipe replacement is an incredibly easy project category to build into a pay for success contract.**

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In 2018, Congress passed the [Social Impact Partnerships to Pay for Results Act](#) (SIPPRa), which provided funding to the Department of the Treasury to support state and local government projects to produce quantified social benefits. For example, early in 2021, Treasury made a grant to New York State Energy and Research Development Authority (NYSERDA) that would provide up to [\\$8.2 million](#) in funding if the state was successful in increasing wages of low-wage workers in clean energy jobs.

Lead pipe replacement is an incredibly easy project category to build into a pay for success contract because it can either be measured by the visible removal of lead or by testing of drinking water in the home to which the pipe was connected. A lead pipe PFS contract could establish a fixed price for any pipe replacement leaving contractors and subcontractors to manage all aspects of finding and replacing pipes. A PFS 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 PFS contract with a company using a model to predict the location of lead service lines but tie payments to the company to the successful identification of those lines, confirmed when replacement activities take place.

### ***Imagining a Lead Pipe Replacement Pay for Success Contract:***

*State water quality administrators set up five to ten indefinite quantity/duration contracts for lead water pipe removal on private or public property, paying the contract per pipe costs for documented removals accompanied by a lead test of the water from the house or building from which it was removed. A diversity of established contracts could allow municipalities throughout the state to ‘piggy-back’ on the state-established contract and rates (where allowed under state law) and effectively create multiple ‘roving’ plumbing or construction businesses that are pre-approved to carry out service line replacements.*

## Environmental and Social Impact Bonds (EIBs and SIBs)

Municipal bond investors are increasingly aligning financial goals with social and environmental ones, i.e. the triple bottom line, to make an impact. The [advantage of municipal bonds](#), called “munis,” is that the interest earned is usually exempt from federal and state income taxes and they are therefore well-subscribed. Municipal bonds provide a low cost source of capital for local government to finance infrastructure projects.

In 2019, the [Essex County Improvement Authority in New Jersey](#) issued \$70 million in guaranteed municipal project bonds to help fund, alongside SRF support, the replacement of 18,000 lead service lines across the City of Newark over three years. To date, over 21,887 lines have been replaced, exceeding all expectations and ensuring that Newark residents do not have to drink lead-contaminated water. A combined muni bond/SRF approach like this doesn’t get past the contracting delays associated with any complex construction program, but this approach would provide an immediate way to get dedicated capital flowing into lead pipe replacement and could be especially relevant in larger cities and utilities that already have experience with SRF program applications.

A second and more recent [example](#) took place in June 2021, when the Buffalo Sewer Authority closed on a \$54 million environmental impact bond—the largest in the country to date—to finance green infrastructure and stormwater mitigation projects with an equity focus. Six priority combined sewer overflow basins that serve 48 percent of Buffalo’s 255,284 residents are the focus for these infrastructure investments, with the expectation that infrastructure installation will increase from approximately 9.5 acres per year during 2014-2020 to more than 28 acres per year from 2021-2027. According to Dr. Sanjiv Sinha of Environmental Consulting & Technology, Inc. (ECT), [what’s new about this project](#) is the improvement in risk sharing with a private partner, delivery and cost surety if performance goals are met, maximizing pricing efficiencies since performance is directly linked to payments, and additional social and environmental benefits to the city.

Environmental Impact Bonds could help bring additional capital into water utility efforts to replace lead service lines, and could be developed right now, instead of waiting for Congress to appropriate new funding for the SRF program. If impact investors were willing to take such risks, an Impact Bond could even be structured such that loans do not need to be repaid if Congress does not appropriate additional LSL funds within a certain period of time or the community is not awarded them.<sup>3</sup>

**Imagining a Lead Removal Impact Bond:** A dedicated effort is financed across bond issuance agencies, with support from the federal government and philanthropy, to set up dozens of municipal bonds in states with large numbers of lead service lines. The bonds are tied to health equity by having a requirement that all or a majority of the financing goes to communities that meet certain income and environmental justice criteria, such as the ones that Massachusetts has developed. EPA and states use the Drinking Water State Revolving Funds to double the muni bond funding available for lead service line replacement by providing a 1:1 match to the bond amount but as an SRF grant, not a loan.

<sup>3</sup> This approach is likely too risky unless Congress were to also authorize repayment (through the SRF) of any lead service line replacements that occur from 2021 forward, effectively allowing communities to get a head start on any LSL replacements and not having to wait for Congressional action each year, and then state program delivery of those funds.

# Conclusions

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To achieve widespread, equitable, and faster lead service line replacement around the country, including through some of the mechanisms described above, there are several necessary ingredients:



- **Prioritize disadvantaged communities:** Unless we make a concerted effort to focus on lead service line replacement in disadvantaged communities, it won't happen with our current funding programs and mechanisms. A goal of equity needs to be baked into the funding and project implementation, rather than included as an add-on.



- **Regulatory reform:** In the case of the P3 and CBP described above, there were regulatory requirements in the MS4 permit and stormwater regulations and enforcement that served as an impetus for those partnerships. In the case of lead service line replacement, we are still waiting on the Lead and Copper Rule Revisions to go into effect, and until they are, some communities will likely continue to turn a blind eye to replacing their lead pipes. The [sooner](#) these revisions becomes law, the sooner communities will be required to identify their lead lines, develop an inventory, and create a plan for removing and replacing them.



- **Procurement reform:** The potential of an influx of federal funding without reforming current governmental procurement and contracting mechanisms represents an enormous hurdle that will need to be addressed. In order for 100 percent of lead lines to be replaced, as President Biden has promised, we need to remove as many of the bureaucratic hurdles that are in the way, especially related to procurement and contracting.



- **Aggregation:** In the model demonstrated by P3s, bringing multiple communities together in one contract will create greater efficiencies and cost savings through economies of scale. Twenty-four municipalities were brought together in the Clean Water Partnership in Prince George's County, and the cost savings on projects are equal to about one-third of the overall original project estimates, with additional community and other benefits.

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**What does success look like for replacing toxic lead water pipes? Over the next five years, we are able to replace one million lead pipes from homes and schools in just 365 days, putting us on a path toward full replacement of all of America's ten million lead pipes.**

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- **Local leadership:** All of these mechanisms require strong local leadership willing to push things forward and anchor organizations willing to champion and prioritize the work.



- **Local buy-in:** In the [words](#) of Eric Glass of AllianceBernstein, one of the impact investors involved in the Buffalo Sewer Authority's environmental impact bond, if you don't have local buy-in, the project will fail. The community not only needs to be involved but more importantly should be driving the process. This local buy-in is critical for the success of the project and ensures also that equity is built in by focusing on the communities who need help the most.



- **Community benefits:** Investing in the training of local workforces, as well as contracting with local women and minority-owned businesses not only ensures that the community benefits, but can also create more equitable project outcomes.



- **Stakeholder engagement and community outreach:** For these mechanisms to be successful, multiple stakeholders have to engage and come together. In addition to bringing together 24 municipalities, the Clean Water Partnership in Prince George's County, for example, involved commitments and support from the EPA, multiple agencies within the county, public school districts, the transit authority, and others.

The reality is that the silos and structures that exist today will most likely prevent us from achieving full lead service line replacement in every community in many of our lifetimes, unless we make these and other key changes TODAY. Fortunately, there are clear examples of where silos have been broken down, collaborations and partnerships have been established, investments have been made, and innovation between the public and private sector is happening. Lead service lines were installed largely a century ago; we can't let another century go by before we replace them—especially when innovations and solutions are right in front of us.