

INCREASING FUNDING AND FINANCING OPTIONS FOR SUSTAINABLE STORMWATER INFRASTRUCTURE



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EXECUTIVE SUMMARY

Our nation's stormwater and wastewater infrastructure is aging and in a poor state of repair. It is increasingly threatened by climate change, which will cause more frequent and severe storms, leading to greater flood risk. Traditional public funding and financing methods for stormwater infrastructure provide limited options and are insufficient to address current problems. At the same time, views on flooding are changing, with increased recognition of urban flooding and the need for distributed infrastructure to manage it.

Thus, new ideas are needed to introduce innovative approaches to sustainable water infrastructure investment by both the public and private sector. This white paper examines a variety of options:

- Reform State Revolving Funds (SRFs), which are potentially powerful mechanisms for resilient and equitable stormwater investment but are typically not used to their full potential in terms of their ability to provide grants or offer forgivable loans.
- Use value capture techniques like Tax Increment Financing (TIF) or Special Service Areas (SSAs) to take advantage of the positive property value impacts of green infrastructure like trees and parks.
- Increase the ability of stormwater utilities and local governments to make public stormwater investments on private property, which is often the most cost-effective approach, and change stormwater regulations to establish fee-in-lieu programs or stormwater credit trading to drive infrastructure investment to the most beneficial areas.
- Combine existing separate funding streams for energy efficiency, weatherization, flood prevention, lead abatement, and other healthy homes investments to create comprehensive housing rehabilitation funding programs.
- Develop a strategy to unlock private property investment for stormwater management by improving understanding of flood risk and how this risk can be reduced with certain investments.

The field of stormwater funding and finance should take lessons from the energy efficiency field, which is far more developed and demonstrates the use of many relevant mechanisms. In energy, the use of public funds for investments on private property is a common practice, and financing methods have been developed to spark private capital investment.

Financial barriers are certainly not the only challenge to increased sustainability of water infrastructure. Other challenges – like fragmented ownership of water systems, incomplete recognition of the broader set of community benefits created by green stormwater infrastructure, outdated regulations, and low capacity at many local governments and utilities – also present significant barriers. While recognizing these barriers, this paper focuses on funding and financing challenges and solutions.

CNT hopes that this document sparks discussion and consideration by several key groups. These include implementers, including municipalities and stormwater utilities; financial institutions, including Community Development Financial Institutions (CDFIs) and other mission-driven investors; the real estate industry, including realtors, appraisers, and developers; the insurance industry; and others

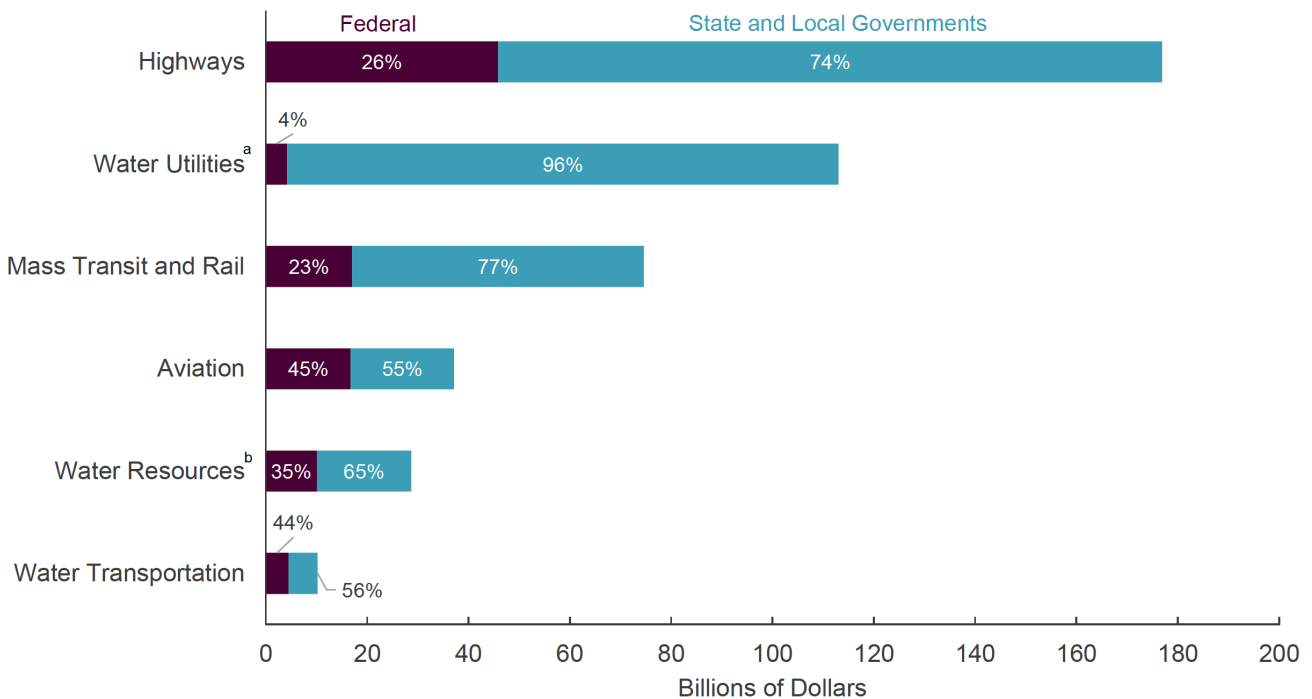
CURRENT STORMWATER INFRASTRUCTURE FUNDING AND FINANCING

Funding (the money to pay for infrastructure) and financing (the tools to provide funds) are major roadblocks to the implementation of innovative, sustainable, and efficient infrastructure around the U.S. The balance of funds used for infrastructure financing varies by project type. Figure 1 shows the level of investment by federal, state and local governments in various infrastructure types.

As this demonstrates, states and local governments are the primary funders of water utility infrastructure, spending \$109 billion per year compared to only \$4 billion by the federal government. This has proven dangerous in states with fiscal problems, as more responsibility is pushed to the local level; this is especially true for municipalities with limited budgets and aged water infrastructure. All of this is putting pressure on local governments and utilities, which have faced shrinking state and federal support, to get more done with fewer resources. Without innovative and suitable financing opportunities that fit within municipal budgets, municipalities are left to make reactive infrastructure investment decisions.

Infrastructure has always required dedicated funding and special financing mechanisms. Communities have traditionally paid for infrastructure projects with capital budgets, bonds, state and federal grants and loans, and private loans. Borrowed money is typically paid back through taxation or user fees. For example, a stormwater upgrade bond may be paid back over time by fees on water and sewer bills. Interest rates have been at historic lows for the past several years following the economic downturn, which has benefitted borrowers and has led local governments with sufficient revenue to take advantage of those low rates with new bonding issuances. However, in many cases, the barrier to investment locally is a gap in funding: some local governments simply lack the revenue stream to repay bonds or loans, regardless of the specific mechanism used. In this context, innovative ideas for funding and financing are necessary.

Figure 1. The Federal Government's and State and Local Governments' Spending on Transportation and Water Infrastructure, by Type of Infrastructure, 2017



Source: Congressional Budget Office, using data from the Office of Management and Budget and the Census Bureau.

a. Includes water supply and wastewater treatment facilities.

b. Includes water containment systems (dams, levees, reservoirs, and watersheds) and sources of freshwater (lakes and rivers).

SHIFTING VIEWS ON FLOODING

The exploration of new funding and financing tools comes at a time when views on the causes and solutions to flooding are shifting. Traditional and emergent views on flooding and financing solutions are contrasted below:

What causes flooding?

- **Traditional view:** Flooding is caused by water bodies overflowing their banks, mainly in response to infrequent major storms.
- **Emergent view:** While overbank flooding is certainly a problem, in many municipalities in the Great Lakes region, the primary problem is caused by precipitation that overwhelms local sewers. Local flooding may occur even while there is capacity in reservoirs and tunnels because the water simply cannot get through the system fast enough.

Where does flooding occur?

- **Traditional view:** Most flooding occurs in low lying areas near water bodies officially called floodplains and mapped by FEMA.
- **Emergent view:** Most flooding occurs outside of the floodplain and is significantly influenced by area permeability and the built environment and is termed urban flooding.¹

How predictable is flooding?

- **Traditional view:** Flooding happens somewhat unpredictably and rarely, signaled by use of language like a “100-year” flood event, or an event that has a 1% chance of occurring in a given year.²
- **Emergent view:** Repetitive flooding is common and predictable, and rather than treating each flooding incident as its own unique event, taking a longer view better communicates investment needs. Damages per event may only run a few thousand dollars for repairs but can occur annually, leading to significant and predictable damages over a multi-year period.

What are flooding solutions?

- **Traditional view:** Stormwater and wastewater is best managed through a series of centralized systems made up of pipes, tunnels, reservoirs, and treatment plants, designed to capture and send precipitation away as fast as possible. Solutions approach stormwater management as a capacity problem, solved by building large, grey engineered systems (more pipes and larger holding tanks) to handle major storms.
- **Emergent view:** The primary driver of urban flooding is an inflow restriction problem, meaning stormwater can't enter the tunnel and pipe system fast enough during rain events and floods streets, yards, and buildings. A more effective solution is through a distributed, decentralized system of green stormwater infrastructure (GSI), which prioritizes infiltration and temporary on-site retention.

Where should flooding solutions be located?

- **Traditional view:** Stormwater and wastewater infrastructure services can best be handled on the publicly-owned right-of-way.
- **Emergent view:** The majority of land within urban areas is privately owned property, and most precipitation occurs outside of the public right-of-way. In Chicago and its surrounding region, approximately two-thirds of land is privately owned. Thus, an efficient system of distributed infrastructure would include privately-owned land.

1. CNT, Cost and Prevalence of Urban Flooding, 2013, State of Illinois DNR, Report to General Assembly Under the Urban Flooding Awareness Act, 2015

2. US Geological Survey, “The 100 Year Flood,” The Water Science School. Accessed on 11/29/19, https://www.usgs.gov/special-topic/water-science-school/science/100-year-flood?qt-science_center_objects=0#qt-science_center_objects

LESSONS LEARNED FROM THE ENERGY SECTOR

We are not starting from scratch in examining innovative funding and financing for stormwater improvements. Energy efficiency programs originally faced similar financial barriers to those now hampering stormwater infrastructure, but this was solved by the creation of new financial tools. A series of demonstration programs such as the Chicago Energy Savers Fund provided audits, loans, contractors, and follow-up assistance to owners of multi-family buildings. This program and a handful of contemporary approaches around the nation launched an industry of comprehensive programs and one-stop shops with an impact in the tens of billions of dollars invested annually. In Chicago, these services continue to be provided by a partnership between Elevate Energy, a Chicago nonprofit, and the Community Investment Corporation, a Community Development Financial Institution (CDFI).

The program also produces a broader set of benefits, including the prevention of housing abandonment by reducing costs and stabilizing rents. The investors in the program blend a set of such motivations:

- Peoples Gas and Commonwealth Edison, Chicago's principal energy providers, have interests in a stable customer base, as well as in reducing the long term incremental cost of source energy, and in that latter regard, have shown that energy efficiency is the most cost effective "first energy" in their overall portfolio of energy resources.
- Private lenders also have a stake in a stable customer base, and lending funds for cost stabilization reinvests in their primary service territories and represents a set of actions to meet that territory's credit needs, which are the goals of the Home Mortgage Disclosure Act and the Community Reinvestment Act, respectively.
- Philanthropic foundations have an interest in addressing climate change, both in mitigation (reducing greenhouse gas emissions) and in adaptation (reducing the risk of climate change impacts including flooding and excessive heat).

Lessons from the experience of energy efficiency programs in Chicago and elsewhere include:

- Building owners benefit from the guidance provided by trained professional auditors.
- No single intervention can provide the level of benefit desired, so a suite of complementary improvements is needed.
- Few building owners can pay outright for a retrofit, so a utility or municipality-backed subsidy is often necessary to increase program uptake. An effective energy efficiency retrofit costs in the range of \$2,000 to \$3,000 per dwelling unit in a multi-family structure, and from \$8,000 to \$20,000 in a single-family structure.
- Those who have participated in these programs have low rates of late payment. Additionally, default rates are extremely low and foreclosures are almost non-existent. One of the reasons documented by Neighborhood Housing Services and the Federal Reserve Bank is that these are "high touch" programs: participants are getting quality, custom advice on protecting the value of their principal investment. Another is a sense of community: in this case, programs are being offered by non-profit organizations who've built a reputation for quality service.

PACE FINANCING

One innovative financing method for energy efficiency – Property Assessed Clean Energy (PACE) financing – allows a building owner to finance improvements and pay back the upfront cost through an additional assessment on the property tax bill. This is an evolving tool—PACE is allowed in approximately half of US states, with varying enabling legislation, and municipalities and counties are also implementing PACE in different ways, with varying partnerships with financial institutions.³

Some critics see transferability as a concern, since a PACE lien follows the property through sale as opposed to the owner. However, pre-payment of the full assessment can be negotiated as a term of sale. Likewise, the intent is to encourage the uptake of improvements with buyback periods longer than one owner would typically hold title. In the case of energy efficiency, where the need is urgent and the stakes of global climate change are high, this kind of creative financing is important.

Another significant barrier of PACE financing is the unwillingness of the predominant federal mortgage insurance companies to insure properties encumbered by PACE liens. Fannie and Freddie see PACE liens as senior to their primary mortgages, since property taxes are typically paid first in the event of foreclosure. As such, only California has enabled PACE financing for single-family and small apartment buildings by creating at \$10 million statewide loan-loss reserve.



NBT Natural Building Technologies, Flickr (CC BY-NC 2.0)

Some of the benefits of PACE include the following:

- It overcomes the barrier of the high upfront costs associated with energy efficiency improvements.
- Lower interest and longer terms, because lenders see property tax payments as having higher repayment rates.
- Underwriting criteria need not be tied to creditworthiness, because PACE is tied to the property and not the property owner.



Bill Barber, Flickr (CC BY-NC 2.0)

3. American Council for an Energy Efficient Economy, "Property Assessed Clean Energy (PACE)," Accessed May 2017. <http://aceee.org/sector/state-policy/toolkit/pace>

INNOVATIVE FUNDING AND FINANCING SOURCES

While innovative finance ideas are necessary for stormwater infrastructure, the more pressing concern for communities, particularly those that are capacity-strained, is reliable access to funding. Clever financing sources, none of which make up for lack of revenue to repay bonds and loans. In many municipalities, the problem isn't lack of access to financing opportunities – it's funding.

The bulk of this guide lays out five priority funding strategies that are explained in further depth, including:

- **Reform State Revolving Funds (SRFs)**
Recognize SRFs as potentially powerful mechanisms for resilient and equitable stormwater investment, use them to their full potential in terms of their ability to offer negative interest or forgivable loans, and leverage other state and federal funding sources.
- **Employ Value Capture Techniques**
Use techniques like Tax Increment Financing (TIF) or Special Service Areas (SSAs) to take advantage of the positive property value impacts of green infrastructure like trees and parks.
- **Increase Public Investments on Private Property**
Enable stormwater utilities and local governments to make public stormwater investments on private property, which is often the most cost-effective approach, and change stormwater regulations to establish fee-in-lieu programs or stormwater credit trading to drive infrastructure investment to the most beneficial areas.
- **Create Comprehensive Housing Rehab Programs**
Combine existing separate funding streams for energy efficiency, weatherization, flood prevention, lead abatement, and other healthy homes investments to create comprehensive housing rehabilitation funding programs.
- **Expand Private Property Investments of Stormwater Management Practices**
Develop a strategy to unlock private property investment for stormwater management by improving understanding of flood risk and how this risk can be reduced with certain investments.

STATE REVOLVING FUNDS

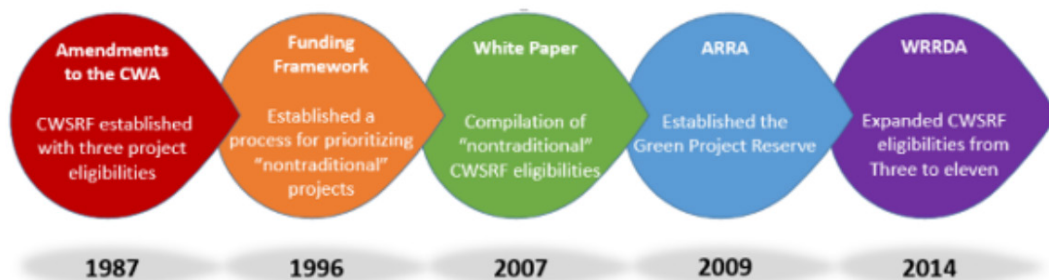
Overview

State revolving funds (SRFs) provide an ongoing source of capital for investments that create a direct financial savings or revenue stream. Once the fund is established, new projects are paid for with funds repaid by borrowers. One significant use of this model for water infrastructure is the Clean Water State Revolving Fund (CWSRF), a 30-year-old program that has provided nearly 40,000 loans totaling \$120 billion for water infrastructure projects.⁴ States administer the program under federal parameters, must provide 20% state matching funds to federal dollars, and must provide loans at or below market rate. Funds can also be used to refinance debt, provide loan guarantees, and in some cases give subsidies or grants to projects.⁵

Recipients are generally limited to governmental entities (local, county, special district). In the Great Lakes, all

states except Pennsylvania engage in leveraging: they issue bonds to borrow against future loan repayment receipts. That plus matching state funds plus an annual federal allotment known as a capitalization grant creates a net of \$2.2 billion spread across the Great Lakes states for 2019 for stormwater and wastewater (termed “clean water” through the SRF program). Two states, Ohio and Minnesota, encourage formation of local funds to further leverage state funds.

Revolving loan funds require significant upfront capitalization and may require risk mitigation measures to attract capital to a specialized or new market, but once established and run responsibly, can be a useful ongoing resource to projects that generate returns over time. A limited-purpose loan fund like the CWSRF also allows lenders and borrowers to learn over time and improve the projects implemented.



Key Strategies for Innovation

Principal Forgiveness

An aspect of the SRF program that deserves more attention is the additional subsidization programs, instituted in 2009 with the passage of the American Recovery and Reinvestment Act (ARRA). ARRA required that no less than 50% of a state’s ARRA allocation must be set aside as grants, principal forgiveness (essentially a grant), or negative interest loans for communities facing economic hardship.⁶ Further, no less than 20% of ARRA allotments must be used for state’s green project reserve program.⁷

“Green” projects are those that relate to green stormwater infrastructure, water and energy efficiency, and environmentally innovative projects.⁸ In 2014, the Water Resources Reform and Development Act (WRRDA) expanded projects that qualify as a green project and made the CWSRF additional subsidization a permanent fixture of the program.⁹ However, under WRRDA, the program is optional and only available when national appropriation for state CWSRFs is over \$1 billion.¹⁰ When appropriation is over \$1 billion, the amount

4. U.S. Environmental Protection Agency, “Clean Water State Revolving Fund (CWSRF),” Accessed May 2017. <https://www.epa.gov/cwsrf>

5. U.S. Environmental Protection Agency, “Learn about the Clean Water State Revolving Fund (CWSRF),” Accessed May 2017. <https://www.epa.gov/cwsrf/learn-about-clean-water-state-revolving-fund-cwsrf>

6. Ohio Environmental Protection Agency, “Principal Forgiveness Loans 101.” Accessed October 2019. <https://epa.ohio.gov/defa/Resource/principal-forgiveness-loans-101>

7. Ibid.

8. U.S. Environmental Protection Agency, “Overview of CWSRF Eligibilities,” Accessed October 2019. https://www.epa.gov/sites/production/files/2016-07/documents/overview_of_cwsrf_eligibilities_may_2016.pdf

9. Ibid.

10. Wisconsin Department of Natural Resources, “Environmental Loans: Principal Forgiveness,” Accessed October 2019. <https://dnrwi.gov/Aid/documents/EIF/Guide/PF.html>

available for additional subsidization is calculated as a percent of the total appropriation, up to 30%. In most cases, states set caps of around \$2 million on the allowable principal forgiveness (PF) per project.

Each state is required to set forth how much of its national appropriation it wants to set aside for additional subsidies, and to develop its own affordability criteria (and other priority criteria, for green projects, innovation investments, etc.) to their allocation methodologies for distributing subsidies.¹¹ A nation-wide survey exploring the various ways that states are designing their additional subsidization programs is needed to understand the full impact that ARRA and WRRDA have had on improving water quality and water quantity outcomes in the most economically disadvantaged communities.

It should also be noted that there is debate regarding an appropriate level of PF programs. SRFs are loan programs, so forgiving principal repayment reduces the amount of funding available for future loans. The SRF program is not structured as a grant program, so the use of PF should be calibrated to only be used in certain circumstances to avoid compromising the viability of the overall loan fund. In addition, even in cases where PF is permitted, some communities which need it most may have difficulty accessing the program due to the complexity of seeking funds.

Blending SRF and Other Federal Funds

Many communities may be more comfortable in planning for and securing Community Development Block Grant (CDBG) dollars, so an integration of those dollars with an undersubscribed or inaccessible SRF program may accelerate necessary water infrastructure planning, design, and investments. Additional research is needed to determine whether CDBG dollars dedicated to water infrastructure might be used as debt service on an SRF loan. The same may be true of Pre-Disaster Mitigation Grant Program funds available through FEMA. North Carolina's SRF and CDBG programs are administered in a way that encourages collaboration between the two funding sources. This effort is described below in more detail.

Examples of Innovative Uses of SRF Programs

Several states, described below, have implemented innovative structures to pursue this balance in their use of additional subsidies (primarily PF) programs.

North Carolina

North Carolina's CWSRF program offers 0% interest loans for green projects and has developed a Wastewater Reserve program that sets aside a portion of the state's federal allocation for grants and low-interest loans for planning, design, and construction of critical water infrastructure for economically disadvantaged communities. Eligible municipalities may receive up to \$3 million for three years of work (presumably covering a multi-year project, involving planning, design, and construction). The state also awards funds to study the potential benefits of merging existing local water infrastructure systems to be more efficient.¹²

Uniquely, in 2013, North Carolina's General Assembly established a program in which a certain amount of Community Development Block Grant (CDBG) funds for infrastructure are transferred to the Division of Water Infrastructure to administer, in order to accelerate investments in public water and sewer infrastructure in communities with majority LMI households. The maximum grant through this program is \$2 million.¹³ It's unclear whether this award can be bundled with the Wastewater Reserve program or be used to pay back a traditional SRF loan.

Illinois

Through Illinois' Water Pollution Control Program, communities that are hardest off may receive up to 60% PF of their total project costs (with no identified cap).¹⁴ However, based on the state's past intended use plans, it appears that the only communities receiving PF are small rural primarily white communities transitioning from septic systems to centralized sewers, for hundreds of thousands to millions of dollars a project.¹⁵ Cook County communities, many of which qualify for economic hardship, are serviced by the Metropolitan Water Reclamation District of Greater Chicago (MWRD) and therefore are not eligible to apply for PF from the state, and are reliant upon MWRD to make appropriate investments in the neediest systems.

It's possible that communities qualifying for economic hardship may be able to leverage CDBG funds for water projects to cover the loan portion of an SRF package,

11. Wisconsin Department of Natural Resources, "Environmental Loans: Principal Forgiveness," Accessed October 2019. <https://dnrwi.gov/Aid/documents/EIF/Guide/PF.html>

12. North Carolina Department of Environmental Quality, "Merger and Regionalization - Feasibility Grants," Accessed October 2019. <https://deq.nc.gov/mergerregionalization-feasibility-grants>

13. NC DEQ, "Community Development Block Grant - Infrastructure," Accessed October 2019. <https://deq.nc.gov/about/divisions/water-infrastructure/i-need-funding/community-development-block-grant-infrastructure>

14. Illinois General Assembly, "JCAR Administrative Code; Title 35: Environmental Portion Section 365.250 Additional Subsidization," Accessed October 2019. <http://www.ilga.gov/commission/jcar/admincode/035/035003650B02500R.html>

15. IL EPA, "2019 Water Pollution Control Intended Use Plan," Accessed October 2019. <https://www2.illinois.gov/epa/Documents/epa/grants-loans/state-revolving-fund/2019-wpc-intended-use-plan.pdf>

so increasing coordination between the two programs (or establishing a reallocation of CDBG funds to the Water Pollution Control Program a la North Carolina's program) might be critical to increasing subscription to the program.

Ohio

Ohio's Water Pollution Control program offers PF for a variety of programs, including home sewage treatment system replacements and upgrades (up to \$300,000 per applicant); publicly owned wastewater treatment plant improvements (up to \$3 million per applicant), and offers zero percent discounts for projects that correct combined sewer overflow issues.¹⁶ Ohio's program also includes a linked deposit program which opens up the SRF to private organizations and individuals for non-point source projects who can borrow from a private lending entity at a below-market interest rate.¹⁷ Finally Ohio EPA references CDBG as another funding source for water infrastructure projects.¹⁸ Unlike North Carolina, they do not have a fund transfer agreement, but are at least making the connection for communities.

16. Ohio Environmental Protection Agency, "2017 SRF Year in Review," Accessed October 2019, <https://epa.ohio.gov/Portals/47/media/2017%20SRF%20Year%20in%20Review.pdf>.

17. Ohio EPA, "Office of Financial Assistance - Linked Deposit," Accessed October 2019, <https://epa.ohio.gov/dela/ofa#169558736-linked-deposit>

18. Ohio EPA, "Office of Financial Assistance - Other Funding Resources," Accessed October 2019, <https://epa.ohio.gov/dela/ofa#169558737-other-funding-resources>

VALUE CAPTURE

Green stormwater infrastructure (GSI) installations, like trees, constructed wetlands, and green open space, that are well-designed and well-engineered, have the potential to add significant value to private property. The value-added of a GSI project can be greater if it enables recreation or beautifies a neighborhood. When public investment creates private property value it makes sense to capture that value and channel some of it back into funding public improvements.

For example, a Portland, OR study found street trees were correlated with a 3% increase in property values, or \$8,870 in additional home sales price.¹⁹ A study of home prices in a Philadelphia community found an even greater increase of 7-11%, which the authors suggest may be related to the social signaling that tree planting represents in some neighborhoods.^{20,21} Green spaces can also add value. A study of floodplain conservation in Missouri found increased property values that were more than three times the value of avoided flood damage.²²

Key Strategies for Innovation

There are several methods of capturing the value of an investment, including property tax assessment, development charges, tax increment financing districts, business improvement districts, and special service areas.

Property Taxes

GSI can increase property values, and as property assessments rise, so does the tax base for a community, and property taxes are a common tool for paying for municipal services. However, property taxes are not always well aligned as a funding or financing mechanism for specific projects. The value of the projects may register in property assessments well after they have been installed, and as property tax goes into the general fund of a community, as well as to other special purposes, such as schools, it may not be targeted to the GSI needs of neighborhoods. In order to use property taxes to appropriately capture the value of GSI investments, the way that property tax dollars are allocated would need to be reconfigured.

Development Charges

For communities with significant new development, one-time development charges can be a useful way to pay for infrastructure and essential public services. Portland, Oregon has such “System Development Charges” for parks, nature trails and open space.²³ [Cully Park](#), which opened in 2018 is an example of the use of those funds as part of a broader sustainable anti-poverty and anti-displacement strategy. San Francisco has a wide variety of development charges and require-

Affordability Considerations

A major concern about increasing property values with green investments is that it can make a community more unaffordable for the current residents and businesses. Avoiding displacement and creating benefits equitably must be part of any GSI strategy from the beginning. Living Cully in Portland, Oregon is a model for addressing the needs of a neighborhood holistically, including affordable housing, jobs, health, transportation, and sustainability.

ments, including a street tree planting requirement that can be offset with an in-lieu fee of \$2,122 in 2019—the cost to the municipality of planting a tree and watering it for three years.²⁴

Tax Increment Financing

Tax Increment Financing (TIF) borrows against the future stream of additional tax revenue a project is expected to generate to finance improvements. In addition to property values, tax increment financing can leverage taxes from rising income or sales in an area benefitting from sustainable infrastructure projects. TIFs have been around for decades, but their use for sustainable infrastructure is somewhat novel, although they have been used to finance wind energy projects.²⁵ In some scenarios, TIFs are used to finance water,²⁶ although those are

19. Donovan, G.H. and Butry, D.T. (2009). "Trees in the City: Valuing Street Trees in Portland, Oregon." *Landscape and Urban Planning*, 94(2010), 77-83. https://www.fs.fed.us/pnw/pubs/journals/pnw_2010_donovan001.pdf

20. Wachter, S. M., & Wong, G. (2008). "What Is a Tree Worth? Green-City Strategies, Signaling and Housing Prices." *Real Estate Economics*, 36(2), 213-239. https://repository.upenn.edu/cgi/viewcontent.cgi?article=1036&context=real-estate_papers

21. Trees provide many benefits beyond property value—Tree is a useful resource for understanding the value of trees in a city.

22. Kousky, C. and Walls, M. (2013) "Floodplain Conservation as a Flood Mitigation Strategy: Examining Costs and Benefits." *Resources for the Future*. <https://media.rff.org/documents/RFF-DP-13-22-REV.pdf>

23. City of Portland, Oregon. Park System Development Charge. Accessed October 2019. <https://www.portlandoregon.gov/parks/article/688797>

24. City of San Francisco, California. "San Francisco Citywide Development Impact Fee Register." Accessed October 2019. https://sfplanning.org/sites/default/files/forms/Impact_Fee_Schedule.pdf

25. U.S. Department of Energy, Energy Efficiency and Renewable Energy, "Economic Development Benefits of the Mars Hill Wind Farm," 2009. http://apps2.eere.energy.gov/wind/windexchange/pdfs/economic_development/2009/me_mars_hill.pdf

26. The World Bank Group, Tax Increment Financing (TIF). Accessed July, 2018. <https://urban-regenerationworldbank.org/node/17>

less common. TIFs are typically created for a specific district in a community where a share of future tax revenue is then directed to a special purpose. Municipalities often issue a bond to access capital for a project upfront that is then paid back over time with TIF funds.

Thinking broadly, TIFs could be used to take advantage of green infrastructure improvements that add to the future value of property, attract visitors and increase local business sales, and create jobs. One application is “tree increment financing,” or capturing the additional property value caused by planting trees or installing other green infrastructure. California has created an alternative structure called an “Enhanced Infrastructure Financing District,” a TIF-like financing tool targeted at particular uses, including stormwater projects.

Business Improvement Districts

Business Improvement Districts (BID), and similar tools like Special Service Areas (SSAs), are locations within a community that have a tax or fee applied to them to pay for additional infrastructure or services. BIDs are common in downtown areas where business

owners cooperate to fund amenities like benches, plantings, and litter control as well as market the district to shoppers or tourists. Unlike municipality-wide property taxes, a BID or SSA targets fees to the distinct needs of a district. This approach can be a good match to district-scale stormwater services. San Francisco has created a similar structure for residential and mixed-use neighborhoods known as a “Green Benefits District,”²⁷ which can build and maintain GSI and other improvements.

Lessons Learned from the Transportation Sector

Public transportation has faced a similar set of challenges, and in recent years value capture has become part of the funding strategy for new transit investments. When a new rail stop or associated transit oriented development zoning is going to create significant new value for nearby property owners that value is leveraged to help pay for the infrastructure improvements. The Federal Transit Administration has case studies of joint development and special districts being used to capture value for transit investments.²⁸

27. City of San Francisco, Department of Public Works. Green Benefit Districts. Accessed December 2019. <https://sfpublicworks.org/GBD><https://sfpublicworks.org/GBD>

28. U.S. Department of Transportation, Federal Transit Administration. Value Capture. Accessed December 2019. <https://www.transit.dot.gov/valuecapture>

PUBLIC INVESTMENT ON PRIVATE PROPERTY

As our understanding of urban flooding shifts, so should the way we think about investing in solutions. To increase community resilience, municipalities should make investments in GSI in a more distributed manner on both public rights of way and private property. Most land in urban areas is privately owned. For example, two-thirds of land in Cook County is privately owned and the ratio is likely similar in other urban counties. Many public stormwater utilities, including MWRD in Cook County, lack explicit authorization to invest on private property. In this context, it is very difficult to invest in a distributed, regional solution to urban flooding.

Paradoxically, installation of stormwater infrastructure on private property is already required under existing regulation. Many municipalities and stormwater utilities require on-site detention and retention for new development (e.g., Chicago's Watershed Management Ordinance requires new developments to capture the first inch of rainfall on site or a pay a fee in lieu). However, most regulations are blunt instruments and incomplete solutions: not designed to achieve the goal of scaling and maintaining green stormwater infrastructure on existing or newly developed land. Driven by new development, they do not encourage stormwater management in weak real estate market areas. As these areas typically correlate with lower income residents, they do not reduce flooding in low income communities, where CNT analysis has shown that urban flooding happens most.²⁹ This is to say nothing of the cost burdens placed on affordable housing developers, for example, who already rely on subsidies to address a variety of development regulations.

Aside from enabling legislation, there are a number of barriers to public stormwater utilities investing in private property.

- Procurement policies can make it difficult to make small scale investment cost effectively.
- Elected officials can be reticent to develop programs restricting public subsidies to specific geographic areas, where GSI is most effective.
- Stormwater utility legal council have expressed concerns about the ongoing public costs and/or liability associated with maintaining GSI on private property.

Despite these challenges, some communities, like the City of Philadelphia, have done extensive planning to identify the most effective ways to scale up green infrastructure on both private and public land. The City's

plan, Green City Clean Waters, lays out an ambitious 25-year plan to reduce stormwater pollution by 85%. In addition to major public investments, the program includes investments in homes and businesses to find the most effective and efficient ways to achieve this goal.³⁰ Similarly, New York City put together a Green Infrastructure Plan in 2011, which outlines how the City will achieve its combined sewer overflow reduction goals by 2030. The first phase of the plan was to identify key ways to retrofit publicly owned land with green infrastructure, with the next phase looking at investments made with public dollars on private property.³¹



Philadelphia Water Department.

In short, utilities will need to invest in private property GSI solutions to be effective at scale. Some ideas explored below include public investments on school grounds and public housing, municipal cost share

²⁹ <https://www.cnt.org/urban-flooding>

³⁰ http://archive.phillywatersheds.org/what_were_doing/documents_and_data/cso_long_term_control_plan

³¹ http://home.nyc.gov/html/dept/pdf/green_infrastructure/gi_annual_report_2018.pdf

programs, establishment of installation and maintenance easements on privately held land, counting green infrastructure on private property as a capital asset, and the establishment of a stormwater utility, fee in lieu, or credit-trading program.

Partnerships with other public agencies

Already, many municipalities and stormwater utilities are creatively finding partners for investment. Stormwater utilities primarily interpret “public” property to include local governments that manage transportation and other infrastructure assets, such as municipalities and counties. However, public property also includes any land owned by any local government, such as park districts, school districts, and public housing authorities. Examples of investments in GSI may provide models applicable to public dollars spent on privately held school campuses and affordable housing.

In Chicago, the Space to Grow program, managed by the Healthy Schools Campaign and Openlands, replaces impervious surfaces in public schoolyards with a suite of green infrastructure improvements that incorporate

Space to Grow



Before



After

Grow/MWRD

landscape features that capture rainfall and manage stormwater. Funding from numerous public agencies, including the City, the school district, and MWRD, supports this program.³²

Through its Department of Environmental Protection (DEP), New York City has begun to install green infrastructure on school campuses and public housing grounds. In 2018, the DEP began construction on 24 NYC public schools, and has completed 12 as of the end of that year. In early 2016, DEP and the NYC Housing Authority (NYCHA) finalized an agreement enabled the DEP to do feasibility analyses for, design, and install green infrastructure at several NYCHA sites.³³ As of the end of 2018, DEP has installed 3 green infrastructure projects on NYCHA properties.³⁴

These examples provide insight into a municipality and sewerage district working with a nontraditional partner to find space for stormwater infrastructure installation. Again, there may be an opportunity to expand this model to include private schools, universities, or other major institutions that might cost share with the region’s wastewater reclamation district.

³² <https://www.spacetogrowchicago.org/about/about-space-to-grow/>

³³ http://home.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2017.pdf

³⁴ http://home.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2018.pdf

Municipal cost share and grant programs

In the Chicago region, the RainReady program, offered in several suburban municipalities and being piloted in a Chicago neighborhood next year, offers public subsidy for green infrastructure improvements to solve highly local yard, street, and basement flooding problems. This program has proven its value, and efforts to scale it up by attracting more public agency funders are now underway. Similarly, NYC has established a green infrastructure grant program which, since 2011, has committed more than \$14.5 million to 35 private property owners to provide stormwater management as a public good.³⁵

Installation and Maintenance Easements on Private Property

Though more common in rural communities and on agricultural land, there are a few instances of municipalities or wastewater management districts establishing green infrastructure installation and/or maintenance agreements with private urban land holders. Both the City of Detroit, Michigan³⁶ and the City of Charlotte, North Carolina³⁷ have established green infrastructure easements, laying out maintenance requirements for stormwater installations made on private property, but meant to benefit the public stormwater infrastructure system. However, in both cases, the easements stop



Native plants in this Oak Park rain garden keep rain in the yard, instead of overwhelming the sewer and backing up into streets and basements.

short of allowing a public entity (stormwater district, municipal government, etc.) to spend dollars toward the maintenance of the green infrastructure practice. The established easements provide a starting point for how municipalities might structure such a relationship with a private property holder, to ensure that green infrastructure investments are properly maintained, and to give governments authority to spend capital on private property.

³⁵ http://home.nyc.gov/html/dep/pdf/green_infrastructure/gi_annual_report_2018.pdf

³⁶ <https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/Stormwater%20Management%20Easement%20-%20Revised%20Draft%20062519.pdf>

³⁷ https://elc.umd.edu/assets/green_infrastructure/session_6_charlotte_easement_example.pdf

Green Stormwater Infrastructure as a Capital Asset

Positively, a recent change to accounting standards could make installation of GSI on private property easier. In 2018, the Government Accounting Standards Board (GASB) approved a language change that permits distributed infrastructure projects – such as investment on private property – to be considered a capital asset by utilities.³⁸ This language clarification, referred to as GASB 62, could have enormous impact in generating further green infrastructure investment, as it allows public agencies to consider private property programs to be capital investments rather than operational expenses.³⁹

Other Models

Municipalities and utilities who are interested in this practice but still concerned about ownership of infrastructure on private property could explore a number of alternatives:

- Stand-alone stormwater utility. A separate stormwater utility may have more ability to use creative and innovative approaches if it is tasked specifically with that function, compared to a municipal government or a utility that manages both drinking water and stormwater. This may be a first step for communities that struggle to address stormwater within current governance structures.
- Contract for stormwater management services. Municipalities and utilities could consider contracting for stormwater management services – that is, paying for the retention of stormwater on a site – rather than owning the infrastructure themselves.
- Fee-in-lieu programs. Rather than requiring all property owners to comply fully with stormwater management regulations, public agencies could provide fee-in-lieu options for development in areas that doesn't actually experience localized flooding. The revenue collected could then be used for investment in places where flooding is actually most severe. Fee-in-lieu programs are used successfully already in other fields, like affordable housing or park provision, to provide a public good more efficiently.
- Stormwater credit trading. Perhaps the most advanced option, municipalities or utilities could create a private market for the purchase and sale of stormwater credits, allowing a private market to establish the appropriate value for these credits and encouraging private property owners to build stormwater infrastructure by establishing a market for it. This type of program has been piloted successfully in Washington DC.⁴⁰ An application in the Chicago region, termed StormStore, is being explored by the Metropolitan Planning Council (MPC) and The Nature Conservancy (TNC).⁴¹

38. <https://www.newsdeeply.com/water/articles/2018/05/23/little-known-accounting-policy-could-fuel-green-infrastructure-surge>

39. https://static1.squarespace.com/static/561dcdc6e4b039470e9a1c001/5b846a7988251bb8342ebb22/1535404668641/GoGreen_EarthEconomics_Web.pdf

40. <https://doee.dc.gov/src>

41. <https://www.ideals.illinois.edu/bitstream/handle/2142/98931/StormStore%20Feasibility%20Study%20Report.pdf?sequence=2&isAllowed=y>

COMPREHENSIVE HOUSING REHABILITATION

While not a new concept, comprehensive housing rehabilitation deserves a fresh look as our housing stock and infrastructure continue to age. Many single-purpose housing rehab programs are already operational, but if a comprehensive program were to exist, homeowners could affordably retrofit their homes with multiple solutions (energy and water efficiency, stormwater management, lead exposure mitigation, etc.) to improve health and reduce vulnerability to the impacts of climate change.

The nation's most recent, successful exploration of subsidized home rehabilitation has already been discussed: energy efficiency retrofitting. In that case, a combination of subsidy and finance have reduced household costs, mitigated climate change, and proliferated climate resilience solutions. Beyond energy efficiency, public funds have been used to rehabilitate private residences for many years and for many reasons.

Several programs funded through different public agencies already provide funding for housing rehabilitation, but they are disconnected:

- The Department of Energy's Weatherization Assistance Program for Low-Income Persons provides block grants to states, who then fund local community action agencies to perform assessment and building improvements that improve energy efficiency. Participants in certain social assistance programs automatically qualify as do households earning less than 200% of the federal poverty level.
- Authorized by the Social Security Act, the Children's Health Insurance program states have the option to draw down federal matching funds for certain non-coverage expenditures to "protect the public health [and] protect the health of individuals" by creating Health Services Initiatives (HSI). Michigan and Maryland have both created HSIs that support lead abatement through home improvement. Further exploration may be useful to determine if other states have created HSIs for other health-oriented residential rehabilitation programs.

- States, urban counties, and municipalities routinely use Community Development Block Grants (CDBG) and HOME Investment Partnership Program (HOME) funding from HUD to support Single Family Rehab (SFR) and Small Rental Rehab programs (SRP), which pay down the cost of bringing buildings up to basic health and safety standards either through grants or zero-interest loans, often forgivable or deferred until the sale of the building.
- Many municipalities with older, combined sewer systems provide grants to single family homeowners to share in the cost of installing certain sewer backflow prevention systems. CNT has piloted an analogous program, in which municipalities share in the cost of installing raingardens and bioswales in yards to reduce urban flooding.

These programs address some of the lessons learned from energy efficiency retrofit subsidy programs. For example, they all acknowledge that few can pay outright for rehabilitation services. They all leverage a thorough diagnosis from a trained, often certified, professional. They all provide high-touch guidance to move homeowners through some steps in the process from eligibility verification, to diagnosis, scoping, bidding, contracting, construction, and closeout. However, none of them has been able to provide all of these interventions through a single program.

Barriers

There are at least three primary barriers to developing and administering a comprehensive housing rehab program: variations in applicant eligibility for subsidies, variations in project scope eligibility, and the limited capacity of any one provider to negotiate these differences in a way that minimizes difficulty for the applicant.

- Variations in applicant eligibility: as it stands now, one intake specialist or account clerk at a service provider – typically a local government or its delegate non-profit organization – verifies applicant eligibility for one subsidy program. Applicant income, tenure (owner vs. renter), and other financial eligibility criteria can vary widely across the programs described above. So, one component of a comprehensive rehab program would be to train intake specialists to verify eligibility for multiple subsidy programs.
- Variations in project scope eligibility: similar to the above, most assessors/auditors/inspectors are trained to identify only building problems that can be solved using the one subsidy in which the service provider specializes (energy efficiency, health and safety, etc.). Another component of a comprehensive rehab program would be to cross-train these professionals to identify problems that can be solved using multiple subsidies. This may not be as difficult to overcome, because many inspectors have worked previously as general contractors or in other building trades.
- Limited capacity to minimize applicant difficulty: service providers typically achieve a level of financial program sustainability over time by learning to maximize efficiency in the delivery of a specific scope of services. Adding new subsidies with new eligibility and scope criteria would likely expose them to new risks initially, but could result in a higher volume of work and administrative funding in the long run.

Solutions

The simplest comprehensive rehab program to describe can be called a “one-stop shop.” In many ways, Elevate Energy embodies this solution as it applies to energy efficiency retrofit subsidies. Applicants are screened for eligibility by a call center for multiple subsidies. Inspectors identify housing problems that have solutions fundable across multiple subsidies. The organization minimizes the paperwork and complexity for the applicant. In this case, the limitation is that the scope of services focuses exclusively on energy efficiency. However, Elevate Energy has a small-but-growing water department and is currently expanding to address lead issues in drinking water at Illinois childcare providers.

Another solution set would involve the sharing of applicant intake and eligibility verification across multiple organizations. In this scenario, a single service provider would screen for applicant eligibility under multiple rehab subsidy programs, provide services under its specialization (energy and water efficiency or stormwater management, for example), and refer to other organizations for other subsidized rehab services. An analog already exists, called “coordinated entry”, in the homeless services ecosystem – clients are screened for eligibility by any one type of service provider (emergency housing, medical care, etc.) and that information is shared across a common database so that other providers know which programs any given client is eligible for.

It might be possible for a similar sharing to occur at the diagnosis stage. Essentially, an assessor/auditor/inspector would perform a more comprehensive building diagnosis, which could be shared across multiple providers even if the building was found not to have problems eligible for solutions offered by the initial service provider.

In either of these latter two solutions, additional training would likely be needed for intake or diagnosis professionals. The costs of that training would likely diminish over time, allowing for more volume in service delivery and (assumedly) more administrative funding for the service providers to compensate. Typically the amount of government subsidy for program administration is capped at a certain percentage of the overall program cost, so there could be a good opening for an initial investment from philanthropy to seed one or more of the solutions identified above.

PRIVATE PROPERTY INVESTMENTS

Like municipalities, property owners have their own infrastructure to maintain. The emerging view of stormwater management indicates the need to finance a larger number of small improvements, many on private property. It also suggests that some of these improvements may be funded and financed in part by private property owners acting in their own self-interest. But several uncertainties limit the willingness and ability of private property owners to invest in stormwater infrastructure:

- First, private property owners need to be able to estimate the flooding damage that future years will bring to understand whether an upfront investment is worthwhile. In many cases, improvements would pay for themselves by reducing damage from flooding in the long term, but these future damages are not known by property owners. Installation of flood prevention measures may cost a few thousand dollars – a significant upfront investment, but not when compared to the property and other economic damage from flooding that occurs year after year. This type of investment may be most attractive to major institutional stakeholders or those with large or multiple facilities, like universities, hospitals, or manufacturers. However, without a full understanding of the likelihood of repetitive flooding, property owners cannot accurately weigh the immediate cost of improvements against their return on investment.
- Second, private property owners need to be able to identify and prioritize flood risk mitigation solutions. Property owners would need to find a reliable home inspector or contractor trained in identifying and prioritizing the most effective and cost-effective potential actions to reduce flood risk. This contractor would need to be able to diagnose the causes of flooding, which requires knowledge of hydrology, plumbing, and landscape design – a rare combined knowledge set.
- Third, private property owners need to know how to pay for these investments. Some homeowners could simply pay for improvements up front, but given the typical cost of several thousand dollars, many would not be able to. These homeowners would need to find a lender that understands the value of these actions. There are few financing opportunities that would allow individual homeowners or other property owners to invest in flood reduction improvements. Further challenges emerge with low-income property owners. Often, homeowners who are most at risk of flooding cannot afford to pay directly for flood prevention measures or secure financing to make improvements that reduce flooding. They would benefit from some of the aforementioned strategies, such as municipal cost-share programs or a comprehensive rehab program.

Potential Solutions

Taking lessons from the energy efficiency sector, some potential solutions include:

- A better understanding of flood risk in order to justify investment. Comparisons between options (for example, spend \$8,000 on improvements now or suffer \$30,000 in damage over the next ten years) become possible. With a more accurate understanding of flood risk, the value of flood-resistant property improvements becomes evident, clearing the way for development of financial products to meet this need. These may bear some resemblance to the existing financial products that support residential energy efficiency improvements. To support this, we need a method to assess flood risk that allows parcel-based predictive estimates of flood damage over a multi-year period, given current and projected precipitation patterns.
- Dedicated, comprehensive inspection and audit programs offered by a trusted organization. One of the lessons from the energy efficiency sector is that programs offered by nonprofits elicit a higher degree of trust than advice from a private contractor. Also critical is reflecting resilience improvements in property valuation and appraisal: these improvements do add real value to a property but are typically not picked up in the appraisal process.
- Financial products that can be used for flood reduction improvements. Lenders usually provide credit to property owners based on creditworthiness. However, in the case of flood prevention improvements, this formula is incomplete: reducing the risk of future flooding actually improves the creditworthiness of a homeowner, by reducing the risk of unexpected large future expenses and disruption caused by flooding. Also worth investigating is the ability for bank loans for flood resilience improvements to qualify for the Community Reinvestment Act (CRA), as noted in a recent report from the Federal Reserve.⁴²

In addition, in order to overcome barriers to implementation among lower-income property owners, public sector financial incentives are necessary. [See Section on Public Investment on Private Property.] Private property improvements like rain gardens, bioswales, and other forms of green infrastructure are particularly desirable, as they not only protect the property on which they are installed, but also other properties in the nearby area. Thus, public agencies should design programs that require GSI to be prioritized for the matching funds to be received. It is not hard to see the possibility for other sectors to participate; for example, property casualty insurers could lower insurance premium reductions in response to flood risk reduction improvements, much like reducing car insurance premiums for safe driving.

Program Design

Experience from the energy efficiency marketplace tells us that creating an effective program to encourage private property investment requires competencies not necessarily found within government and utilities, but could be implemented by tying into existing programs. For example, a new water-focused program could tie to an existing one-stop shop for home repair or energy efficiency, such as those operated in Chicago by Neighborhood Housing Services (NHS) or Elevate Energy. Other options include tying into an existing CDFI, an existing network of privately-offered home repair services, or an entirely new organization. Regardless of the program's ownership, it would need to include financing capacity, home improvement expertise, and auditing capacity for measurement and verification of the value created by the improvement.

⁴² [frb.org/community-development/files/2018/04/climate-adaptation-investment-and-the-community-reinvestment-act.pdf](https://www.frb.org/community-development/files/2018/04/climate-adaptation-investment-and-the-community-reinvestment-act.pdf)

CONCLUSION

Current funding sources are not capable of responding to water infrastructure needs in the face of climate change and declining local government fiscal health. Adaptation of new funding and financing tools to accommodate innovation should be a priority for policymakers, funders, and developers. Many of these are already being pursued by individual local governments and stormwater utilities, but their adoption must become more widespread to be impactful and develop a broader market.

Nationally, less attention has been paid to the development of financial products that can be used by individual property owners to make flood reduction investments

on their own properties, possibly using energy efficiency programming and financing as a model. This concept needs further development and this paper is meant to serve as a first step toward a more thorough examination.

CNT is now circulating this paper for comments from key partners and experts in water financing. Questions, suggestions, and concerns are all welcome! Comments should be directed to Bob Dean (bobdean@cnt.org or 773-917-5898) or Jen McGraw (jen@cnt.org or 415-644-0877).