

Hunting for Money: U.S. Cities Need a System for Financing Climate Resilience and Adaptation

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The growing number of studies and emerging innovations in climate resilience and adaptation financing for cities is setting the stage for developing a comprehensive system—a set of standardized products and services, practices and tools—that is able to overcome key barriers and to take advantage of opportunities posed by climate change. Emerging elements of standardization in public finance within the financial system are becoming evident, but it is up to cities to act collaboratively with the private sector and other levels of government to help bring it into existence.

Barriers to financing substantial urban resilience and adaptation investments and the need for an overarching system that meets cities' needs were laid out in a recent study for the City of Boston. By example, the \$2 to \$4 billion of investments called for the city's resilience plan would require a mix of creative solutions outside the bounds of traditional city financing strategies and reliable state and federal funding sources.¹ The research concluded that even if Boston could obtain 50 to 60 percent of what it might require from federal and state governments, the city would still need to borrow private capital, backed by local property taxes and/or fees on water and sewer users, to cover the gap.² It would also likely need to enable at-risk districts in the city to charge local property owners to cover the cost of engineering and community resilience projects that would directly benefit them. In addition, the city would need new standardized measures for the performance of resilience actions; strong justifications for private and public investment; new or revised financing mechanisms that address risks due to climate change; ways to make sure that financing burdens and benefits are fair and equitable; new governance arrangements; and revisions in state and city policies.

Similar conclusions have been reached in other cities where the initial need for resilience and adaptation investments, both public and private, cannot be met by the current fiscal system supported by state and federal subsidies and conventional local taxing powers. The Boston report was the latest in a series of studies by some individual U.S. cities and metropolitan regions—Miami Beach, Minot, ND, New York City, and the San Francisco Bay Area among them—to figure out how to pay for their climate resilience and

1 Levy, D. "Financing Climate Resilience: Mobilizing Resources and Incentives to Protect Boston from Climate Risks," Sustainable Solutions Lab, University of Massachusetts (2018), available at <https://www.greenribboncommission.org/document/financing-climate-resilience-report/>.

2 Ibid.

adaptation plans.³ At the same time, C40 Cities, the Environmental Defense Fund, 100 Resilient Cities, and other organizations have produced white papers and case studies showing how specific types of climate resilience projects can be financed through particular mechanisms and instruments, such as green bonds.

Solving Boston’s climate finance problems, or those of any U.S. city, is a complex task. But the difficulties at the local level are indicators of an even bigger challenge—how to revise the U.S. system supporting urban and infrastructure investment so that cities throughout the nation can obtain the financial resources—easily amounting to hundreds of billions of dollars—that they will need to build their climate resilience and adaptive capacity. As the report for Boston put it, “[a] systematic approach to fund or incentivize pre-disaster resilience at these various scales does not exist.”⁴

Climate Risk Disrupts Financing

Many U.S. cities report that a key barrier to implementing climate-resilience plans and projects is the availability of financial resources to cover the significant up-front and ongoing costs. Even large, affluent cities do not currently have the financial capacity in place to fund all of their plans. Some cities in weaker financial condition may hesitate to even start planning for resilience for fear they will not be able to afford to implement plans. Cities that have developed plans generally identify a large number of projects and programs across three broad categories:

- **Infrastructure**, the improvement, construction, or removal of built infrastructure;
- **Services**, the provision of programs and resources that reduce social vulnerability to climate hazards; and
- **Risk management**, the stand-by capacity, including property insurance, for emergency response and financial recovery.

Cities have historically paid for infrastructure, services, and risk management by tapping into a complex array of local, state, and federal government funding sources (taxes, user fees, grants, tax expenditures, etc.) and private financing mechanisms (municipal bonds, public-private partnerships, insurance, philanthropic grants and social investments), each with its own legal and administrative requirements, capital-managing institutions, and amounts

3 Northcross, M. et al. “Finance Guide for Resilient by Design: Bay Area Challenge Design Teams,” NHA Advisors (2017), available at <http://arccalifornia.org/wp-content/uploads/2018/01/RBD-Financing-Guide-NHA-Advisors-171204-Final.pdf>; AECOM. “Paying for Climate Adaptation in California: A Primer for Practitioners” (2018), available at <https://www.aecom.com/paying-climate-adaptation-california-primer-practitioners/>; and Keenan, J.M. *Climate Adaptation Finance and Investment in California*, Routledge (2019), available at <https://www.routledge.com/Climate-Adaptation-Finance-and-Investment-in-California/Keenan/p/book/9780367026073>.

4 Levy, D. “Financing Climate Resilience” (2018), p. 3.

of capital. But climate change has introduced new factors that complicate and hinder once reliable public funding and private financing.⁵

There is Insufficient Public Revenue

Cities already face an infrastructure investment deficit. Their general fund budgets are constantly under pressure, and they have intense competition for the use of their financial resources. They will need much more money for resilience and adaptation projects and most of it will have to come from public sources—taxpayers and public-service users. For many cities, though, raising new public revenue may be constrained by state laws limiting property taxes or requiring super-majorities of voter approval, and by local political, financial, and economic conditions.

Climate Change Poses New Risks and Uncertainties

Climate change increases the risk of destructive, acute, chronic, and catastrophic weather hazards, but the timing and severity of these impacts—their future patterns—has some degree of uncertainty. This disrupts traditional methods of calculating and pricing risk, a crucial factor for long-term investments, such as private lending for city infrastructure, for property and other insurance, and for real-estate financing. In addition, current risk-assessment methods tend to underestimate the potential damage from some climate events. Extreme weather events are already disrupting traditional city revenue streams. For example, post-Sandy communities lost revenue from falling property values, particularly from abandoned properties. Meanwhile, there are uncertainties about the performance and effective lifespan of some types of climate-driven projects, such as green infrastructure and sea barriers, which make it difficult to estimate the value of the protection they provide. Few design thresholds for physical infrastructure have been adapted to projected changes in weather and climate to ensure safe, effective, and efficient operation.

Inherent Imbalances between the Burdens and Benefits

Many resilience efforts involve short-term costs, but only produce value in the long term. Some reduce future climate damage and produce multiple future benefits, but do not generate financial returns for private capital. For example, existing utility business models struggle to capture the long-term value of resilience investments that produce an avoided cost rather than a positive cash flow. In addition, resilience projects typically entail investments by public agencies, but many of the benefits accrue to private property owners. The siloed structure of government agencies, budgets, and revenue sources gets in the way of investing in resilience projects with multiple benefits, such as green infrastructure, because

5 Northcross, M. et al. “Finance Guide for Resilient by Design” (2017); AECOM. “Paying for Climate Adaptation in California” (2018); Coffee, J. *Money for Resilient Infrastructure: How to Finance America’s Climate Changed Future*, Amazon Digital Services, LLC (2018); Keenan, J.M. *Climate Adaptation Finance* (2019).

it fragments government's interest and resources. Increasing public revenue to invest in resilience inevitably raises concerns about fairness and equity: who pays, how much they pay, and what benefits they obtain. Fairness, Boston's report explained, "means that the cost burden broadly reflects benefits provided. Equity means that the cost burden reflects ability to pay, and that resilience projects do not exacerbate inequalities. These two goals are often in tension."⁶

Public Policies and Markets are Misaligned

Some crucial government programs have been designed in such a way that they incentivize the wrong kind of behaviors relative to climate investments. Government "last resort" insurance tends to incentivize development in places at risk of climate damage, while "post-disaster" funding focuses mostly on rebuilding as-it-was rather than on building resilience and adaptive capacity to climate change. The federal government's flood insurance programs underestimate potential climate hazards and often underprice or overprice risk relative to projected future conditions. Some state insurance commissions prohibit risk-adjusted insurance premiums to shield risky properties from high premiums. The insurance sector has had little reason to signal increased climate risk or incentivize risk reduction—although recent hurricanes and forest fires have shifted that calculus, particularly in the reinsurance market. The industry sets rates based on historical data and focuses on providing widespread or affordable coverage. Competition among insurers limits their interest in offering incentives or issuing new coverage requirements. The insurance industry is further discouraged from offering incentives because of uncertainties about the effectiveness of risk-reduction measures and the difficulties of monitoring such efforts. Real estate markets do not provide climate-risk information and in some cases have resisted the potential adoption of public policies to require such disclosure. Climate risks are not factored into mortgage interest rates—yet.

Outside Traditional Municipal Jurisdictions

Climate impacts regularly cross municipal boundaries and affect multiple municipalities and interdependent built infrastructure and natural systems that are managed and regulated by separate government agencies. Responding effectively requires a level of collaboration for planning, budgeting, funding, and operations that is rare among siloed local government entities and may not be legal in some cases. Boston's report found that "[f]inancial and governance mechanisms don't yet exist for transfers across municipalities, for example, to enable fees from Boston buildings to pay for upstream investments, or for developers to offset stormwater impacts in Boston with mitigation measures in other communities."⁷ At

6 Levy, D. "Financing Climate Resilience" (2018), p. 5.

7 Ibid, p. 23.

the same time, some climate impacts are experienced at the district, rather than citywide, scale. Although states and cities provide for various district financing mechanisms (e.g., tax increment financing, business improvement districts), they have not been designed for, and may not permit investment in climate resilience.

A Flood of Financial Innovations

Dozens of innovative efforts are underway to address these new challenges, and examples of successful implementation are emerging from cities across the country. They revise some of the financing mechanisms, analytic tools, investment standards, government regulations and policies, and governance and institutional arrangements that provide cities with money. However, most are “one-off” innovations developed through significant time and resource investment by an individual city, nonprofit organization, financial institution, or insurer for a specific project or financial mechanism. Furthermore, these many efforts are largely disconnected from each other. The public and private sector stakeholders engaged in climate finance efforts do not have a shared vision, common framework, or strategies for developing, as quickly as possible, a comprehensive, large-scale system for underwriting, capitalizing and managing urban climate investments.

These efforts provide potentially useful opportunities to learn what works and doesn’t work—a testing ground for innovations. But they do not sum-up to a new system for meeting cities’ climate capital needs. Our research identified 30 types of innovative activities that seek to address barriers and opportunities in climate financing and investment. Table 1 contains examples, categorized by the type of climate-resilience financial problem they address.

Table 1. Innovations in Climate Finance

Generating Public Revenue for Climate Investment
Improving comprehensive cost-benefit analysis (CBA) to make the case for public return on resilience-project and plan investments, including valuation of ecosystem services.
Requiring that city infrastructure projects and capital budgets incorporate climate risk and vulnerability analysis and adaptation plans to ensure that future spending contributes to resilience.
Expanding targeted federal disaster recovery funds (already in state government hands) for pre-disaster planning in eligible communities.
Issuing “resilience bonds” that generate risk-reduction rebates from a city’s catastrophe insurance premiums to pay for resilience projects.
Creating local stormwater markets and credit trading that incentivize private property owners to invest in reducing stormwater runoff.

Managing Financial Risk Posed by Climate Changes
Developing metrics and disclosures that enable financial markets to incorporate risk more accurately into asset values and interest rates.
Packaging bonds for city resilience and adaptation projects with climate-risk insurance to serve as a credit-enhancement.
Using “pay for performance” design in “Environmental Impact Bonds,” which make the amount of payments to lenders contingent on performance of the adaptation measures, such as green infrastructure.
Preparing and regularly updating accurate flood-risk maps for cities and making them available to the public.
Balancing Burdens and Benefits of Investing in Climate Resilience and Adaptation
Designing city climate investment plans to combine citywide revenues, district-scale revenues, and incentives for private investment in ways that are fair and equitable.
Using community-based organizations and financial institutions to develop and finance projects that advance economic and social equity in the city.
Aligning Public Policies to Support Investment in Climate Resilience and Adaptation
Replacing National Flood Insurance Program with lower-cost state programs.
Increasing participation in FEMA Community Rating System (CRS) in which municipalities earn credits (discounted NFIP premiums up to 45 percent) for different flood-reduction activities.
Using risk-adjusted insurance premiums and longer-term property insurance policies.
Requiring climate-risk disclosure for private real estate and public assets.
Leveraging/Catalyzing Private Capital for Climate Resilience and Adaptation
Issuing municipal “Green Bonds” to attract capital to bundles of resilience projects.
Establishing public-private partnerships to bring private expertise and capital to the design, financing, construction, operation and/or maintenance of a publicly-owned asset, with contracted payments based on project revenues.
Using green bank loan programs to property owners to increase engineering resilience functionality.
Using density bonuses and other development incentives to induce climate investment.
Revising Government Jurisdictions to Address the Geography of Climate Solutions
Jointly planning and financing infrastructure investments across municipal and utility jurisdictions, including the creation of single entities, such as flood and resilience districts, to conduct this integrated work.
Creating special-purpose resilience and/or flood districts.
Developing coastal master plans that cover multiple communities.

We believe that to scale the needed financial investment, cities need to move beyond reliance on “one-off” projects and adopt a systemic approach to climate-resilience finance. Cities need money for implementing their climate-resilience plans and, even more broadly, they and their capital-providing sources need to factor climate resilience into all future investments in the city’s infrastructure and services. We envision this would take the form of a set of standardized practices and guidelines shaping the financial system capitalizing urban investment, with known rules for making financial transactions involving climate projects. This system would have three main elements:

- *City transaction capabilities*, including climate resilience and adaptation planning, investment planning, governance arrangements at metro-regional and city district scales, and public revenue sources and funding mechanisms;
- *State, federal, and regional government policies*, including climate resilience and adaptation planning requirements and support, climate standards, flexible governance structure frameworks, insurance market regulations and public “last resort” insurance, grant and loan funds for city climate-resilience projects; and
- *Financial, insurance, and real estate markets*, including climate products and services, risk assessment, disclosure, and pricing, lending and investment standards.

The city climate financial system we envision would not be a single, centralized system or a one-stop shopping model for cities. Instead, it would be a system of systems—a distributed set of technical capacities, public policies, and standardized mechanisms for public funding and private financing that provide cities with pathways to capital for not only resilience and adaptation but also investments made in the name of climate mitigation. It would build on existing distributed urban financing systems, modified to address climate resilience and adaptation.

Accelerating Emergence of a New System

The abundance of innovative efforts presented in Table 1 amount to an early stage of experimentation that could transition into a more standardized and impactful system. This can be done by engaging cities, the private sector, and other levels of government in coordinated and strategic work focused on building the system’s main elements. Collaborators would seek to: (i) enhance city capacities to conduct resilience and adaptation financing transactions; (ii) align state and federal government policies for climate resilience and adaptation; and (iii) scale-up promising innovations in the financial, insurance, and real estate sectors. A great deal of the burden for initiating a comprehensive effort of this sort would fall on cities acting collectively to build a system, not individually to solve immediate problems.

The many years of working with cities on climate and sustainability innovations convince the authors of this article that cities can be engaged to link, learn, and align with each other. They can act in concert with relevant private sector actors and other levels of government

to develop and implement projects that build a climate-sensitive financial system. But they don't yet have a collective path forward or the substantial and sustained support they will need to imagine and implement a new systemic solution to climate challenges. Philanthropic funding and convening power could play a crucial role in advancing the development of the needed system for climate finance and investment. Foundations have already backed many of the innovations underway, and they have contributed to the development of urban climate-resilience planning processes and capacities. Their relationships with cities and innovators in other relevant sectors, as well as their ability to provide financial support, position foundations and other community development organizations, such as Community Development Financial Institutions (CDFIs), to catalyze productive new collaborations to solve the pressing problem of the mobilization of systems supporting climate finance and investment.

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