Financing Resilience
The Big Challenge
UP AND UP AND UP. Every day the cars of the Coney Island Cyclone—one of the nation’s oldest surviving wooden roller coasters—slowly rattle their way along a steep incline to the ride’s first drop. The Cyclone is on the National Register of Historic Places. It has a baseball team named after it. An American cultural icon, it is also a good metaphor for the state of climate change and the U.S.

The Cyclone’s highest drop is 85 feet. The plummet from climate change won’t be measured in feet, but in its effects on homeowners and business owners, real estate values, infrastructure, cities, states—and taxpayers.

The costs of climate change continue to rise significantly. And they are not sustainable. Yet even in the face of this massive challenge, there is a path forward. We know what the risk is. We know why and what we need to build. We just don’t know how we’re going to pay for it.

Our nation needs to create resilient cities and infrastructure. The biggest obstacle to advancing these projects is financing their construction.
In November 2016, more than 40 representatives of government officials, engineers, scientists, civic planners, non-profits, and finance professionals gathered at the Boston offices of GZA, an engineering and applied science firm with expertise in climate change resiliency and adaptation planning and design. GZA sponsored the New England Environmental Business Council (EBC) workshop entitled “Financing Resilience: The Big Challenge” to take the early steps towards solving the challenge of financing climate change resiliency.
INVESTING PROACTIVELY

PREPARING OUR NATION for the effects of climate change is an expensive proposition, but justified by the risk. “The U.S. financial exposure is huge,” says Daniel Stapleton, Senior Principal and head of GZA’s Risk Management and Climate Change group. “The U.S. government incurred over $375 billion in direct costs during the last decade due to weather related disasters. This number, however, does not capture all taxpayer costs. For example, $60 billion was spent in supplemental appropriations in response to Hurricane Sandy. In addition, national flood and crop insurance programs add additional costs annually. So annual costs of weather related disasters on the order of $500-$600 billion is not impossible in the future. That’s 2 to 3% of U.S. GDP.”

FEMA estimates, as a rule of thumb, that every $1 invested in proactive disaster mitigation is worth about $4 in prevented loss. A 2014 report by the Center for American Progress and the Political Economy Research Institute at the University of Massachusetts estimated that over the next two decades, the cost of preparing the US economy and infrastructure for climate change would total $200 billion per year. The value of proactive investment in climate change resiliency to prevented loss is clear. This is in contradiction to the reactive way natural disaster response is funded today. “We do not want to continually be looking in the rearview mirror,” says Wayne Cobleigh, GZA Principal and a speaker at the November event. “The current model is broken. If we just pick up the pieces after each disaster without planning for the next one, it’s like a dog chasing its own tail. Proactively investing in climate change resiliency is the key.”

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Every $1 invested in proactive disaster mitigation is worth about $4 in prevented loss.
According to Stapleton, resiliency projects are currently paid for through two primary mechanisms:

“First, the cost of resiliency is passed on directly to the consumer. This is known as the direct revenue method. An example of this is a developer complying with building code regulations for flooding. In this case, the cost of resilience is integrated with other construction costs and becomes part of the project financing. Another example is passing the cost onto rate payers for lifeline facilities like waste water treatment plants and power plants. Yet another example is when companies add the cost of resiliency to the cost of their products and services. In general, financing resiliency through direct revenue is very efficient—that is, the costs are clearly supported by the benefits with little waste. Second, the cost of resiliency is passed on directly to the taxpayer and distributed by the government. Examples of this are federal and state grants and subsidized infrastructure spending. For example, HUD provided $43 billion between 2005 and 2013 to fund projects to enhance resiliency including $930 million for Hurricane Sandy. This form of financing resiliency is essential, in particular for projects that are considered public goods, but not always efficient since there is often waste and a disconnection between risk, cost and benefit.”

These funding mechanisms fall short, however. For example, for low to moderate income homeowners and small businesses, paying for resiliency can be a real challenge. Julie Wormser is the Vice President of Policy and Planning for Boston Harbor Now, a non-profit working to preserve the environmental, economic, and cultural uses of the city’s waterfront and islands. “When a financing solution is able to align profitability with preparedness, it will be successful,” she says. “Until then, it will be unsuccessful.” Passing on the cost of climate change resiliency directly to the U.S. taxpayer will not be sustainable—in particular in our political climate of no significant tax increases and high federal debt.
So alternative funding sources are needed to create climate change resiliency on a national scale.

The November GZA-sponsored EBC workshop covered both existing and new, innovative climate change resiliency financing mechanisms.

**GRANTS AS INCUBATOR FUNDING.**
Federal and State grants can serve as incubator funding for resiliency planning. For example, the Massachusetts’ Coastal Resilience Program provides roughly $2 million worth of grants each year to the State’s coastal communities to finance resiliency planning and small projects. While not enough to finance municipal-scale projects, these types of grants can provide the mechanism to identify and conceptually design projects to position them for additional funding—either public or private.

**SUPPORTING PROPERTY OWNERS.**
For a large number of property owners paying for resiliency can be a real challenge. And impacts to property owners can have major consequences if they result in mortgage defaults and loss of property tax income to municipalities. A combination of state grants and low interest loans can help these property owners. For example, Connecticut’s “Shore Up Connecticut” program provides subsidized loans to homeowners located along the coast for the purpose of making resiliency improvements. However, this State funding, which is taxpayer subsidized, is generally inadequate to meet the needs of property owners.

According to one of the EBC workshop presenters, Matt Macunas, the Connecticut Green Bank presents an innovative opportunity—state-backed, asset-backed low interest loans from private banks. The Connecticut Green Bank currently finances renewable energy projects for commercial buildings through their Commercial Property Assessed Clean Energy (C-PACE) program. The bank is an example of an intermediary institution connecting public money from a small surcharge on electric rates and leveraging that public investment to attract multiples of private investment from capital markets. C-PACE uses the money that property owners save on energy costs to pay for the project financing. Since 2013, the program has gone from 100 percent government funded to just 38 percent government funding in 2016, with the remainder coming from the private market. During that time period, the Connecticut Green Bank has spurred $93 million in project financing. Connecticut Green Bank’s C-PACE program uses a municipal benefit assessment mechanism, meaning that the investment and loan are tied to the value of an underlying property rather than the creditworthiness of an individual property owner. This provides investors security in their risk-adjusted returns. Like a utility payment, the payment obligation for the bundle of energy-saving measures transfers with property ownership.

“The concept is to use the Green Bank C-PACE as a model for financing property-scale resiliency, in particular for homeowners,” says Cobleigh. “While this loan model for retrofitting buildings presents some challenges when applied in the residential sector, it can make for a more stable long-term investment that improves the cash flow of a property, which has already shown to be attractive to commercial lenders.”

**BUILDING BIG PROJECTS.**
State grants and low-interest property loans are important but can’t finance large, municipal-scale resiliency projects. These type of large infrastructure projects can cost millions to hundreds of millions of dollars. Further, state revolving funds, which are usually 80 percent federal and 20 percent state funded, are challenged in supporting the number and scale of municipal-scale climate change resiliency projects. A new form of financing for these types of projects is needed.
Direct Revenue

**Benefits**
- efficient, very little waste, cost integrated with construction costs or passed to rate payers

**Challenges**
- for low to moderate income homeowners and small businesses, it’s not easy to afford
Taxpayer Funds

Benefits
- essential for public goods, powerful response after catastrophic events

Challenges
- not always efficient, and not sustainable in high-debt and low-tax environment

Government Grants
Subsidized Infrastructure Spending
Energy Efficiency
### Capital Markets

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<tr>
<th>Benefits</th>
<th>Challenges</th>
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<td>deepen capital base, fills gap for entities without resources to fund resiliency independence</td>
<td>new products, need refinement and expansion</td>
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- Asset-backed low-interest loans
- Private Investment
- Insurance and Reinsurance Products
- Municipal, Catastrophe, Resiliency and Green Bonds
SO WHAT ALTERNATIVES ARE AVAILABLE?

- PUBLIC-PRIVATE PARTNERSHIPS “P3”
- TAX INCREMENT FINANCING (TIF)
- BONDS
PUBLIC-PRIVATE PARTNERSHIPS “P3”

P3s are contractual agreements formed between a public agency and a private sector entity that allows for greater private sector participation. It is typically used for the delivery and financing of infrastructure projects. For these types of projects, the public funding sources generally come from bonds, taxes or Tax Increment Financing or TIFs. The return on the private investment comes through the collection of tolls, use-fees, etc. P3s currently make up only a small percentage of infrastructure projects but a growing one. In particular, P3s are allowed by many (but not all) states and are being increasingly used for water infrastructure projects such as drinking water, wastewater and stormwater projects. These types of projects are usually contracted with the private sector through Design-Build or Design-Build-Manage project delivery methods. A significant challenge for use of P3s on climate change resiliency projects is that there is not a clear and obvious model for providing a return to private investors. For example, sea walls do not usually come with a user fee. So investor return needs to come through typical appropriations and tax revenue.

TAX INCREMENT FINANCING (TIF)

TIF is an economic development tool available to local governments to finance public infrastructure improvements. Typically, the municipality creates a TIF authority and designates the community where the program will be applied (the TIF district). This type of financing depends on fixing the taxable worth of real property within the TIF district at the value at the time the program is approved. Tax payers within the TIF district make tax payments based on the “increased” property value, and the increased taxes are applied to project construction or to repay construction financing. “If property values drop to zero, that’s a real problem for everybody, because that’s our tax base,” says Wormser. “Is it possible to pay for the necessary resilience projects with water bills in part, combined with something like cuts in flood insurance premiums? Any solution has got to be a combination of carrots and sticks.” The increased resiliency within a TIF district is usually expected to spur more investment and in turn further increase the area’s property value.
BONDS

Tax-exempt municipal bonds have been the principal financing tool for municipalities to fund capital costs related to infrastructure projects. These bonds are usually revenue bonds payed for by user fees. Investor-earned interest is tax exempt. While municipal bonds are common, smaller municipalities can have limited access to markets. Green bonds attract investors interested in projects with environmental or sustainability benefits. Resilience bonds present an alternative bond product. Says Stapleton, “I expect that risk-based financial instruments will become an important way to finance resiliency for municipalities, states, and institutions within the U.S.” There is a precedent for risk-based financial instruments—catastrophe bonds.

Catastrophe bonds, or “cat” bonds, are a form of insurance-linked security—their payouts and investments are tied to insurance. “All of this is about spreading risk,” says Rhodri Lane, Vice President at GC Securities. “Catastrophe bonds create a pool of insurance risk, and involving the capital markets broadens the parties that can participate in the insurance investment and who also share in the insured risk; which can stabilize the overall available risk capital.” Because these bonds have exhibited a low correlation to overall market conditions, as are many other investments, they are attractive to investors seeking true diversity in a portfolio. And these bonds have been successful.

Catastrophe bonds outperformed the S&P 500 over the past 12 years with significantly less volatility. The total market for these products recently hit an all-time high in 2016: about $26.5 billion. The goal of resilience bonds is to link catastrophe bonds—an insurance product—to capital investment in resiliency infrastructure. “Resilience bonds leverage existing catastrophe bond technology and are insurance products for specific natural disasters with possible financial benefits when more resilient conditions are achieved,” says Lane. A resilience bond accounts for the lowered risk to a community as a result of the added protection from the construction of a new resiliency project. That lowered risk leads to lower insurance costs, as well as lower financial losses after a natural disaster. The money saved from these lowered payments and risks could conceptually be issued by a resilience project owner as a rebate, which can be used to pay for the ongoing operation and maintenance of the resiliency project. While no resiliency bonds have been issued yet, these bonds offer an opportunity to create a promising financing model for resiliency projects.
TOWARDS A SOLUTION

Just as certain as the drop on the Coney Island Cyclone, the bill for climate change will come due. Proactive investment to create climate change resiliency can reduce the cost of that bill to property owners, to local government, and to the U.S. taxpayer.

The November, 2016, a GZA-sponsored EBC workshop “Financing Resilience: The Big Challenge” was the start of an ongoing and necessary conversation and identified a range of traditional and innovative new solutions for solving the challenge of financing climate change resiliency. The best solutions will draw from multiple sources—government grants, property-assessed value of the C-PACE and R-PACE programs managed by Green Banks, P3s, Tax Increment Financing and Resilience Bonds. Says Stapleton: “The goal of the workshop is to start the conversation. Because even with all the great climate change science, studies and planning that has been done in the U.S., the central issue remains: How to pay for it all?”
The goal of the workshop is to start the conversation. Because even with all the great climate change science, studies and planning that has been done in the U.S., the central issue remains: **How to pay for it all?**
GZA is interested in your ideas and connecting with experts in financing resilience.

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to advance these solutions.