



FINANCING HIGH-PERFORMANCE INFRASTRUCTURE



CAPITALIZING ON INNOVATIVE FINANCING TO BUILD HIGH-PERFORMANCE INFRASTRUCTURE

High-performance infrastructure seeks to achieve outcomes—such as improved climate resilience or social impacts—not just construct projects. As a result, high-performance infrastructure attracts more diverse funding sources and achieves multiple benefits for communities.

Many states and local governments are struggling to meet the investment needs of their basic infrastructure. From roads and bridges beyond their useful lifespan, to stormwater systems and flood controls with years of deferred repairs, to energy inefficient buildings, communities are suffering from significant modernization needs. As traditional municipal and state revenue streams continue to dwindle, communities are under increasing pressure to justify every expense and exhaust every funding resource.

At the same time, natural disasters are occurring more frequently and are increasingly severe. All levels of government, individual households, and businesses are shouldering the high cost of disaster recovery. Communities are looking for new ways to become more resilient to these challenges. By investing in climate-resilient transportation, water, power, and buildings, communities can prevent billions in future climate-related damages and economic losses.

By linking resilience and green design, communities are accessing new funding opportunities to increase the value and performance of their infrastructure networks. Vulnerable infrastructure isn't limited to individual physical assets like bridges and buildings, but includes distributed systems responsible for moving electricity, commodities, and information. Many strategies for modernizing these systems can include green elements, such as clean energy, stormwater best management practices, and adaptive design. These green elements can lower cost and resource use over time. Improving resilience also reduces investment risk, making these projects more attractive to investors and insurance companies while opening paths to innovative financing products for states, cities, and local governments.

U.S. states and cities have started turning to the bond market for innovative green financing solutions. The traditional bond market has been a trusted financial avenue for U.S. municipalities for generations. Green bonds represent a new and innovative approach. They combine the robust municipal bond market with features of socially responsible investing designed to finance green projects and assets with bond proceeds, reducing overall investment risk. In 2015 alone, U.S. states, cities, and businesses issued over \$10.5 billion in green bonds. In addition to lower risk profiles, resilience projects realize a variety of returns, from lower utility and maintenance costs, to reduced insurance premiums.

BY THE NUMBERS

**\$500
BILLION**

WEATHER-RELATED
COVERED LOSSES IN
THE U.S. BETWEEN
1980-2010

\$1 → \$4

\$1 SPENT ON
MITIGATION SAVES
AN AVERAGE OF \$4
IN RECOVERY COSTS

**\$10.5
BILLION**

TOTAL ESTIMATED
VALUE OF GREEN
BONDS ISSUED IN
THE U.S. IN 2015

**\$215
MILLION**

AVERAGE AMOUNT
RAISED PER GREEN
BOND ISSUANCE IN
2015 (WORLDWIDE)

HOW TO ISSUE GREEN BONDS



**LOCATE QUALIFYING
GREEN PROJECTS OR
ASSETS TO FUND WITH
GREEN BONDS**



**IDENTIFY AN ISSUANCE
GROUP TO STRUCTURE,
UNDERWRITE, AND
MARKET GREEN BONDS**



**COMPLETE THE
VERIFICATION STEPS
REQUIRED TO CONFIRM
PROJECT ELIGIBILITY**



**ISSUE BONDS AND TRACK
THE FUNDS TO ENSURE
THAT NET PROCEEDS ARE
LINKED TO THE PROJECT**

GREEN BONDS DIFFER FROM STANDARD MUNICIPAL BONDS IN THREE WAYS:

- 1) The bonds are labeled as “green” by their issuer;
- 2) Proceeds are earmarked for green investments; and
- 3) Bond proceeds are tracked to ensure green compliance.

EXPLORING THE BOND MARKET FOR FUNDING GREEN AND RESILIENT INFRASTRUCTURE

Eligible infrastructure projects cover multiple sectors, creating many opportunities for funding resilience efforts at the local level

While there are not yet any universally accepted criteria for green project eligibility, best practice guidelines have been developed as a voluntary standard. The Green Bond Principles (GBP) were launched in 2014 by an international group of financial institutions to provide broad categories for suitable green activities. In practice, however, all green requirements are left to the issuer to define and verify. Broad green project categories suggested by the Green Bond Principles include:

- Renewable energy and/or energy efficiency (including efficient buildings)
- Sustainable waste management
- Sustainable land use (including sustainable forestry and agriculture)
- Biodiversity conservation
- Clean transportation
- Clean water and/or drinking water
- Climate change adaptation

In most cases, a well-designed resilience project will feature critical green elements, making it applicable to many of the categories listed above. Distributed infrastructure networks are particularly well-suited for green investment, given the wide range of sectors (water, energy, transportation, waste) that these systems rely upon. By effectively linking green design and climate resilience, green bonds provide a significant opportunity to help communities invest in high-performance infrastructure built to mitigate the impact of climate change.

BEYOND GREEN BONDS

Alternative financing mechanisms for high-performance infrastructure

CATASTROPHE BONDS

The current market for climate resilience-related bonds is generally limited to catastrophe bonds (also known as cat bonds). These are financial instruments that provide disaster insurance to sponsors and provide a return to investors. Catastrophe bonds are not linked to projects but simply provide an additional hedge against future losses.

RESILIENCE BONDS

Resilience bonds—instruments which evaluate the impact of a resilience project on the investor's expected loss—are currently under development and are an intriguing option for communities seeking to fund resilience-specific projects. Proceeds from the issuance of resilience bonds are earmarked for a specific resilience project designed to reduce the risk of future damages.

Given the reduced risk-profile of resilience bonds, investors accept a lower payout after the project is completed. This risk reduction may also result in lower insurance costs to communities, a benefit not associated with catastrophe bonds.

SOCIAL IMPACT BONDS

Social Impact Bonds are another potential tool for funding resilience projects that focus on community safety and welfare. Investors provide the initial capital while the government entity agrees to make payments only when targeted outcomes are achieved. Over 17 states and local governments are using Social Impact Bonds to address a range of social issues.

GREEN BOND CASE STUDIES



Green bond proceeds are helping the MA Dept. of Conservation and Recreation acquire and protect natural habitats, such as 70 acres of coastal property within the Great Marsh

Issuance Amount: \$450 million
Year: 2013 and 2014
Type of Bond: General Obligation

In 2013, the Commonwealth of Massachusetts sold \$100 million in green bonds, representing the first ever green bond issuance by any state or local government in the U.S. In September of the following year, the state sold \$350 million in green bonds, more than triple the size of last year's sale. Both bonds were rated AA+.

Eligible project categories included:

1) Land Acquisition, Open Space Protection & Environmental Remediation, 2) River Revitalization and Preservation & Habitat Restoration, 3) Energy Efficiency & Conservation, and 4) Clean & Drinking Water.

Learn more at:
<http://www.massbondholder.com/>



MTA's green bond proceeds are paying for continuing work on infrastructure renewal and projects that began during the MTA's 2010-2014 Capital Program

Issuance Amount: \$500 million
Year: 2016
Type of Bond: Revenue Bond

In 2016, New York's Metropolitan Transportation Authority (MTA) offered its first-ever green bonds to the public in a two-day order period. The bonds are certified by the Climate Bonds Initiative, an international not-for-profit organization that supports financing for projects around the world that help reduce the impacts of climate change.

The bond proceeds will pay for continuing work on infrastructure renewal and upgrade projects on New York City Transit, Long Island Rail Road and Metro-North Railroad that were begun during the MTA's 2010-2014 Capital Program.

Learn more at:
http://web.mta.info/mta/investor/investor_02.htm



Iowa's SRF green bond proceeds are being used to finance projects that adhere to the federal Clean Water Act and Safe Drinking Water Act, such as efforts to restore the Big Sioux River

Issuance Amount: \$321.5 million
Year: 2015
Type of Bond: Revenue Bond

In 2015, the Iowa Finance Authority issued \$321.5 million in State Revolving Fund green revenue bonds. These bonds were issued with 1 to 5 percent coupons and were rated AAA. The green bonds were backed by water-related fees and taxes.

The Iowa State Revolving Fund in turn makes loans to Iowa municipalities to build or upgrade drinking water and wastewater infrastructure. Proceeds for the green bond sale were earmarked for water and wastewater projects that adhere to the federal Clean Water Act and Safe Drinking Water Act.

Learn more at:
<http://www.iowasrf.com/>

CAPTURING THE VALUE OF HIGH-PERFORMANCE INFRASTRUCTURE PROJECTS

Investments in resilience and green design can pay off in a variety of ways

Municipalities may struggle to conceptualize and communicate the many benefits of resilient and green projects. While the savings captured from avoided costs are easy to understand, these benefits are not fully realized until a disaster has occurred. However, there are additional values that should be taken into consideration when planning a resilience project, some of which can be realized almost immediately after project completion. Below are two examples of high-performing buildings which provide many additional benefits, such as reduced operating costs and services to building users. *Source: [2015. Returns on Resilience: The Business Case. Urban Land Institute.](#)*

SPAULDING REHABILITATION HOSPITAL (BOSTON, MA)



This waterfront non-profit hospital includes a variety of green and resilience features, based in part upon the lessons learned from Hurricane Katrina. Spaulding's primary resilience measure included encasing the high-voltage electrical riser throughout the building, reducing the risk of a flood knocking out the power.

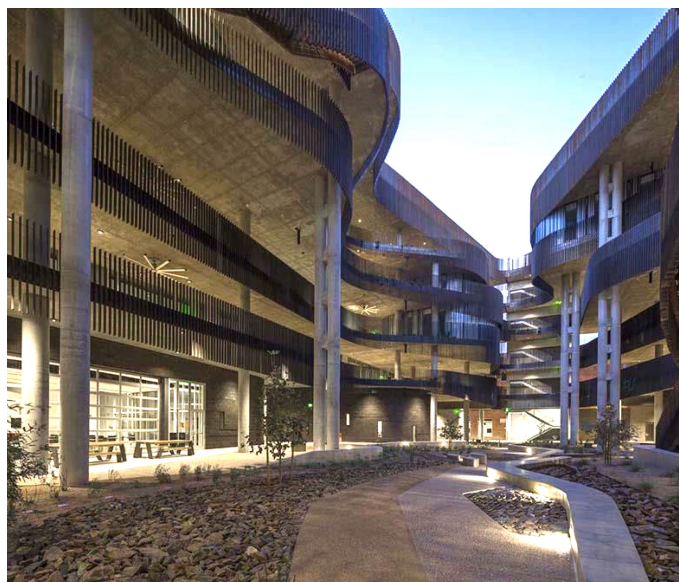
Investments in the building envelope and more efficient mechanical systems have had a rapid payback, reducing the hospital's first-year operating costs by \$400,000.

Green features have also played a role in enhancing the reputation of the hospital in the community, while the flood-resilient landscape doubles as a patient rehabilitation therapy area.

ENVIRONMENT AND NATURAL RESOURCES 2 (ENR2) BUILDING (TUCSON, AZ)

ENR2, a new five-story, 150,954 ft² building on the University of Arizona campus in Tucson, utilizes cutting edge design to save energy and water. Slated for LEED Platinum certification, the building's key resilience features are its passive energy systems, building orientation, and courtyard design that creates a natural cooling effect, reducing air conditioning needs by 30 percent.

The building also addresses drought risks with water harvesting systems, including a 52,000-gallon underground holding tank. Benefits include a projected 30 percent annual savings on energy costs, enhanced recruitment of staff and students, and features that extended building life.



RESOURCES FOR INNOVATIVE FINANCING

Technical assistance and guidance available from HUD

TECHNICAL ASSISTANCE ON INNOVATIVE FINANCE

HUD provides a variety of types of technical assistance (TA) to help communities plan and finance resilience projects, large and small. For organizations that currently receive funds directly from HUD, in-depth programmatic TA is available for organizations seeking guidance on innovative financing. To access this service, please visit the HUD Exchange website and submit a TA request. When submitting a TA request, please select “Innovative Finance for Resilient Infrastructure” under the “Community Resilience” Topic. <https://www.hudexchange.info/get-assistance/technical-assistance/>

COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG) PROGRAM

HUD estimates that states spend roughly half of their Community Development Block Grant (CDBG) allocation on infrastructure; individual localities spend about one-third of their CDBG funding on infrastructure projects. HUD CDBG funds can be used by local communities as a ‘match’ for other federal funds and may be eligible for predevelopment activities.

<http://portal.hud.gov/hudportal/documents/huddoc?id=BAInfraResGuideMay2015.pdf>

SECTION 108 LOAN GUARANTEE PROGRAM

The related Section 108 Loan Guarantee Program allows local governments to transform a portion of their CDBG funds into federally guaranteed loans large enough to pursue physical and economic revitalization projects. Loans typically range from \$500,000 to \$140 million.

<https://www.hudexchange.info/programs/section-108/>

HUD EXCHANGE COMMUNITY RESILIENCE PORTAL

HUD provides a portal of free resources for communities to use on the HUD Exchange dedicated to community resilience. This portal catalogues a set of public resources and case studies that local planners can use to help plan and prepare for changing natural hazards when undertaking HUD-funded activities. www.hudexchange.info/manage-a-program/community-resilience

Resources and guidance available from other federal agencies

DEPARTMENT OF THE INTERIOR NATURAL RESOURCE INVESTMENT CENTER

This new center uses market-based tools and innovative public-private collaborations to conserve natural resources, enhance efficient water allocation, and promote increased investments in critical infrastructure in conjunction with the Department’s programs, bureaus, and offices.

<https://www.doi.gov/invest>

ENVIRONMENTAL PROTECTION AGENCY WATER INFRASTRUCTURE AND RESILIENCY FINANCE CENTER

This new center provides financial expertise to communities that finance drinking water, wastewater, and stormwater infrastructure. <https://www.epa.gov/waterfinancecenter>

DEPARTMENT OF TRANSPORTATION BUILD AMERICA TRANSPORTATION INVESTMENT CENTER (BATIC)

This new center assists states, municipalities and project sponsors looking to utilize federal transportation expertise, apply for federal transportation credit programs, and explore ways to access capital. <https://www.transportation.gov/buildamerica>

Resources developed by non-governmental organizations

THE GREEN MUNI BONDS PLAYBOOK

This playbook, published by the U.S. Green City Bonds Coalition, provides guidance on designing and issuing green municipal bonds. <http://www.climatebonds.net/files/files/Green%20City%20Playbook.pdf>

THE WORLD BANK GREEN BOND TOOLKIT

This primer was developed by the World Bank and covers the principles of this relatively new financial instrument. As of 2015, the World Bank has issued over 100 green bonds.

<http://treasury.worldbank.org/cmd/htm/What-are-Green-Bonds-Home.html>

CLIMATE BONDS INITIATIVE

The Climate Bonds Initiative is an international, investor-focused not-for-profit entity. It is an industry leader, focusing on mobilizing the \$100 trillion bond market for climate change solutions. In addition to providing useful data and guidance, the Climate Bonds Initiative manages a Climate Bonds Certification process, backed by the Climate Bond Standards Board. <https://www.climatebonds.net/>

ROCKEFELLER FOUNDATION RESOURCES

The Rockefeller Foundation continues to be a leader in the socially responsible investment space, funding research and helping to scale innovative social impact investment approaches. The Foundation has helped fund a new report on Resilience Bonds and developed a new financial product designed to support resilient infrastructure investment.

<http://www.refocuspartners.com/reports/RE.bound-Program-Report-December-2015.pdf>

For more on Social Impact Bonds visit:

<https://www.rockefellerfoundation.org/our-work/initiatives/social-impact-bonds/>

RETURNS ON RESILIENCE: A BUSINESS CASE

This report by the Urban Land Institute uses multiple case studies to demonstrate how resilience projects capture additional value, such as better financing, more competitive insurance premiums, lower utility costs, and greater returns on investment.

<http://uli.org/wp-content/uploads/ULI-Documents/Returns-on-Resilience-The-Business-Case.pdf>

REGIONAL INFRASTRUCTURE ACCELERATORS

Accelerators like the West Coast Infrastructure Exchange help catalyze innovative infrastructure efforts that spur private sector innovation, allocate life cycle project risks most efficiently between the public and private sectors, and build resilience considerations into the design process.

<http://westcoastx.com/about/>



HUD.GOV

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Office of Community Planning and Development

Office of Economic Resilience

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July 2016