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Investing in Resiliency with
Green and Blue Bonds



BNY MELLON

Investing in Resiliency with Green and Blue Bonds



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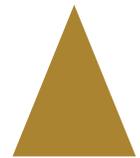
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Investing in Resiliency with Green and Blue Bonds



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Investing in Resiliency with Green and Blue Bonds



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Green and Blue Bonds for Resilience

Overview

CDFA

Elizabeth Bellis Wolfe

April 19, 2022

What is resilience?

Resilience is the ability to prepare for and adapt to changing conditions, and to withstand and recover rapidly from disruptions.

--U.S. Department of Energy North American Energy Resilience Model, citing Presidential Policy Directive (PPD)-21: Critical Infrastructure Security and Resilience.

Resilience investments improve the ability of assets and systems

- to persist, adapt and/or transform
- in a timely, efficient, and fair manner
- that reduces risk, avoids maladaptation, unlocks development and creates benefits, including for the public good,
- against the increasing prevalence and severity of climate-related stresses and shocks.

-- Climate Bonds Initiative's Climate Resilience Principles (CRPs)

What are the costs of inadequate resilience investment?

- The natural disasters of the past few years (including Superstorm Sandy, Hurricanes Katrina, Harvey, Maria, Irma, and most recently Michael) offer a sample of the adverse impacts on the well-being of our citizens.
 - Hurricane Maria caused parts of Puerto Rico to be without full power for more than a year.
 - Superstorm Sandy's impact was widely experienced by 24 states, totaling **\$72 billion USD** in damage, and caused widespread outages to critical electrical and water services.
 - Superstorm Sandy also resulted in **159 deaths** and the closure of the New York Stock Exchange for two business days.
- The increasing coupling of the natural gas and electric infrastructure has resulted in new operational and energy planning reliability challenges. Gas-dependent electrical generators can simultaneously experience outages during gas supply disruptions caused by extreme events, such as polar vortexes, hurricanes, and earthquakes.
- Such large economic impacts pose a significant financial and safety risk.

What are some examples of investments that may improve resilience?

The U.S. Department of Energy and the national laboratories have identified technologies and investments that can improve resilience, including:

- **Distributed generation and storage:**
 - Distributed solar plus storage, particularly with off-grid capable inverters and systems. See [DG Guide | Introduction \(ornl.gov\)](#); just-released FOA at <https://www.energy.gov/eere/solar/articles/funding-notice-renewables-advancing-community-energy-resilience-racer>.
 - The distributed nature of solar plus storage can increase resilience and assist in faster restoration efforts by generating electricity locally, near the customers, and avoiding the need for fuel deliveries.
- Replacing generators with energy storage (e.g., batteries, fuel cells, capacitors, and/or flywheels) for spinning reserves
- **CHP.** See [Combined Heat and Power for Resiliency - Completed | Better Buildings Initiative \(energy.gov\)](#)
- **Hydroelectric power generation**
 - See, e.g., [DOE Prize Seeks to Maximize Hydropower's Ability to Support Grid Reliability and Resilience | Department of Energy](#).

Some states identify and prioritize critical facilities for hardening and continuity of operations, such as water and wastewater treatment plants, hospitals and long-term care facilities.

Example of Green Resilience: Replacing Generators with Batteries for Spinning Reserves

- The balance between adequate electricity power quality and delivery is delicate— constant adjustments, such as spinning reserves, are required to maintain good power quality and reliable service.
- Traditionally, generators that are online and partially loaded are used to provide spinning reserves. When needed, the generator can increase or decrease power output. There is a cost to reserving a generator for spinning reserves, as it is not operating at its most economical dispatch point and loses opportunity to be compensated for providing energy at its maximum capability. Further, as uncertainty associated with system components (e.g., renewables) and potential damage (e.g., due to extreme weather events) increases, the quantity and cost of spinning reserves increases.
- An alternative way to provide spinning reserve is using energy storage, including devices such as batteries, fuel cells, capacitors, and flywheels. The value of energy storage comes from responding within milliseconds or minutes to system needs, and the ability of storage to respond faster than generators can buy time for an offline and less costly generator to come online. This approach will contribute to less cost and generator emissions as resources are called on when needed, instead of idling generators, freeing up generators to run at full capacity and produce more electricity.

How can resilience be financed?

- Cost recovery for resilience investment is often challenging.
 - See [July 2019 North American Energy Resilience Model](#) (citing [2016: A historic year for billion-dollar weather and climate disasters in U.S. | NOAA Climate.gov](#)); [feur_11_resilience_final_20190401v2.pdf \(doe.gov\)](#)
- Green and blue bonds are one way to address this challenge.
 - In October 2017, Fiji issued a \$50m (USD) sovereign green bond to support climate change mitigation and adaption; the majority of the bond proceeds was allocated to build resilience in highly vulnerable areas (coastal and river) and sectors (agriculture, health and education infrastructure, rural housing and community driven development). See [Green Bonds for Climate Resilience \(gca.org\)](#)
 - The European Bank for Reconstruction and Development (EBRD) issued a labelled 'Climate Resilience Bond' in January 2020 to support climate-resilient infrastructure, climate-resilient businesses, and climate-resilient agriculture and ecological systems.

What are Green and Blue Bonds?

- Multiple definitions, taxonomies and standards exist
- A green bond is a bond whose proceeds are used for capital investments or improvements that bond investors may consider “green”, such as: energy efficiency, renewable energy, public transportation, clean air, waste management, conservation, and certain water projects
- The World Bank defines a “blue bond” as a debt instrument issued to finance marine- and ocean-based projects that have positive environmental, economic and climate benefits.

Green Bonds for Blue Projects?

- Many green bonds are used for water-related projects.
- 16.4% (1,265) of deals in the global labelled green bond market (7,725 deals) up to September 2020 included activities related to climate adaptation and resilience, mostly in the water and water-related sectors.
- For example, as of 2017, as many as **47 percent** of municipal labeled green bonds were for water-related projects such as improvements to wastewater and sewage systems to control pollution. See Wolfe, E. & Williamson, S.
- Similarly, by number of deals, water efficiency accounted for 77% of the bonds identified, water treatment accounts for 5%, wastewater treatment for 4%, and flood control for 2%. See Green Bonds for Climate Resilience (gca.org).

US state & local green bonds for resilience

We'll hear today from Connecticut and Hawaii on their recent successes. In addition:

- Multiple **Michigan** green bonds have financed environmental and natural resources protection programs that would clean up and redevelop contaminated sites, protect and improve water quality, prevent pollution, abate lead contamination, reclaim and revitalize community waterfronts, make state park infrastructure improvements, enhance local recreational opportunities, and clean up contaminated lakes, rivers and streams.
- **New Jersey** Infrastructure Bank's multiple green bond issuances aim to improve wastewater treatment
- **Iowa** Finance Authority's green bonds provide loans under the 'Iowa Water Pollution Control Works and Drinking Water Facilities Financing Program'
- **Atlanta, Georgia** issued a \$14 million environmental impact bond to fund six stormwater projects in economically distressed neighborhoods

Sources: [Green Bonds for Climate Resilience \(gca.org\)](https://www.gca.org/); [HE_Funding-strategies-flood-mitigation-handout.pdf \(climate.gov\)](#)

Resources

- [Funding Opportunities | U.S. Climate Resilience Toolkit](#)
- [July 2019 North American Energy Resilience Model](#)
- [DOE Prize Seeks to Maximize Hydropower's Ability to Support Grid Reliability and Resilience | Department of Energy](#)
- [Workshop: Building a Resilient Community Using Distributed Energy Resources | Department of Energy](#)
- [Combined Heat and Power for Resiliency - Completed | Better Buildings Initiative \(energy.gov\)](#)
- [DG Guide | Introduction \(ornl.gov\)](#)
- Wolfe, E. & Williamson, S., [Leveraging Bond Financing to Support Energy Efficiency and Renewable Energy Goals: A Resource Summary for State and Local Governments | Department of Energy](#) and related webinar “Bond Financing for Energy Efficiency and Renewable Energy: Overview for State and Local Leaders”, April 19, 2018 ([PowerPoint Presentation \(energy.gov\)](#))

Q&A

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Investing in Resiliency with Green and Blue Bonds



Eric Shrago

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CONNECTICUT
GREEN BANK SM

Connecticut Green Bank

A Planet Protected by the Love of Humanity

Green Bonds US



Connecticut Green Bank is the nation's first green bank. Established in 2011 as a quasi-public agency, the Green Bank uses limited public dollars to attract private capital investment and offers green solutions that help people, businesses and all of Connecticut thrive.

Our mission is to confront climate change and provide all of society a healthier and more prosperous future by increasing and accelerating the flow of private capital into markets that energize the green economy.

**Guiding this mission is our vision for
“...a planet protected by the love of humanity.”**

Connecticut Green Bank

Vision, Goal, and Target



...a planet protected
by the love of humanity

- **Goal** – to strengthen Connecticut’s communities, **especially vulnerable communities**, by making the benefits of the green economy inclusive and accessible to all individuals, families, and businesses.
- **Target** – by 2025, no less than 40 percent of investment and benefits (e.g., jobs) from Incentive and Financing Programs is directed to **vulnerable communities**.



Connecticut Green Bank



About Us

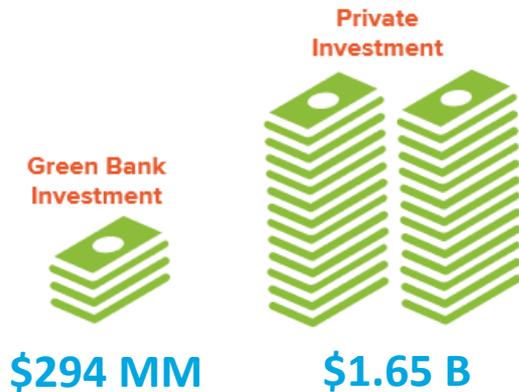
- **Quasi-public organization** – broad enabling statute and powers set forth in Conn. General Statute 16-245n
- **Focus** – Finance clean energy (e.g., renewable energy, energy efficiency, and alternative fuel vehicles and infrastructure) by leveraging public capital with multiples of private capital
- **Support** – from a variety of sources, including:
 - **State Support** – \$0.001/kWh surcharge (i.e., Clean Energy Fund) on electric ratepayer bills (about \$7-\$10 per household per year ≈ \$26 MM per year) and RGGI allowance proceeds about \$3-5 MM per year (renewable energy)
 - **Federal Support** – competitive solicitations (e.g., SunShot), non-competitive resources (e.g., ARRA-SEP, USDA, etc.), and maybe a National Climate Bank
 - **Other Support** – issue “green bonds,” interest income, private capital (e.g., impact investors), and foundations (e.g., PRI’s)

Connecticut Green Bank



Impact Investment – Social and Environmental

INVESTMENT



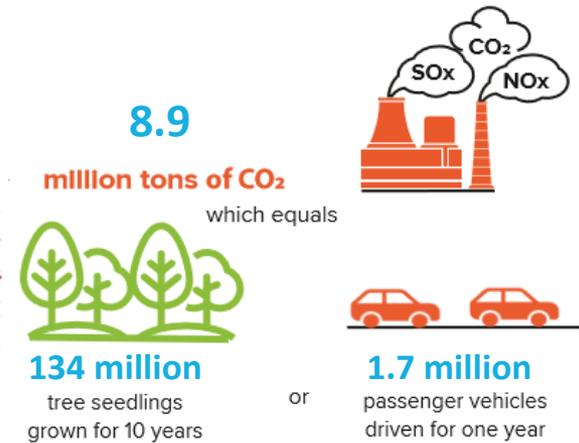
ECONOMIC DEVELOPMENT



families
55,000+

businesses
375+

ENVIRONMENTAL PROTECTION



TAX REVENUES



PUBLIC HEALTH SAVINGS



REFERENCES

Comprehensive Annual Financial Report for FY2020 (p. 110)

Why have we created the
Green Liberty Bond?











Green Bonds



Green Bonds Can Solve Our Climate Crisis

Forbes



Green Bonds Can Solve Our Climate Crisis



By Miriam Tuerk
August 28, 2019

Those of us involved in the clean tech industry are well aware that financing is a key component of growing clean tech adoption. Despite a rise in Environmental, Social and Governance (ESG) investing, the financial services industry still has a lot of work to do to assist in the global effort against climate change. As with all things, this brings both social responsibility and business opportunity.

...

Here are some examples of companies leading the charge:

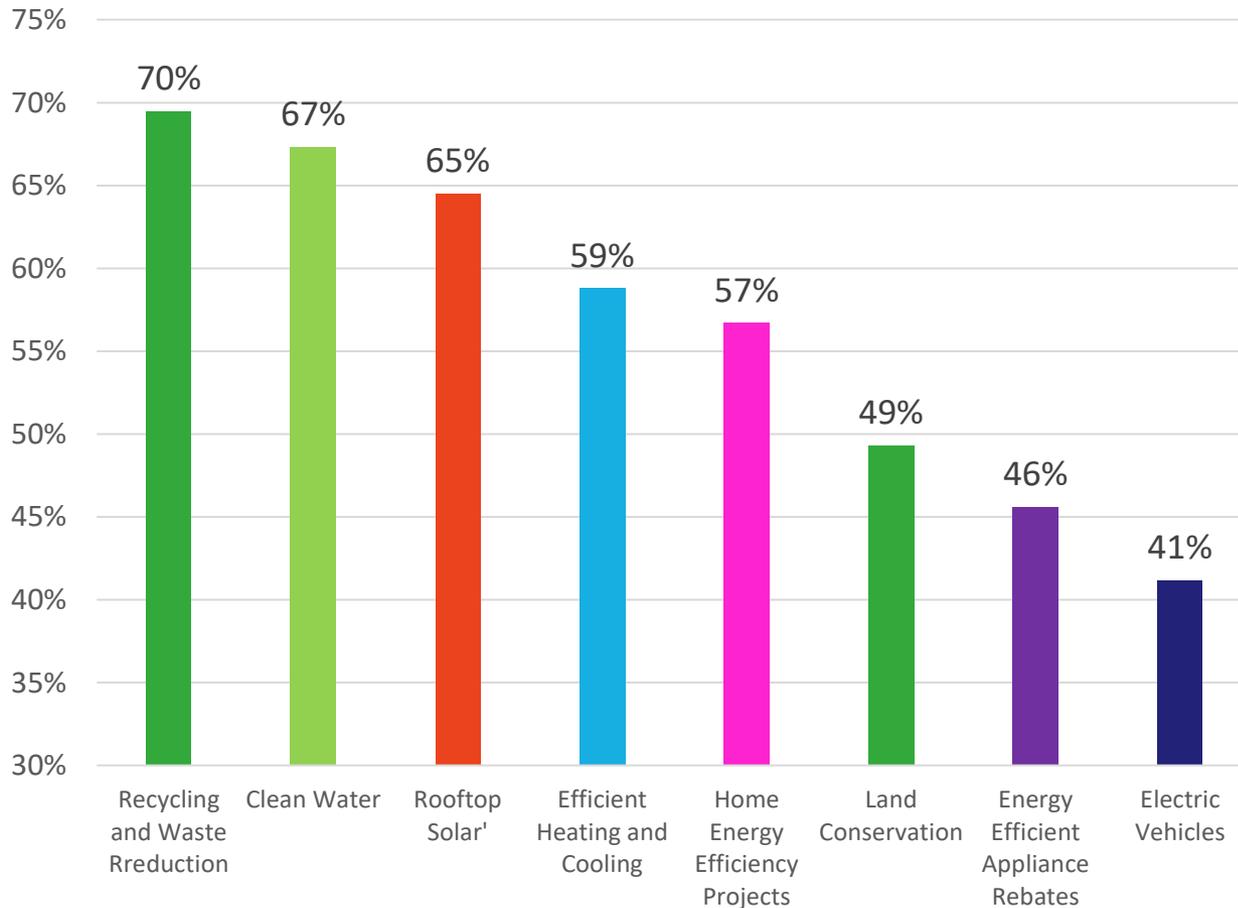
Connecticut Green Bank

While not a utility, the Connecticut Green Bank completed an [issuance](#) of \$38mm for Connecticut's Residential Solar Investment Program (RSIP) in May. RSIP [provides](#) homeowners with a rebate of \$0.46 cents per watt of solar installed in order to help offset the costs of installing residential solar power.

Citizen Engagement Research



Types of Green Projects for Investment

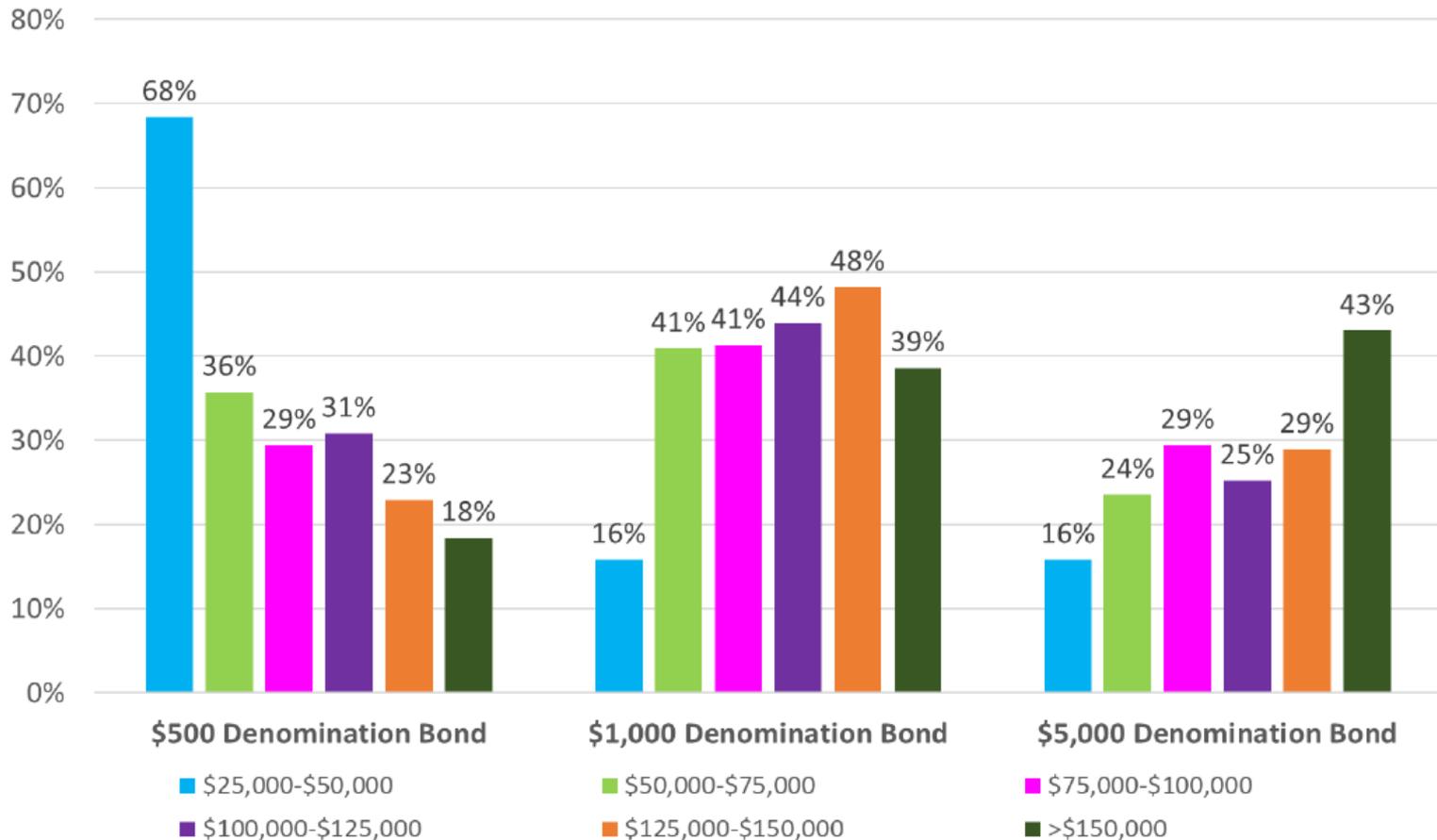


REFERENCES

Research conducted by GreatBlue Research on behalf of the Connecticut Green Bank. Two targeted audiences were reached – households that have installed residential solar PV in CT and general population of CT (i.e., households that haven't participated in a Connecticut Green Bank Program).

Citizen Engagement Research

Equitable Access to Green Bond Investment



REFERENCES

Research conducted by GreatBlue Research on behalf of the Connecticut Green Bank. Two targeted audiences were reached – households that have installed residential solar PV in CT and general population of CT (i.e., households that haven’t participated in a Connecticut Green Bank Program).

Green Liberty Bonds

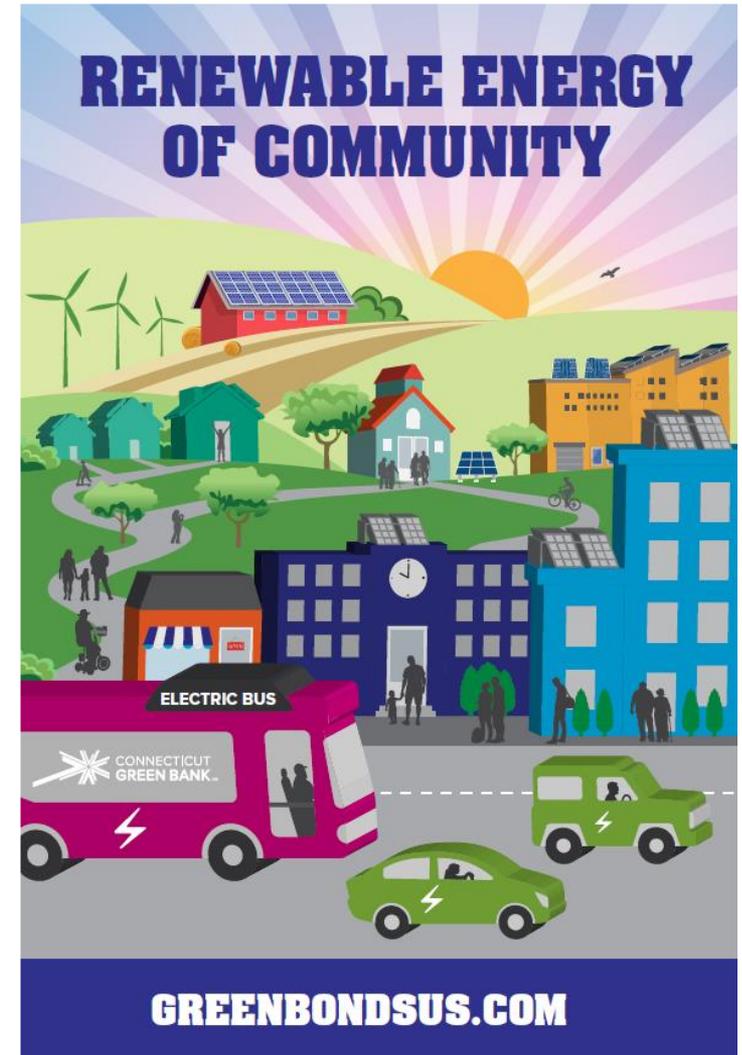
Celebrating the 50th Anniversary of Earth Day



Green Liberty Bonds

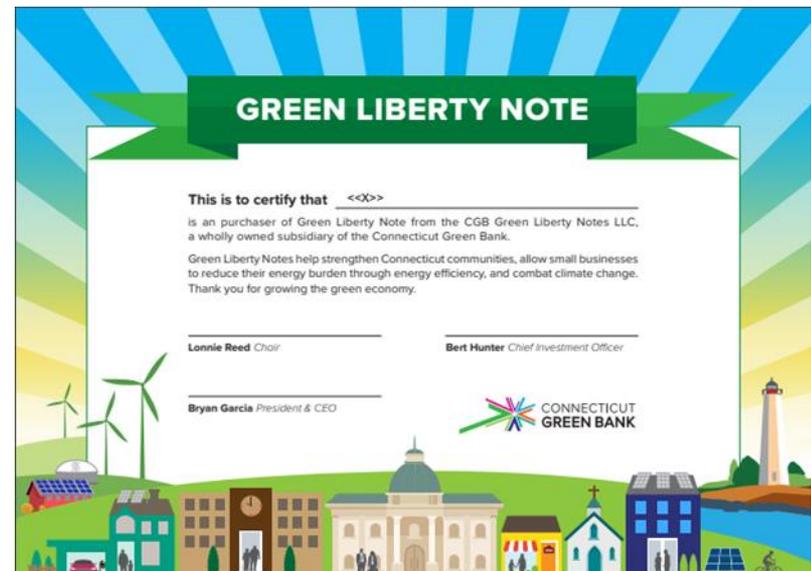
Three Features of the Green Bond

- **Use of Proceeds** – use of proceeds from the bond are invested to *combat climate change* (i.e., support Paris Agreement with mitigation and adaptation projects) and create jobs in our communities
- **Retail Accessible** – bonds available to purchase by *everyday citizens* (vs. institutional investors only) in small denominations (i.e., ≤\$1,000)
- **Certified and Verified** – independently certified (e.g., Climate Bonds Initiative, Green Bond Principles, etc.) and verified as a climate bond or green bond for *consumer protection*



Green Investment Solutions

- Launching in honor of Earth Day, the second investment offering from our subsidiary, CGB Green Liberty Notes LLC
- Allows citizens to invest to confront climate change with as little as \$100
- Investments support energy efficiency for Connecticut's small businesses
- Offering has been verified by a third party for its environmental attributes
- Offered in partnership with Raise Green
- Visit www.greenlibertynotes.com for more



Bond Issuances



Issuance	Type	Proceeds	Use
SHREC Series 2019-1 Class A and Class B	Asset Backed Security	\$38,527,549.54	The proceeds from this offering were used to reimburse the Green Bank for incentives and program administration costs of the RSIP.
SHREC Green Liberty Bonds, Series 2020	Municipal Bond	\$16,795,000.00	
SHREC Green Liberty Bonds, Series 2021	Municipal Bond	\$24,834,000.00	
Green Liberty Note 1, December 2021	Crowd Funded Note	\$180,000.00	The proceeds were used to support the Green Bank's purchase of Small Business Energy Advantage Loans from Eversource and lower the cost of operating the program for Ratepayers
Green Liberty Note 1, April 2022	Crowd Funded Note		

As we look to a broader mission supporting resilience and the environmental infrastructure in Connecticut, we will look for ways to leverage our bonding capacity to efficiently raise capital and crowd in support from the public.



Thank You

Connecticut Green Bank

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www.greenlibertybonds.com



Investing in Resiliency with Green and Blue Bonds



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CDFA – BNY Mellon Development Finance Webcast Series: Investing in Resiliency with Green and Blue Bonds

Hawaii Green Infrastructure Authority

April 19, 2022



Hawaii Green Infrastructure Authority

Constituted in November 2014, Act 211 (SLH 2013) provided a framework to establish a State administered clean energy financing Authority. Two deliverables:

1. Capitalize the Loan Fund with low-cost capital; and
2. Deploy loans to those previously locked out of solar

GEMS Bond

- Loan fund capitalized with the net proceeds of a \$150.0 million Green Energy Market Securitization (“GEMS”) Bond
- Leveraged a Rate Reduction Bond financing mechanism
- Repaid via a Green Infrastructure Fee by Hawaiian Electric Companies’ ratepayers

Awards & Accolades for the GEMS Bond

- 2014 Council of Development Finance Agencies, Excellence in Energy Finance Award
- 2014 International Financing Review, North America Structured Finance Issue of the Year Award
- 2014 International Financing Review Americas, US Structured Finance Issue of the Year Award
- 2015 The Bond Buyer, Deal of the Year: Non-Traditional Financing

Deliverable #2: HGIA's "WHY"

Objective:

Make clean energy investments accessible and affordable to Hawaii's underserved ratepayers; stimulate private investments and leverage innovative tools to mitigate risks and reach new markets.



Ohana means family and family means no one gets left behind.

Goals

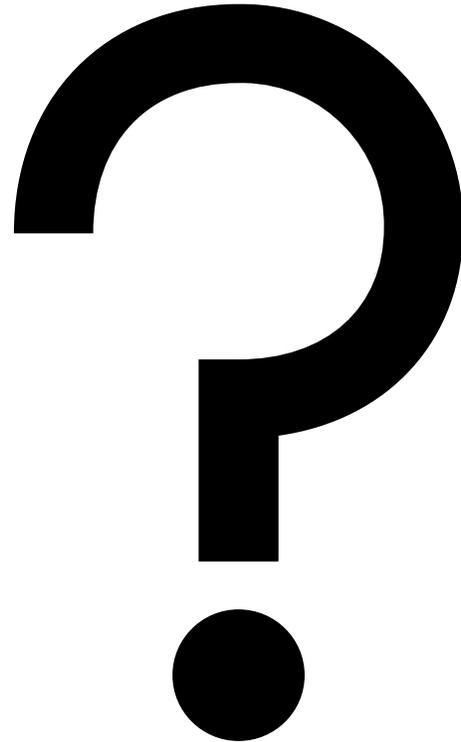
Original 2014 Goal:

At least 51% of the funds to be used to finance LMI households and nonprofits

Current Goal effective 9/1/2019:

100% of the remaining funds to be used to finance underserved ratepayers defined as LMI homeowners, renters, nonprofits, small businesses and multi-family rental projects

Repayment Risk Mitigation

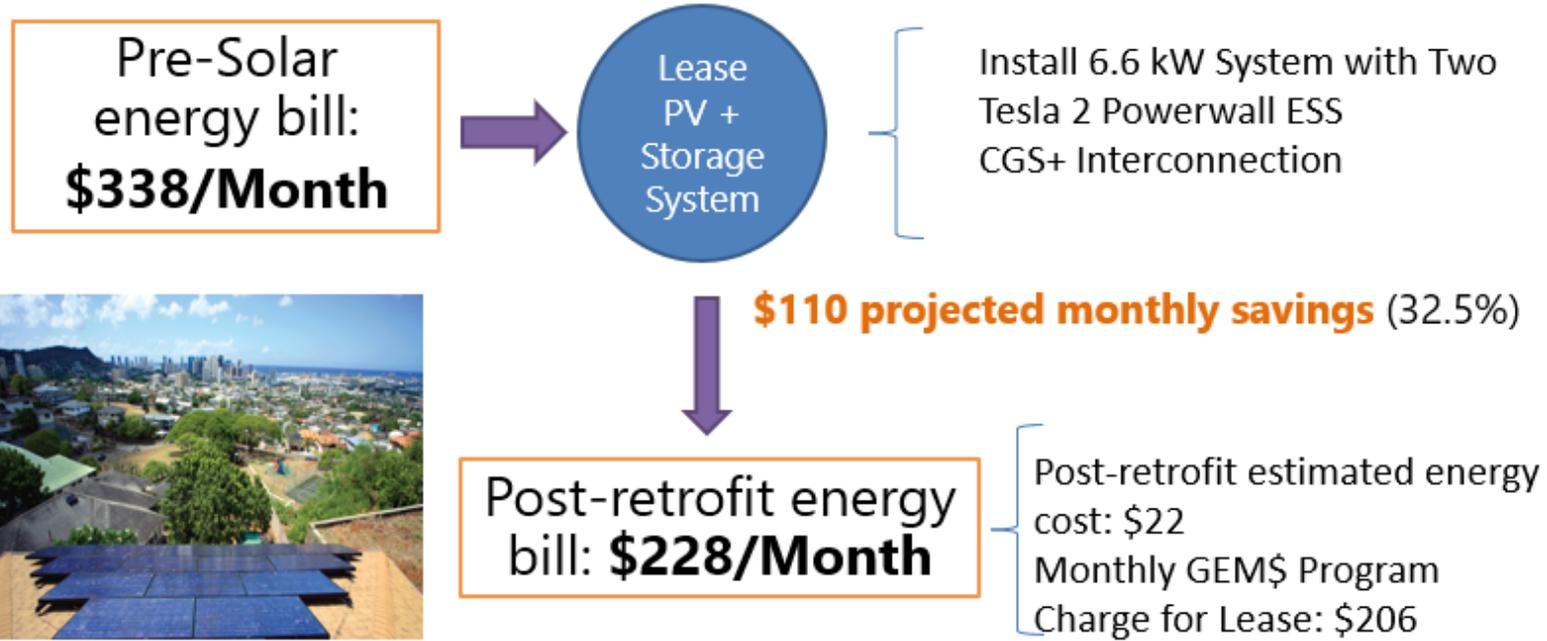


HGIA's "HOW"

Green Energy Money \$aver (GEM\$) On-Bill Program

- Eliminates credit barriers
- Immediate estimated utility bill savings
- Obligation tied to the utility meter (allows for transfer from tenant to tenant)
- Payments conveniently made via monthly electric utility bill

Utility bill: Before & after solar installation



Estimated Energy Savings: **\$24,658**
(over 20-year life of PPA)
Estimated Energy Savings: \$37,291
(of exercise purchase option and purchase price = GEM\$ Loan Balance)



1

More “**HOWs**” Commercial Loan Product

Similar to...

504 Loan Program



U.S. Small Business
Administration

TM



Kahauiki Village Micro-Grid Financing Solution

HGIA's "HOW"

Exciting Elements of K-Village

- Innovative approach to responding to the state's homeless crisis
- Groundbreaking initiative that maximizes public and private resources
- No low-income housing tax credits, no Section 8 Project-Based subsidies, no HHFDC financing
- Multiple Phases aggregating 153 homes
- Rents lower than comparable projects



Scary Elements of K-Village

- Innovative approach to responding to the state's homeless crisis
- Groundbreaking initiative that maximizes public and private resources
- No low-income housing tax credits, no Section 8 P subsidies, no HHFDC financing
- Multiple Phases aggregating 153 homes
- Rents lower than comparable projects



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Hurdles to Overcome

- No historical cash flow to determine feasibility of proforma financial projections
- No Project-Level permanent lender, HHFDC or low-income housing tax credit investor involved to closely monitor project's ongoing financial viability
- No project based subsidies to increase tenant demand
- First Phase consisted of 30 homes. Micro-grid infrastructure to support 153 homes. Project costs "front-loaded" and supported by only 20% of the total projected units
- Desire to minimize the energy cost for the renters



Portfolio Performance

Losses to Date: \$0.00



Thank you

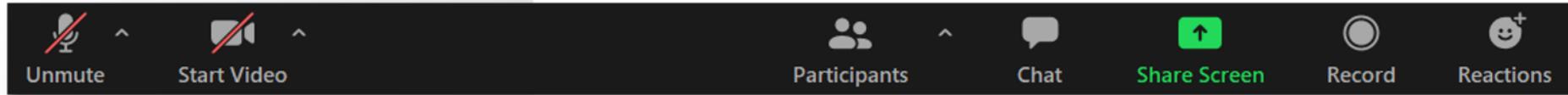
For more information, please contact:

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Infrastructure Authority**

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Audience Questions



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April 25 - 26 // Daily: 12:00 - 5:00 PM Eastern

Advanced Tax Increment Finance WebCourse

April 27 - 28 // Daily: 12:00 - 5:00 PM Eastern

CDFA Food Systems Finance Webinar Series: Where's the Beef? Financing Meat Processing Infrastructure

Tuesday, May 10, 2022 // 2:00 - 3:30 PM Eastern

CDFA // BNY Mellon Development Finance Webcast Series: What Development Finance Needs to Know about Web3

Tuesday, May 17, 2022 // 2:00 - 3:00 PM Eastern

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