Shades of Green in Financing: Green Bonds Defined

Moderator:

- Jessica Rackley, Program Director, Center for Best Practices – Energy, Infrastructure & Environment Division

Speakers:

- Mike Paparian, Senior Advisor, Climate Bonds Initiative
- Bert Hunter, EVP & Chief Investment Officer, Connecticut Green Bank
- Tony DePrima, Executive Director, Delaware Sustainable Energy Utility, Inc.

Green Bonds: Aligning Infrastructure, Finance, Climate

National Governors Association

Lead by Example Workshop

Providence, Rhode Island

October 4, 2019

Michael Paparian

California Representative

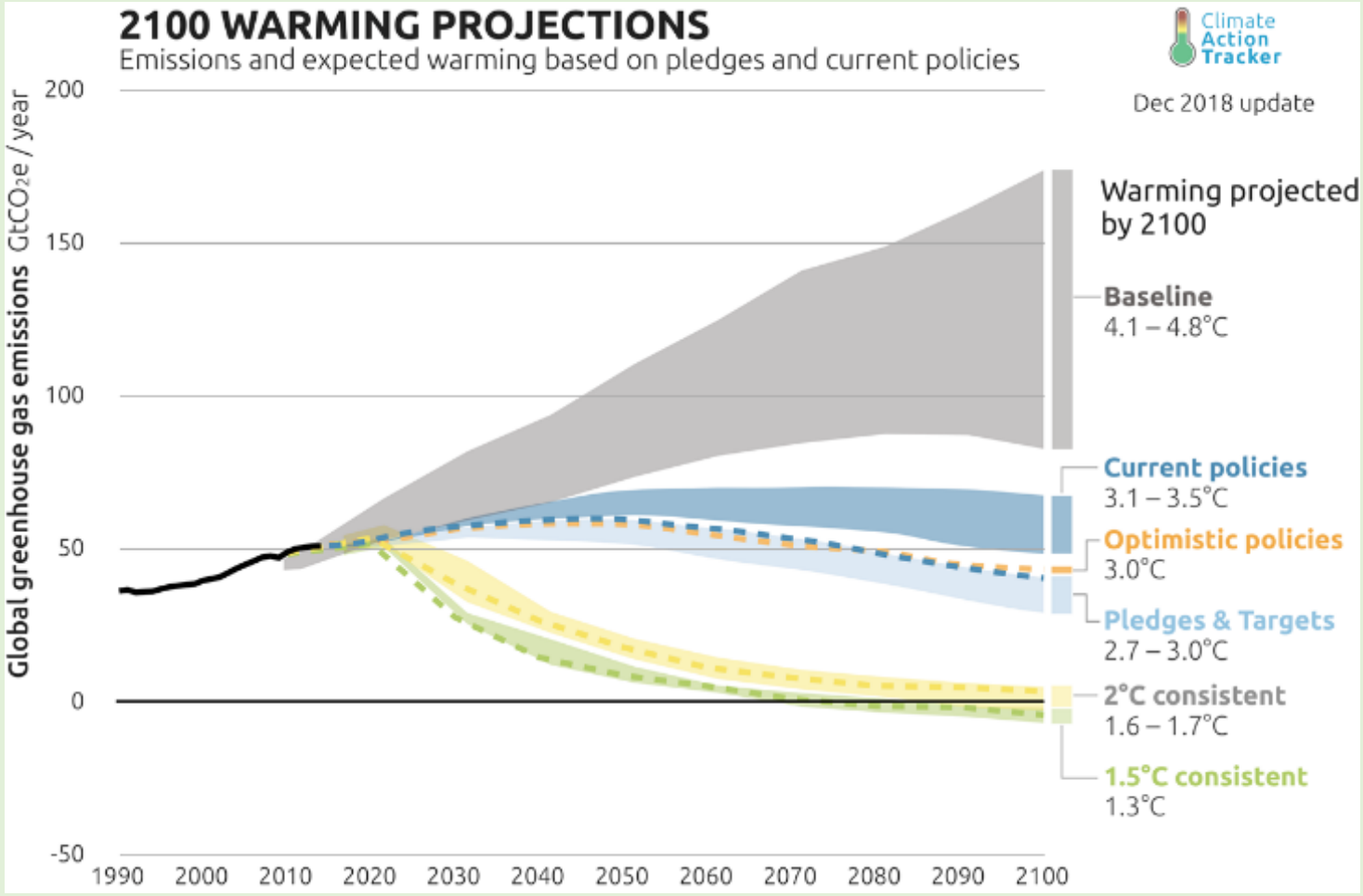
Climate Bonds Initiative

Climate Bonds INITIATIVE

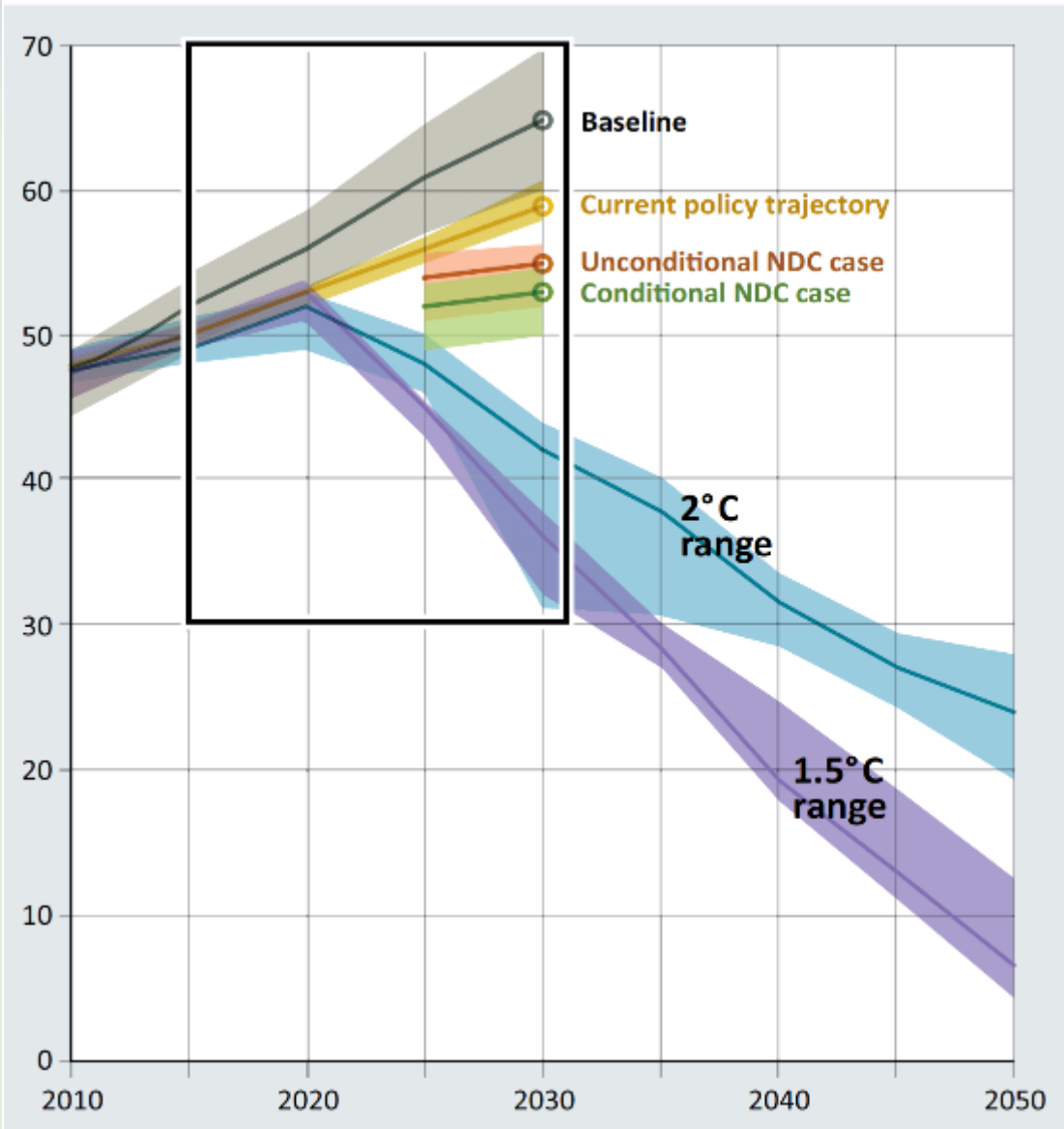
Green Bond Fundamentals

- Why Green Bonds?
- Green Bond Basics
- The Market
- Standards and Certification
- The Path Forward

Climate change will impact infrastructure…



...and the next 10 years will determine how bad it will get.



Annual Global Total Greenhouse Gas Emissions (GtCO2e)

Climate Bonds INITIATIVE

“We need to build trust and reduce risk, make the best use of available resources, and find innovative ways of financing, such as ***green bonds*** *whose viability and success are already realities,” the Secretary-General said.* ***Finance is the key to successful climate action. We need more ambition – climate change is moving faster than we are and this is a war we cannot afford to lose.”***

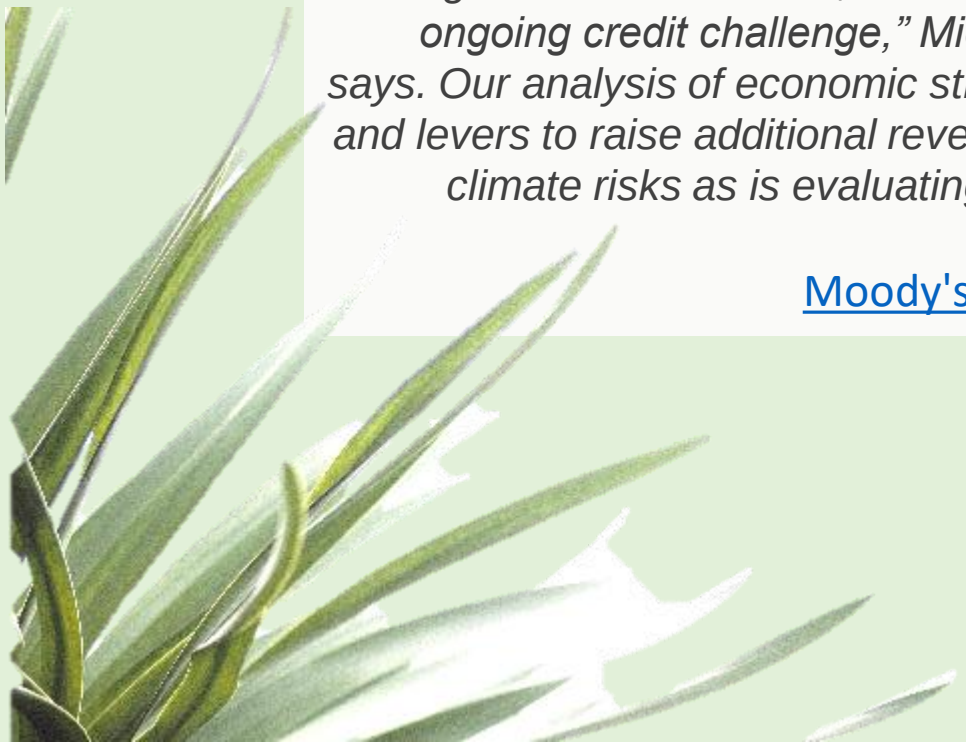
"The world should adopt a simple rule: ***If big infrastructure projects aren’t green, they shouldn’t be given the green light****. Otherwise we will be locked into bad choices for decades to come. Investing in climate-friendly development is where the smart money is needed."*

António Guterres
UN Secretary General

Climate shocks or extreme weather events have sharp, immediate and observable impacts on an issuer's infrastructure, economy and revenue base, and environment. As such, we factor these impacts into our analysis of an issuer's economy, fiscal position and capital infrastructure, as well as management's ability to marshal resources and implement strategies to drive recovery.

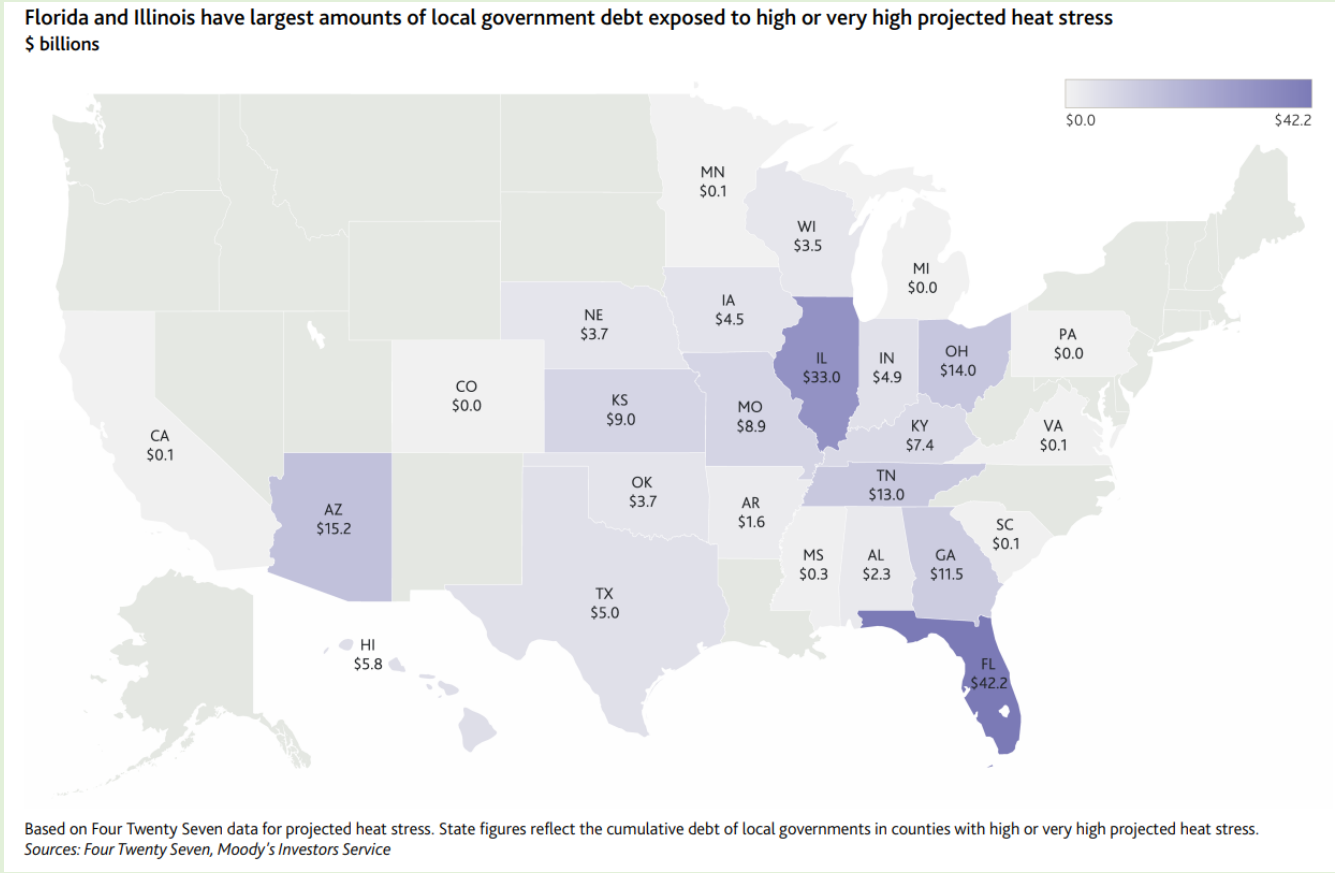
"While we anticipate states and municipalities will adopt mitigation strategies for these events, costs to employ them could also become an ongoing credit challenge," Michael Wertz, a Moody's Vice President says. Our analysis of economic strength and diversity, access to liquidity and levers to raise additional revenue are also key to our assessment of climate risks as is evaluating asset management and governance.

Moody's Announcement, November 28, 2017



One Example: Heat Stress

"Heat stress threatens to cause local governments to pay unanticipated costs for emergency response, infrastructure repair and adaptive strategies." Moody's Report on Heat Stress 9/24/2019



Quick Bond Primer

Borrower agrees to pay investor back over an understood rate and time.

Enable many investors to lend and get repaid for the borrower's project.

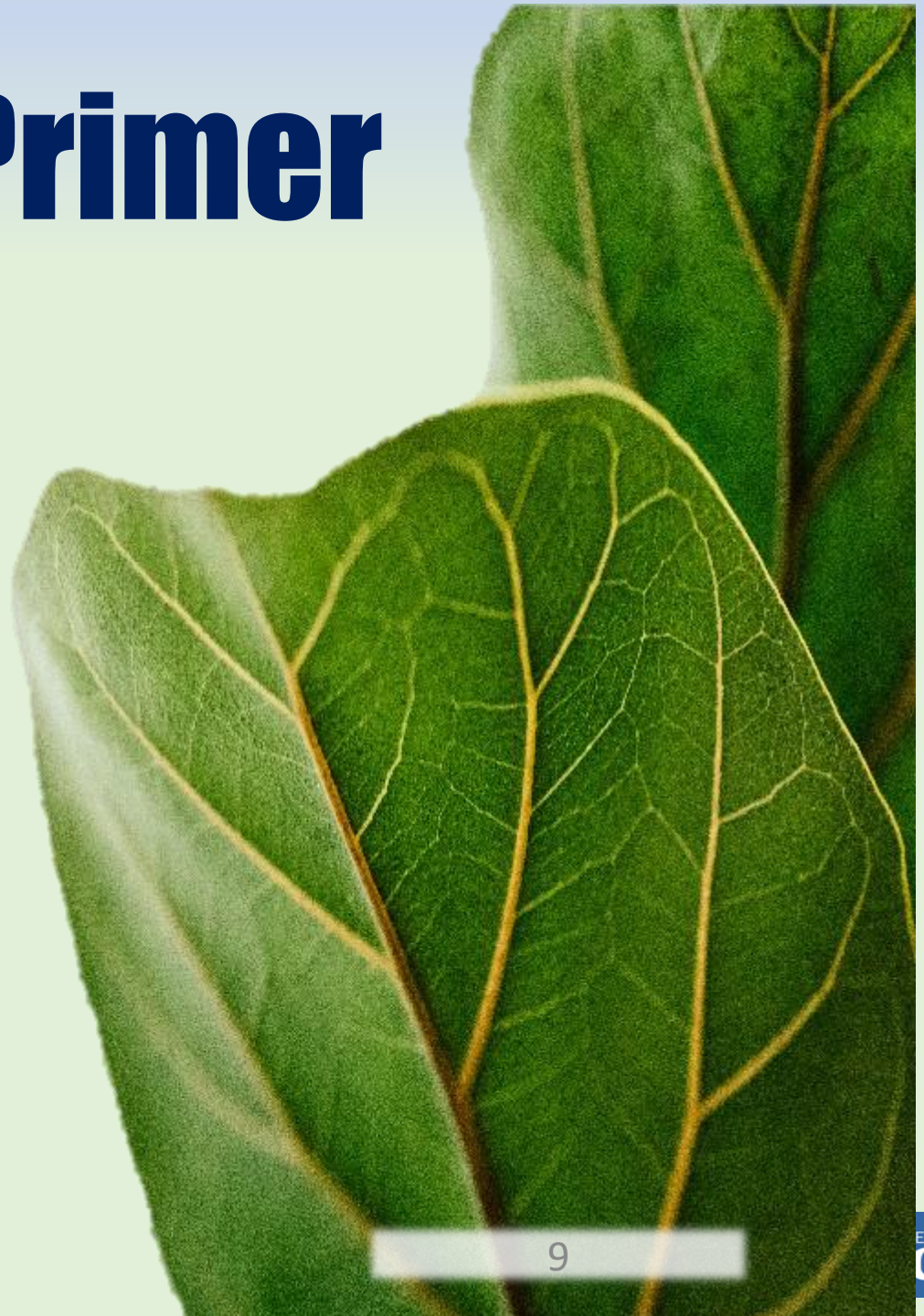
Unlike stocks, bonds are not a form of ownership of a business.

Typically considered safer investment than equity.

Transaction costs are more than conventional loan.

Taxable vs. Tax Exempt

More Info: CDIAC's Debt Financing Guide



Green Bond Definitions

There are several accepted definitions, including:

Fixed income securities which finance investments with environmental or climate related benefits.
Bis.org

Bonds issued by municipal entities, private sector or multilateral institutions (e.g., the World Bank) to finance projects with an environmental or climate impact. For example, green bonds might be issued to finance renewable energy and energy efficiency projects, clean public transportation, pollution prevention and control, conservation, sustainable water and wastewater management, and green buildings.

Green bond projects, generally, are intended to have material, positive net benefits for the climate or environment. Projects that are not primarily climate-focused typically contribute to conservation and/or sustainable and efficient management of natural resources; reduce waste or pollution; and otherwise enhance environmental quality and contribute to sustainable living.

MRSB, About Green Bonds

Essentially….

Regular "Vanilla" Bond + **Green Label** = **Green Bond**

The bond needs to be financing or refinancing, in whole or in part, a **project or asset** that benefits the climate or environment.

Later in this presentation, we will discuss **taxonomies** that are being developed to help identify qualifying projects or assets.

Throughout this series we will discuss **considerations** of adding a green label.

Later in this presentation, we will cover **standards and certification** of the use of funds to qualify attaching the green label. This will continue into the second webinar where with a deeper dive into **how** the issuer attaches the green label prior to issuance, and the ongoing administration.

What can green bond proceeds be used for?

Examples include…

- Clean energy, such as solar or wind installations
- Energy-efficient buildings
- Technologies to reduce greenhouse gas (GHG) emissions
- Clean transportation
- Sustainable waste and water management
- Sustainable forestry and agriculture
- Projection against flooding, watershed management, wetlands restoration, and biodiversity conservation
- Infrastructure consistent with a climate-challenged world
- Climate adaption

At a high-level….

Issuer Considerations

Benefits

Expanded investor base; possible different bond maturities
Possible credit benefits
Aligns infrastructure development to climate challenges
Demonstrates commitment to environmental initiatives
Earmark funds for climate projects
Ease of explaining climate initiatives to constituents

Challenges

Different from past practices; newness may be frowned upon
Aligning reporting
Desire to show additionality
Refunding vs New Projects
Marginal added costs
Assuring green commitments are maintained

At a high-level….

Investor Considerations

Benefits

‘Greening’ assets under management
Access to climate initiatives without project risk
Strong secondary market performance
Corporate governance / engagement on green initiatives
Early adoption of climate-aligned investment

Challenges

Defending green attributes
Assuring green commitments are maintained
Justifying potential pricing difference “Greenium”
Diversity of available green bonds
Small offering size
Index ineligibility due to offerings under $250 million
Illiquidity in secondary market
Lack of standardization

Who is buying green bonds?

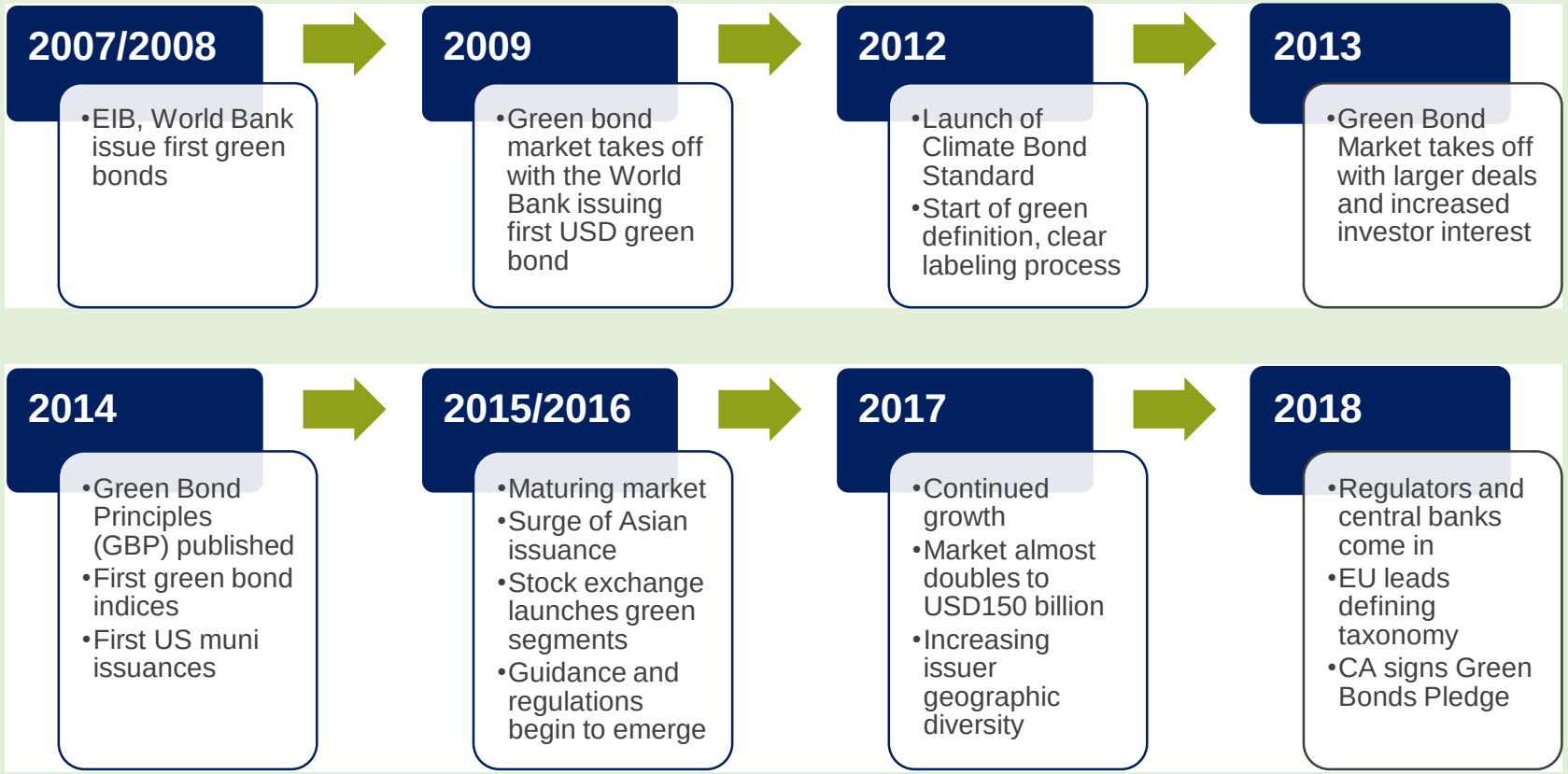
Worlds largest investors, such as:

- California Public Employees' Retirement System (CalPERS)
- California State Teachers' Retirement System (CalSTRS)
- California State Treasurer's Office
- New York Common Retirement Funds
- TIAA-CREF Green Bond Fund
- Van Eck Green Bond Fund
- BlackRock and the Global Green Bond ETF Fund
- StateStreet Green Bond Index-Fund
- Allianz Green Bond fund
- Shelton Green California Tax Free Income Fund
- Calvert Green Bond Fund
- Mirova (Natixis) Global Green Bond Fund
- AP2 (Sweden), FMO (Netherlands), Zurcher (Germany), etc.

Increasingly, individuals are participating directly in this market.

Links provided for additional research on an organization's green/sustainable initiatives.

Overview of Market Development

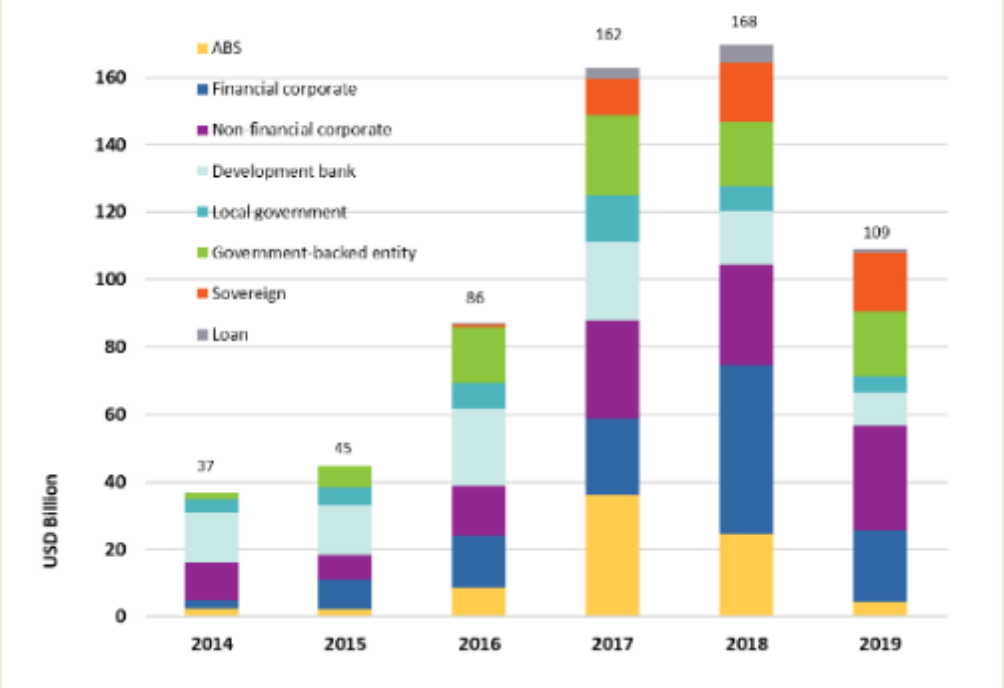


Continued Market Growth

2018 Statistics

- USD 168.5bn total green bond issuance
- Over 1,500 green issues
- 44 countries, 8 new
- 336 issuers, 215 new
- 60% of volume by repeat issuers

Green Bond Issuance at End of 2019 Q2

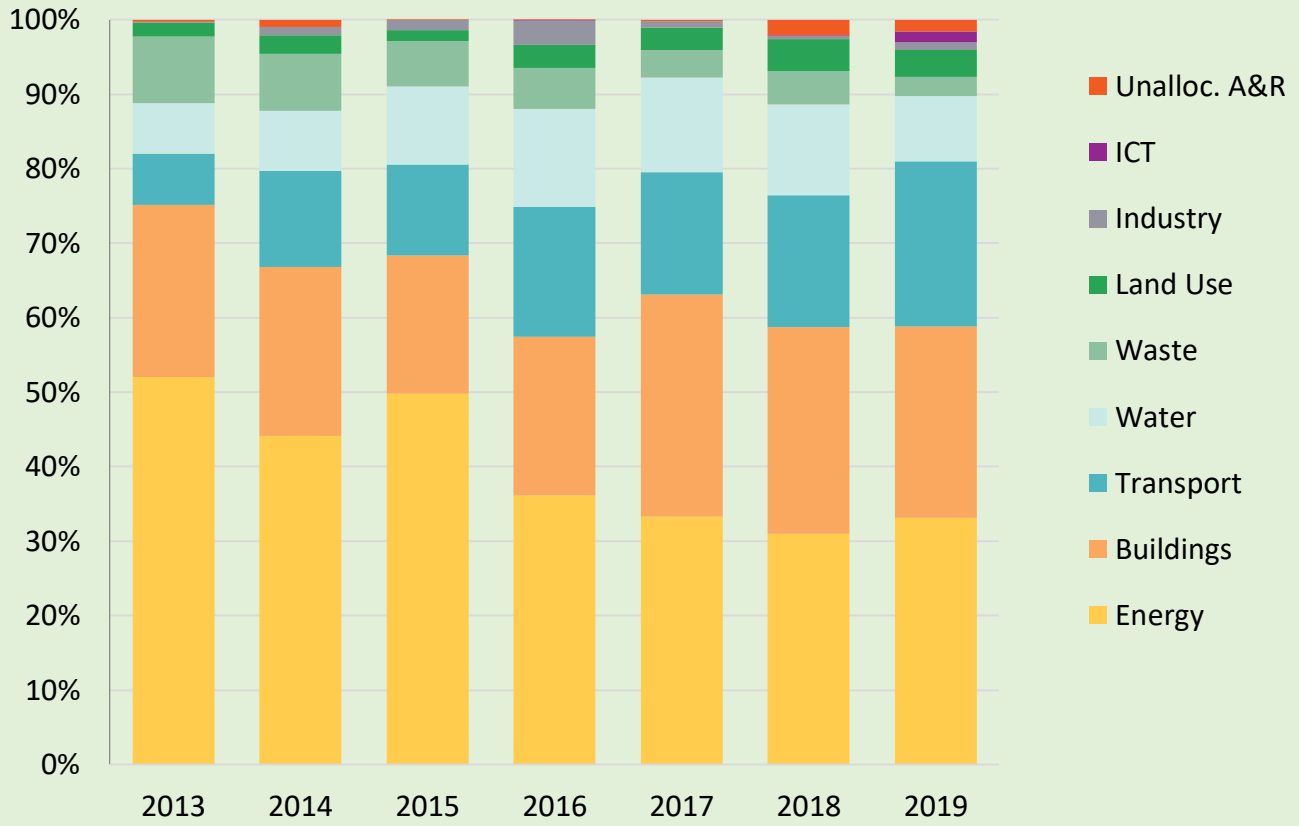


Indication of continued market growth.

Data courtesy of:

Climate Bonds INITIATIVE

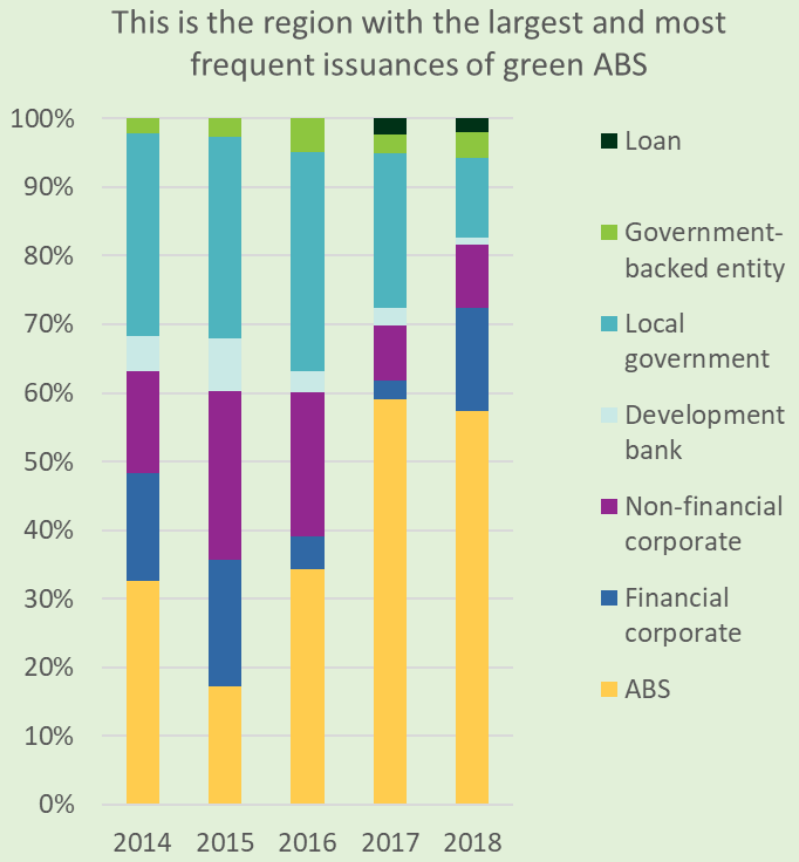
Diversification of Proceed Use

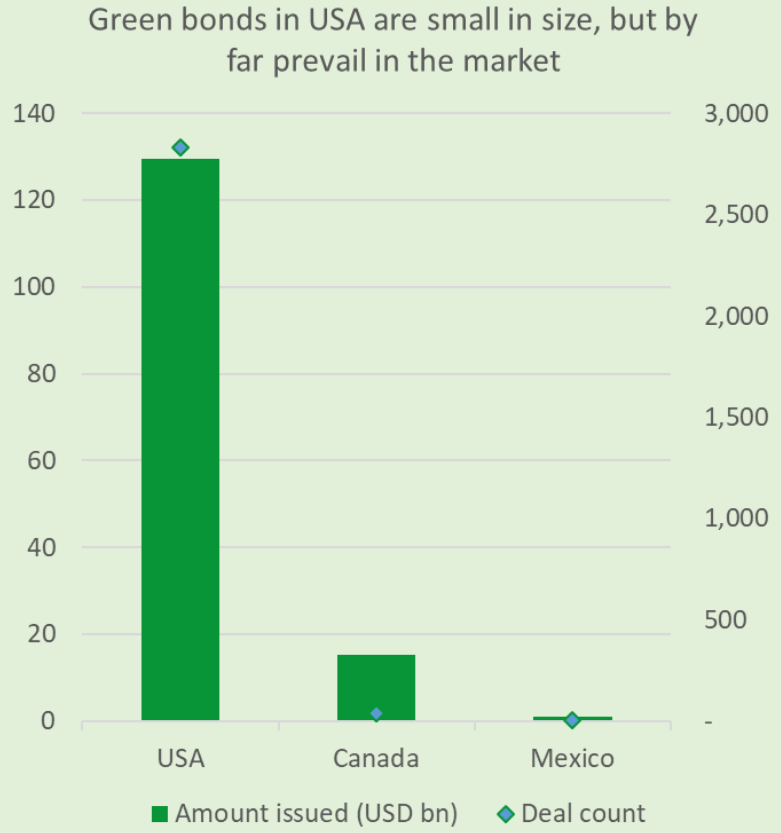


Data courtesy of:

Climate Bonds INITIATIVE

North America Dominated by Fannie Mae





Data courtesy of:

Climate Bonds INITIATIVE

Top Five US Muni Issuing States Now Top $1 Billion Cumulative Green Bonds

	Deals	Issued (USD)
CA	59	9,560 m
NY	39	9,112 m
MA	20	3,062 m
WA	9	2,004 m
IN	11	1,437 m

Data courtesy of:

Climate Bonds INITIATIVE

Broadening Issuances: Recent & Upcoming Green Bonds per MuniOS

PRELIM Negotiated	MA	**Massachusetts Clean Water Trust** ($205,680,000) State Revolving Fund Bonds, Series 22 (Green Bonds)	Jefferies PFM Financial Advisors LLC (MA)	09/30/19
PRELIM Negotiated	DC	**District of Columbia Water and Sewer Authority** ($502,720,000) Public Utility Subordinate Lien Revenue Bonds, Series 2019A (Green Bonds) and Series 2019B and Public Utility Subordinate Lien Revenue Refunding Bonds, Series 2019D (Federally Taxable)	Siebert Cisneros Shank & Co., L.L.C. J.P. Morgan PFM Financial Advisors LLC (MA)	09/27/19
FINAL Negotiated	MD	**The Conservation Fund** ($150,000,000) Taxable Green Bonds (Working Forest Conservation Program), Series 2019	Goldman Sachs & Co. LLC	09/23/19
PRELIM Negotiated	CO	**The Regents of the University of Colorado** ($288,480,000) University Enterprise Revenue and Refunding Revenue Bonds, Series 2019B and Series 2019C (Term Rate Bonds) (Green Bonds)	Stifel Goldman Sachs North Slope Capital Advisors (MA)	09/19/19
FINAL Negotiated	NY	**Dormitory Authority of the State of New York** ($121,415,000) Cornell University Revenue Bonds, Series 2019D (Green Bonds)	Morgan Stanley The Yuba Group LLC (MA)	09/13/19
PRELIM Negotiated	IN	**Indiana Finance Authority** ($40,505,000) First Lien Wastewater Utility Revenue Bonds, Series 2019A (CWA Authority Project) (Green Bonds)	Citigroup	09/12/19
FINAL Negotiated	CA	**Harbor Department of the City of Los Angeles** ($163,080,000) Refunding Revenue Bonds • 2019 Series A (AMT), 2019 Series B (Non-AMT), 2019 Series C-1 (AMT) (Green Bonds) and 2019 Series C-2 (Non-AMT) (Green Bonds)	Jefferies KNN Public Finance, LLC (MA)	09/04/19
PRELIM Negotiated	IN	**Indiana Finance Authority** ($200,000,000) State Revolving Fund Program Bonds, Series 2019E (Green Bonds)	Morgan Stanley Wells Fargo Securities PFM Financial Advisors LLC (MA)	08/30/19
FINAL Negotiated	GA	**Private Colleges and Universities Authority** ($257,840,000) Emory University Revenue Bonds, Series 2019A and Series 2019B (Green Bonds)	Goldman Sachs & Co. LLC Barclays Yuba Group LLC (MA)	08/21/19
FINAL Negotiated	PA	**Pennsylvania Economic Development Financing Authority** ($50,000,000) Solid Waste Disposal Revenue Bonds, Series 2019A (Covanta Project) (Green Bonds)	BofA Merrill Lynch	08/16/19

Expansion of Issuance Team Roles

With an emerging market Underwriters, Issuers, Counsel, and Advisor's roles are expanding.

Issuer Education
Educate investors on the Green Bond product and how it could fit into their investment policies

Strategy
Help issuers clarify sustainable financing proposition and links with strategy

Green Bond Framework
Help issuers design procedures to select projects and manage proceeds

Green Bond Alignment
Help issuers define scope of eligible green projects

Deal Execution
Match issuers with differing green & mainstream investors, provide advice on green pricing

Creation of New Roles

Reviewers/Verifiers

Certification Entities

Standards And Certification

Self Certification

Versus

External Review

Types of Reviews

Pre-issuance review	Scope	Providers
Assurance	Positive or negative assurance on compliance with the Green Bond Principles (GBP) or the Green Loan Principles (GLP)	EY, Deloitte, KPMG, etc
Second Party	Confirm compliance with GBP / GLP. Provide assessment of issuer's green bond framework, analysing the "greenness" of eligible assets	CICERO, Sustainalytics, Vigeo-Eiris, DNV GL, SynTao Green Finance, CECEP Consulting, etc
Green bond rating	Rating agencies assess the bond's alignment with the Green Bond Principles and the integrity of its green credentials	Moody's, S&P, CCX (China), ChinaBond Rating, R&I and JCR (Japan), RAM (Malaysia)
Pre-issuance verification	Third party verification confirms that the use of proceeds adheres to the Climate Bonds Standard and sector specific criteria	Approved verifiers under the Climate Bonds Standard scheme
Post-issuance review	**Scope**	**Providers**
Assurance or SPO	Assurance of allocation of proceeds to eligible green projects	Audit firms, ESG service providers, scientific experts
Impact report	Reporting that seeks to quantify the climate or environmental impact of a project/asset numerically	As above
Post-issuance verification	Assurance against the Climate Bonds Standard, including allocation of proceeds to eligible green projects and types of green projects	Approved verifiers

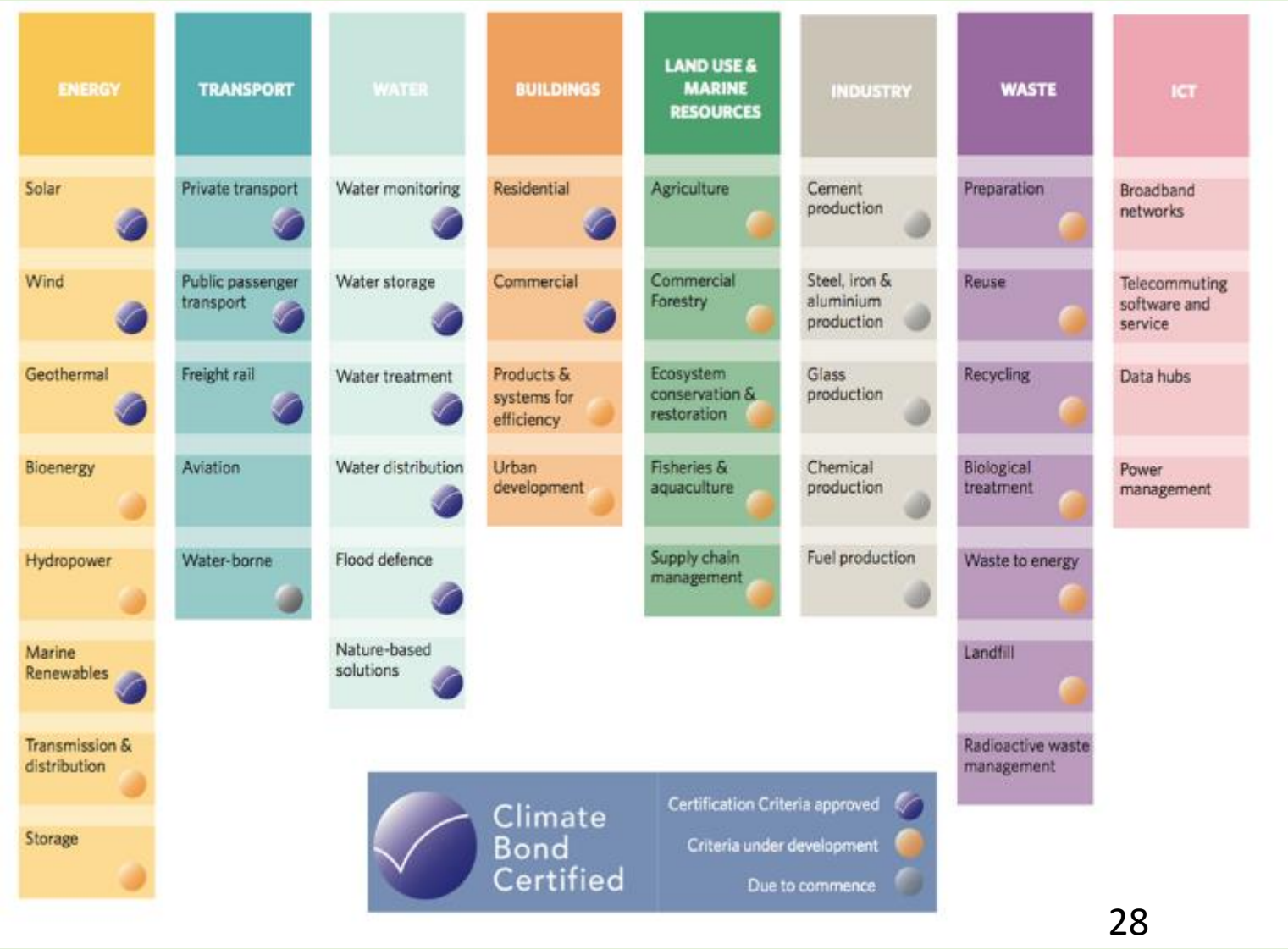
Comparison of Approaches

Summary of the most common approaches to standards and best practice recommendations: Green Bond Principles; Climate Bonds Initiative Standards; European Union proposed standards.

	GBP	CBI	EU GBS
Eligibility Criteria	High-level	CBI Taxonomy	EU Taxonomy
External Review	Recommended *Not Required*	Required	Required
Publication of External Review	No	Required	Required
Accreditation of Reviewers	No	Yes	Yes *New EU system*
Impact Reporting	Recommended *Not Required*	Recommended *Required Eligibility Reporting*	Required
Use of Proceeds in Legal Documentation	Recommended *Not Required*	Required	Required

The Need To Define ‘Green’

Climate Bond Standards Taxonomy



Climate Bonds Sector Criteria

Developing Sector Criteria

Formula

- Climate Science
- Stakeholder Engagement
- Paris Agreement Goals
- Practicality
- \+ Industry and Market Acceptance

CBI's Sector Criteria

Process

1. Technical and industry working groups
2. Working groups draft criteria
3. Draft criteria for public review
4. Climate Bond Standard Board approval
5. Publish final criteria for Certification use
6. Ongoing review

CBI Certification Mark

What does the Certification mark mean?

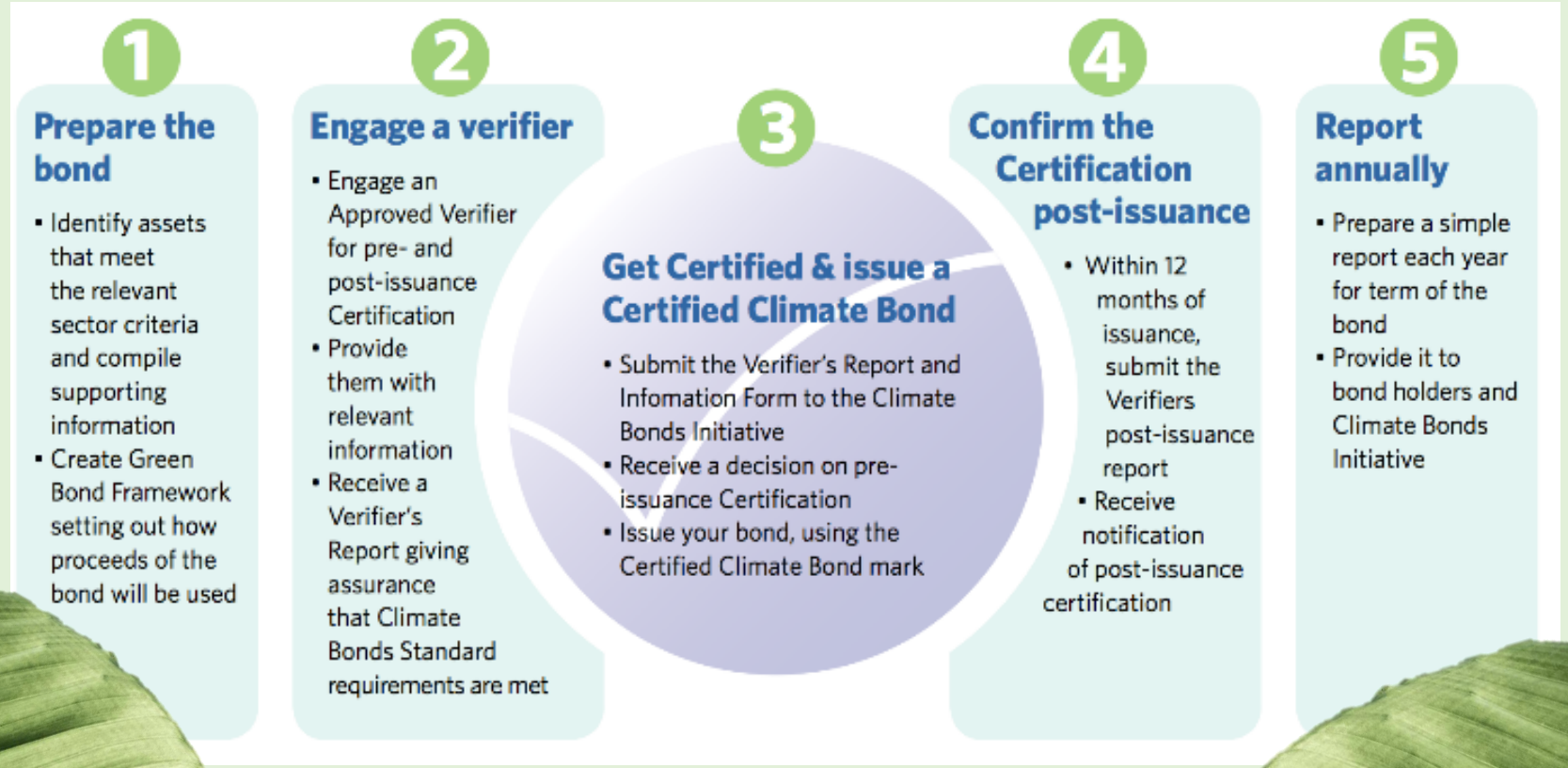
Certification under the Climate Bonds Standard confirms that the bond, loan or other debt instrument is:

1 Fully aligned with the Green Bond Principles and/or the Green Loan Principles

2 Using best practices for internal controls, tracking, reporting and verification

3 Financing assets consistent with achieving the goals of the Paris Climate Agreement.

CBI Standard Certification Scheme



CBI Standards Board

Office of the California State Treasurer, Fiona Ma, CPA

State Teacher's Retirement System (CalSTRS)

Institutional Investors Group on Climate Change (IIGCC)

International Cooperative and Mutual Insurance Federation (ICMF)

Investor Group on Climate Change

Natural Resources Defense Council

Ceres Investor Network

Green Bond Principles (GBP)

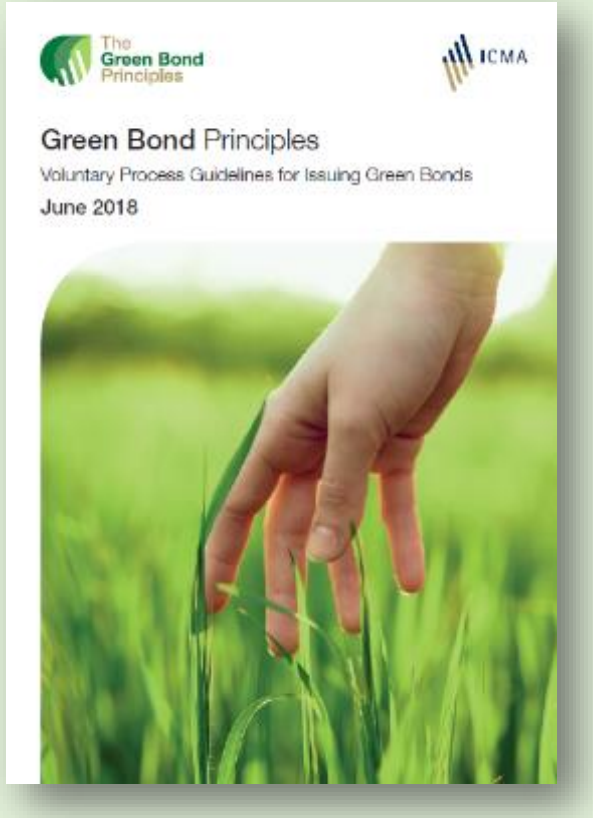
Globally leading voluntary process guidelines that recommend transparency and disclosure, while promoting the integrity in the development of the Green Bond market by clarifying the approach for the issuance of a Green Bond.

Four Major Components

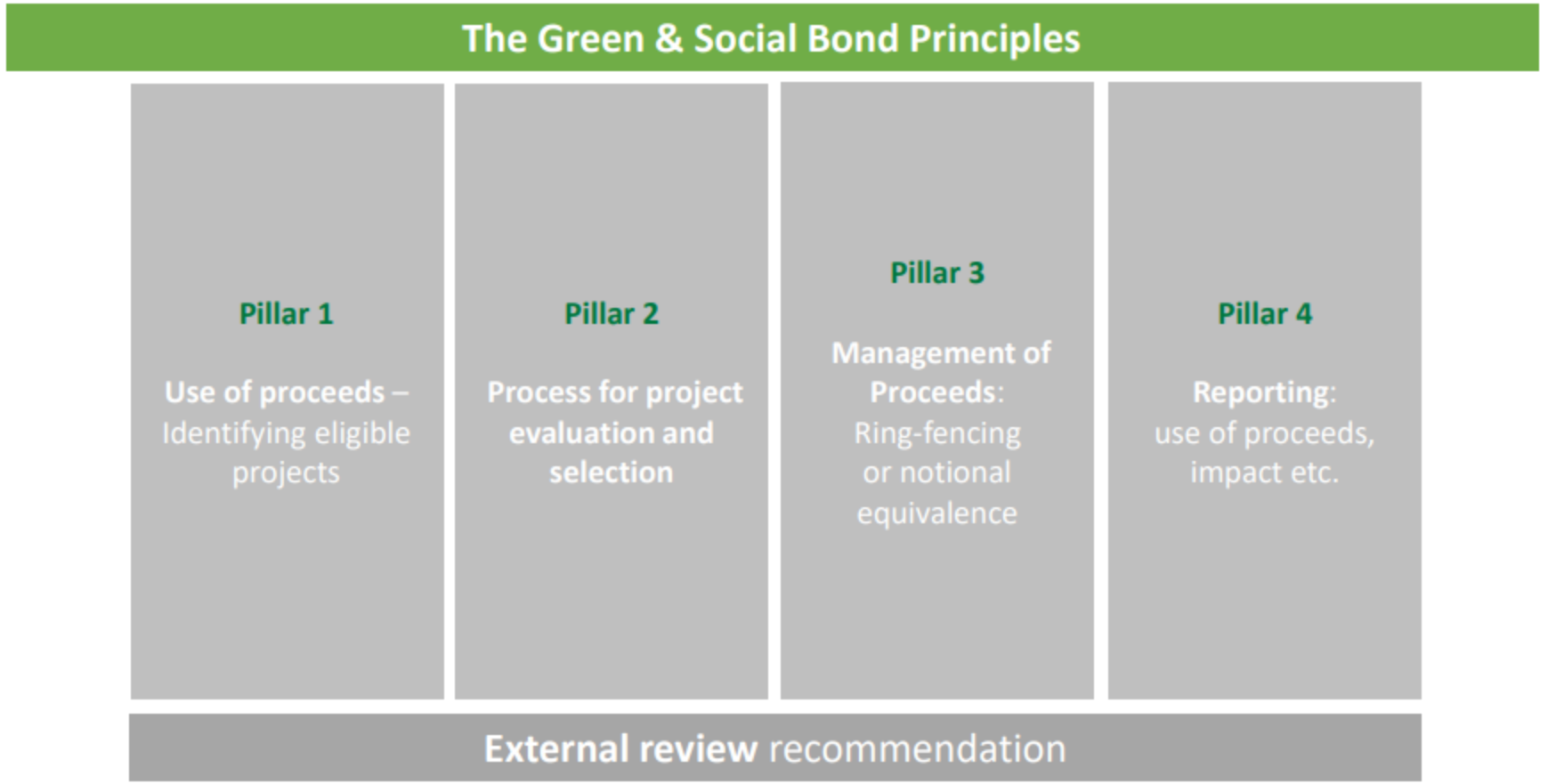
1. Use of Proceeds
2. Process for Project Evaluation and Selection
3. Management of Proceeds
4. Reporting

The principles also provide guidance for external review.

Link to the Green Bond Principles (accessible in PDF of slides).



Key Features of the Principles



Source: ICMA Presentation

GBP Governance Structure

Green Bond designation is voluntary and the market is largely built upon the community coming together to maintain its reputation. Governance of the Green Bond Principles has been established to foster best practices and maintain market acceptance. Below are four major groups involved in governing the GBP and a high-level description of their role.
Link to Governance Framework on ICMA's Website (accessible in PDF)

1. Members and Observers

Members
Organizations that have issued, underwritten or placed, or invested in a Green Bond qualify to apply for membership.

They elect Excom, decide on changes to the Governance, provide input on Principles, and may participate in working groups.

Observers
Active in the field but not qualified to be a member. May provide input on the Principles and participate in working groups.

2. Executive Committee (Excom)

Role
Decide updates of the Principles; with Member and Observer input. They appoint the Secretariat and establish working groups.

Participants
24 Members who have been elected, representing investors (8), issuers (8), and underwriters (8).

Working Groups
Currently 6: Green Projects Eligibility, External Reviews, Impact Reporting, Indices & Databases, New Markets, and Social Bonds

Link to Excom Members and Working Groups (accessible in PDF)

3. Steering Committee

Excom Chair and elected Deputy Chairs. They prepare and present feedback to update the Principles for the Excom to review.

4. Secretariat

ICMA
International Capital Market Association

Principles and CBI Standards Work in Tandem

- The GBP is the market's leading framework; CBI provides a green taxonomy, and a standard for the certification of green bonds
- International Organization for Standardization is currently developing Green Bonds Standards ISO 14030 expanding on the GBP

	Green Bond Principles	Climate Bonds Initiative
Recognition	• Global self-regulatory reference for international Green Bond market • Recognised and reflected in markets that have or are considering regulation e.g. China, EU, India and ASEAN countries	• CBI standard and taxonomy is widely looked to by the official sector and the market • CBI has played key role in advising China on set-up of its GB market and is a full member of the EU's HLEG on Sustainable Finance
Output	• GBP provides high level principles for GB issuers focused on transparency and reporting	• CBI produces (i) a standard for GB certification, (ii) a green taxonomy and (iii) a GB list
Representativity	• Represents a consensus view based on input of entire market via GBP and its near 250 members and observers	• CBI represents in particular a buyside view as reflected by the composition of its Climate Bond Standard Board (CBSB)
Defining Green	• Provides only high level guidance on green through its Eligible Project Categories	• Detailed guidance through a green taxonomy
Market Guidance	• The GBP is not involved in vetting individual GB issues • Provides broad market guidance through its online Questions & Answers	• CBI manages a bond certification scheme that can be renewed post issuance and uses independent "accredited verifiers" • CBI's GB list is largely used by the market and is a reference point for indices & database providers

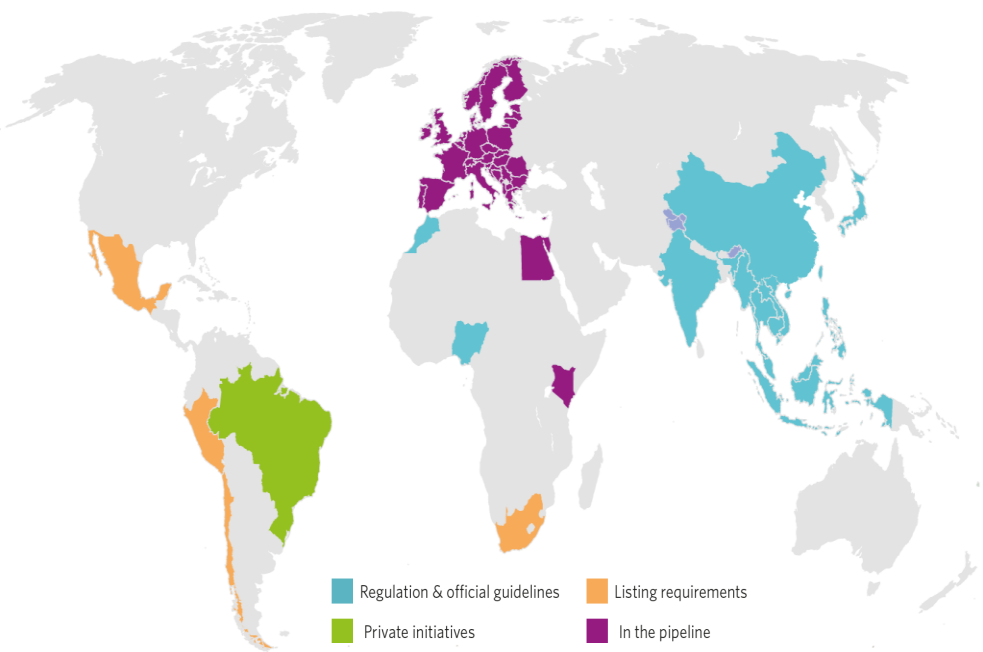
Source: ICMA Presentation to ECB 2/6/18

Consistent Rules Support Market Growth

Voluntary rules drove early market growth and allowed global consistency.

The Green Bond Principles

Climate Bond Certified



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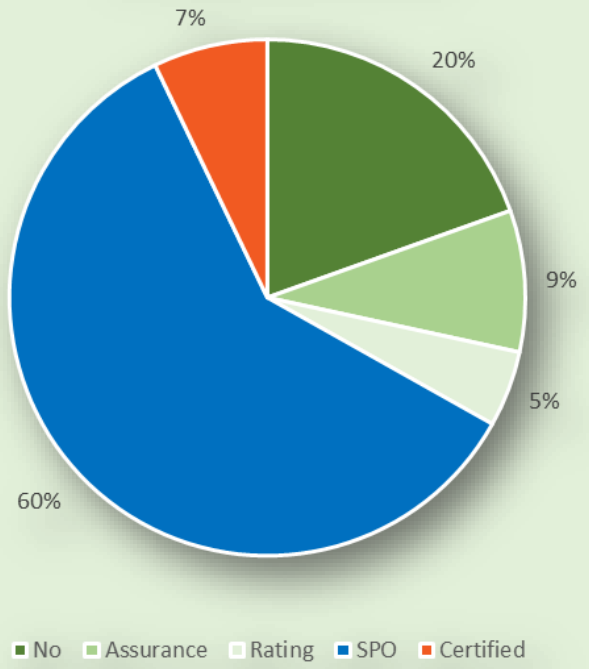
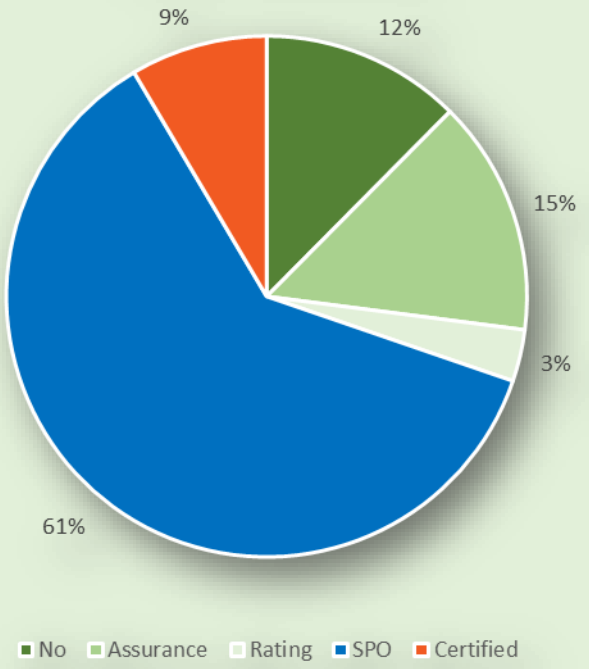
External Reviews Are Now Dominant

More than 80% of the amount issued is covered by an external review



By bond count.
Does not include Fannie Mae bonds.
Data as as of 12/6/18

More than two-thirds of bonds have either an SPO or are Certified

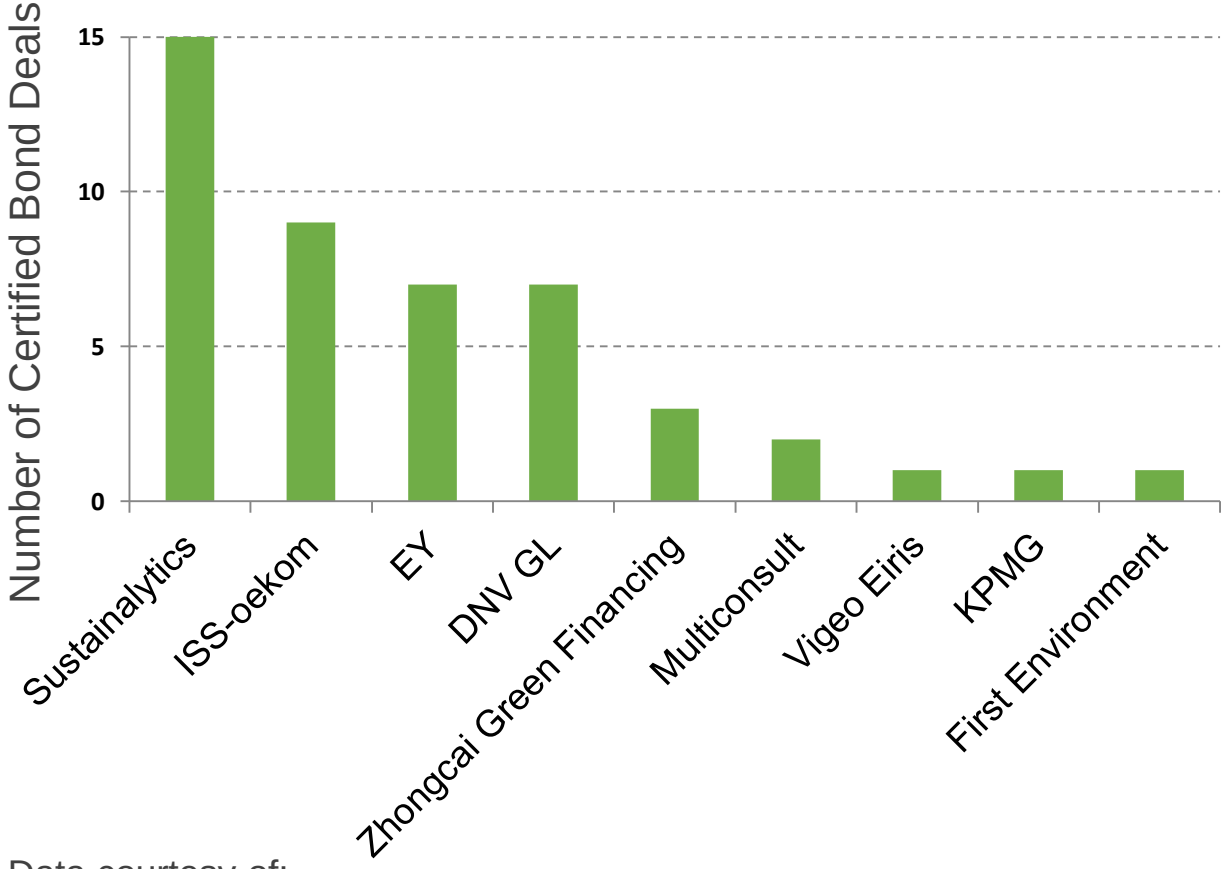


By amount issued.
Does not include Fannie Mae bonds.
Data as of 12/6/18

Data courtesy of:

Climate Bonds INITIATIVE

2018 Approved Verifier Activity Globally



Data courtesy of:

Climate Bonds INITIATIVE

External Review Costs Per One Active Verifier

Costs

Second Party Opinion or Verifiers Report
$1,000-$25,000, could be more if complex

CBI Certification Fee
1/10th of a basis point of the bond principal. Example: $500M bond, the certification fee is $5,000

Impact Reporting
Could be as low as $500/year for basic report

Reporting

Hot topic in the Green Bond market.

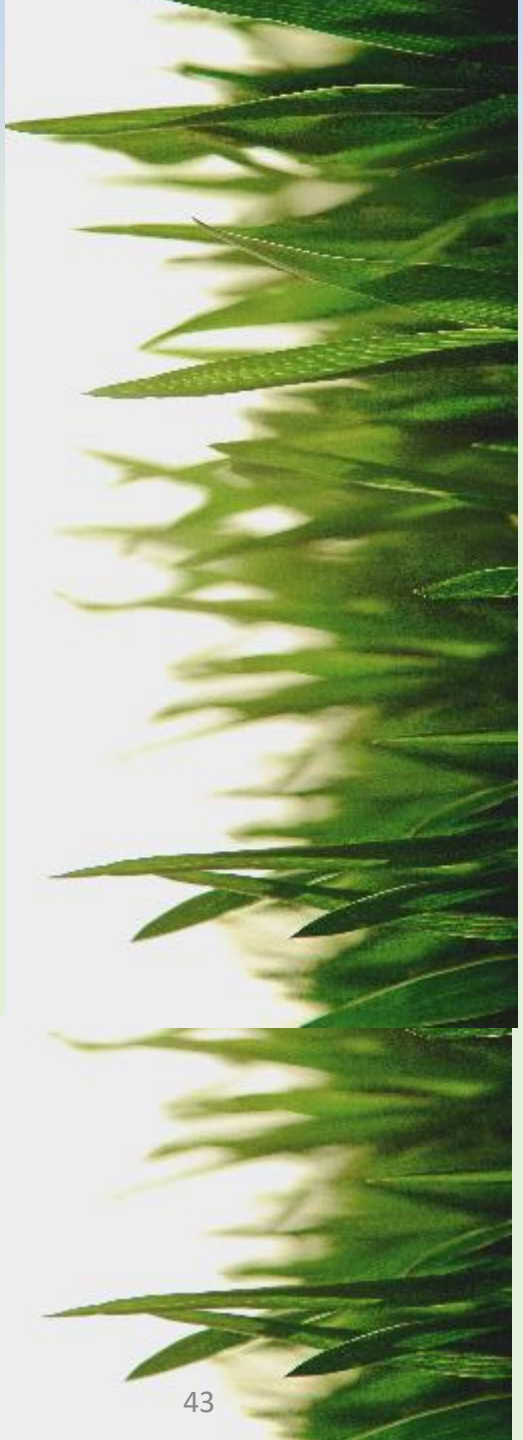
Fourth major component in the GBP, which recommends post-issuance reporting/disclosure on:

- Use of Proceeds
- Environmental Impact (Impact Reporting)

Voluntary disclosure provides transparency, increases accountability, and underpins credibility of the Green Bond market. However, it does require ongoing commitment and resources.

As the market has grown, so has investor interest in the use of proceeds and impact reporting to inform their decision making, but the burden on issuers is also under scrutiny.

Green Bond Issuer Reporting



Almost half of issuers provide reporting on both allocations and impact

Reporting scope		UoP reporting	Impact reporting	Both
Number of issuers	Reporting	251	194	172
	Non-reporting	116	173	195
	% reporting	68%	53%	47%
Number of bonds	Reporting	715	1,514	501
	Non-reporting	1,190	391	1,404
	% reporting	38%	79%	26%
Amount issued (USDbn)	Reporting	223	219	186
	Non-reporting	58	62	95
	% reporting	79%	78%	66%

Analysis covers all Green Bonds issued up to November 2017.

Data courtesy of:

Climate Bonds INITIATIVE

The Path Forward

Examples from California

California Green Bond Solutions

California Green Bond Market Development Committee

Chair
Treasurer Fiona Ma, CPA

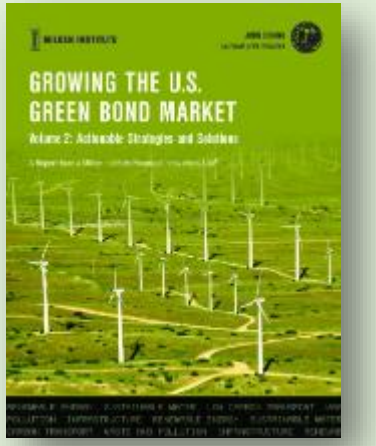
Secretariat
UC Berkeley Goldman School of Public Policy

GOLDMAN SCHOOL OF PUBLIC POLICY
UNIVERSITY OF CALIFORNIA BERKELEY

https://gspp.berkeley.edu/centers/cepp/projects/green-bonds-market-development-committee

Growing the U.S. Green Bond Market Reports

Collaboration between the Treasurer's Office and Milken Institute to provide actionable strategies to grow the California Green Bond market.
(Link to more info, accessible in PDF)



Green Bond Pledge

Declaration to incorporate Green Bonds into the planning and deployment of infrastructure projects.
(Link to more info, accessible in PDF)

green bond pledge

California Green Bond Market Development Committee

Chair

California State Treasurer
Fiona Ma, CPA

Secretariat

GOLDMAN SCHOOL OF PUBLIC POLICY
UNIVERSITY OF CALIFORNIA BERKELEY

Role

Developing strategies and solutions to expand the Green Bond market in California.

Committee will build on the first and second volumes of the *Growing the U.S. Green Bond Market Reports*, promote the Green Bond Pledge, advise policy leaders, and assist issuers.

Participants

Finance experts, engineers, public policy experts, attorneys, climate scientists, and others.

Meetings

Initial meeting took place in June 2019, second meeting took place Sept 2019.

Growing The U.S. Green Bond Market

Drivers

- Aligning infrastructure needs with climate challenges
- Rise of Environmental, Social, and Governance (ESG) investing
- Intergenerational wealth transfer

Expansion Opportunities

- Address barriers to expansion including undersupply, index ineligibility, and illiquidity
- Improve standardization
- Responsible issuer program
- Credit enhancement
- Green taxable bond program
- Regional/pooled issuance

Links to Reports

(Accessible in PDF)

Volume 1: The Barriers and Challenges

Volume 2: Actionable Strategies and Solutions

green bond pledge

- We agree that all infrastructure and capital projects will need to be climate resilient and, where relevant, support the reduction of greenhouse gas emissions.
- We welcome the role that Green Bonds can play in helping to achieve the financing of that infrastructure.
- As a signatory to this pledge, we support the rapid growth of a Green Bonds market, consistent with global best practices, that can meet the financing needs we face, and will issue, whenever applicable, bonds for infrastructure as Green Bonds.
- We pledge to support this goal by establishing a Green Bonds strategy that will finance infrastructure and capital projects that meet the challenges of climate change while transforming our community into a competitive, prosperous and productive economy.

- www.greenbondpledge.com

Great Overview of Green Bonds 1

Global Green Bond Partnership's Green Bond Roadmap

Provides users with a basic outline of green bonds and their role in mobilizing capital for climate change action. It is intended to help government officials quickly get oriented to the world of Green Bonds and provides curated tools and information from organizations around the world that play an active role in the Green Bonds market.

Link: www.globalgreenbondpartnership.org

Green Bonds Overview	Green Bonds Checklist	Types of Green Bonds	Framework, Labeling, Certification, Verification, Standards	Resources

Great Overview of Green Bonds 2

California Treasurer's Green Bond Webinar Series

Powerpoints, Background Docs, Webinar Replay

GOLDMAN SCHOOL OF PUBLIC POLICY
UNIVERSITY OF CALIFORNIA BERKELEY

CDIAC

Go to California Treasurer Debt and Investment Advisory Commission & click on "Education" at:
https://www.treasurer.ca.gov/cdiac/

Or use direct link:

https://www.treasurer.ca.gov/cdiac/webinars/2019/greenbonds/description.asp

Michael Paparian

California Representative

Climate Bonds Initiative

Mike.Paparian@climatebonds.net

Web page: https://www.climatebonds.net/

Twitter: https://twitter.com/ClimateBonds

LinkedIn: https://www.linkedin.com/company/climate-bonds-initiative

Connecticut Green Bank

Lead by Example Green Bonds Workshop
National Governors Association
Providence, RI
October 4, 2019

Connecticut Green Bank
Quick Overview

- **Quasi-public organization** – 1st STATE GREEN BANK in the USA
- **Focus** – finance **clean energy** (i.e. Solar PV, wind, small hydro, energy efficiency, and alternative fuel vehicles (EVs) and infrastructure)
- **Balance Sheet** – approximately **$184 MM** in assets **(FYE 2018)**
- **Support** – supported by
  - Small charge elec bill ($10 / HH / yr) – approximately **$27 MM / year (stable)**
  - Small share of "CO^2 Cap & Trade" – approximately **$3 MM / year (stable)**
  - Portfolio Income – approximately **$6 - $8 MM / year (growing)***
  - Private capital, foundations (PRI**) , US Govt (more limited now) – **(varies)**

*** Excludes SHREC revenues**

**** Program Related Investment**

Connecticut Green Bank

Delivering Results for Connecticut

- **Investment** – mobilized over $1.5 billion of investment into Connecticut's clean energy economy while raising nearly $50 million in state and local tax revenues
- **Jobs** – created nearly 16,000 total job-years – 6,200 direct and 9,700 indirect and induced
- **Energy Burden** – reducing the energy burden on over 30,000 households and businesses
- **Clean Energy** – deployed more than 285 MW of clean renewable energy helping to reduce over 4.6 million tons of greenhouse gas emissions that cause climate change

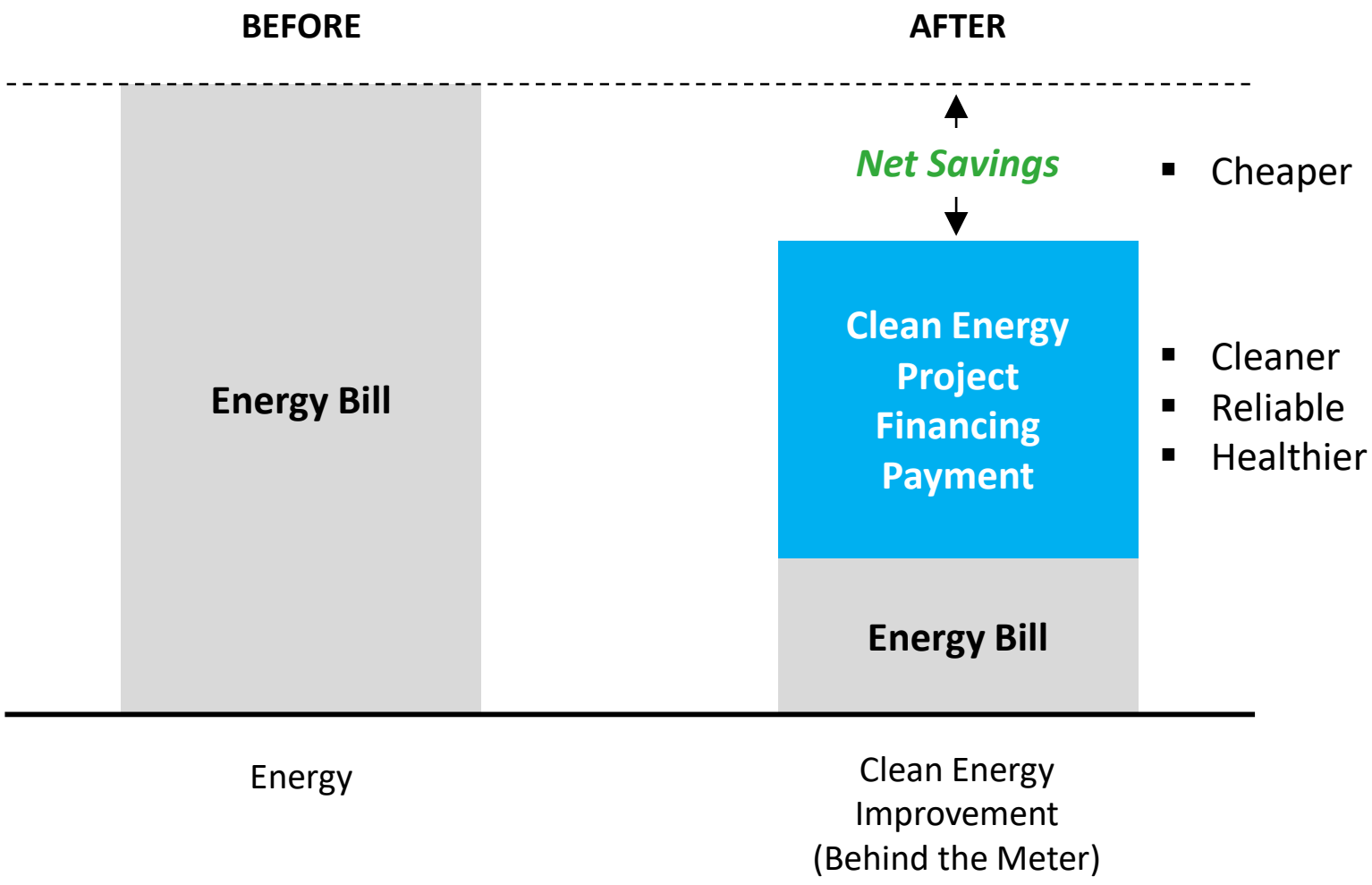
Private investment drives economic growth

Creates jobs, lowers energy costs, and generates tax revenues

REFERENCES

CT Green Bank data warehouse report from July 1, 2011 through June 30, 2018

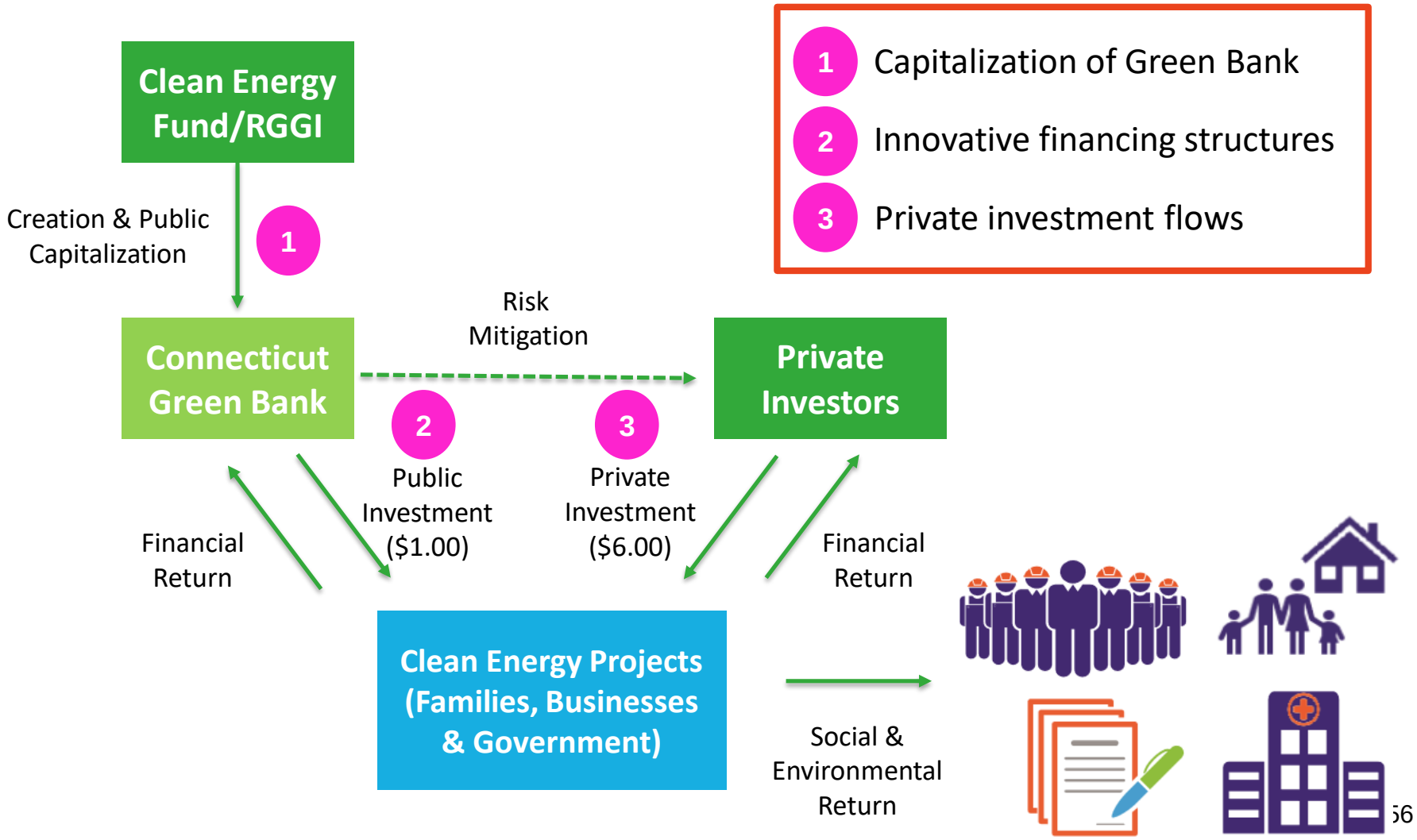
Connecticut Green Bank
Reduce End User Costs



REFERENCE
Definition provided by the Coalition for Green Capital and adapted by the Connecticut Green Bank

Connecticut Green Bank

Increase Private Capital Investment



Financing Program

Public Private Partnership Examples

Smart-E Loan
RSIP
Solar for All

Reducing the burden of energy costs on **families** in partnership with **local contractors** and **community banks and credit unions**

C-PACE to
SBEA

Reducing the burden of energy costs on **businesses** in partnership with the **utilities**, **contractors**, **Greenworks Lending**, and **Amalgamated Bank**

Solar PPA
Lead by Example

Reducing the burden of energy costs on the **State of Connecticut** in partnership with **GE Solar** and **Bank of America**

Financing Programs

Portfolio of Public-Private Partnerships

Credit Enhance	Warehousing	Tax Equity Finance		Project Finance	PRI	Tax Credit Bonds
$59 MM OPEN 20:1[1] smart-e loan energize CT Residential Energy	**$50+ MM** CLOSED 9:1 HANNON ARMSTRONG C-PACE	**$75 MM** CLOSED 7.5:1 US Bank KeyBank Webster Bank Residential Solar Commercial Solar	**$60+ MM** CLOSED 6:1[3] ONYX Green Bank Solar PPA	**$65 MM** CLOSED 10:1 FuelCell Energy Dominion Grid-Tied	**$5 MM** OPEN 100%[2] MacArthur Foundation hdf Multifamily Energy	**$9 MM** CLOSED 9:1 CSCU Bank of America Green Bank Solar PPA
$6 MM CLOSED 6:1 Sungage Financial Residential Solar	**$30 MM** CLOSED 4:1 CLEANFUND C-PACE	**$65+ MM** OPEN 4:1 PosiGen US Bank Enhanced Capital Solar for All		**$22 MM** CLOSED 8:1 Colebrook Wind Webster Bank 5 MW Wind Project	**$3 MM** OPEN 100%[4] THE KRESGE FOUNDATION Residential and Commercial Storage	**$3 MM** CLOSED 3:1 City of Meriden CT Bank of America Archimedes Screw Hydroelectric Project

REFERENCES

1. LLR yields high leverage – and it is 2nd loss and thus with no to low defaults, we haven't used to date. IRB's not considered in the leverage ratio.
2. Foundation PRI is to HDF, guaranteed by the CGB in the case of MacArthur Foundation.
3. Onyx Partnership has no upper limit and CGB currently has authorization to commit up to $15mm.
4. Foundation PRI's are backed by CGB balance sheet
5. Data from Power BI through June 30, 2019

CGB Public-Private Partnerships

OVER $750 million[1] in private capital raised (5 Years)

$80 MM
CLOSED
15:1
fuelcellenergy
Dominion
Grid-Tied

$90 MM
OPEN
5:1
PosiGen Solar Solutions
LIBREMAXCAPITAL
INCLUSIVE PROSPERITY CAPITAL
Residential Solar

$90 MM
CLOSED
7.5:1
usbank
KeyBank
Webster Bank
Residential Solar
Commercial Solar

$30 MM
CLOSED
4:1
CLEANFUND Commercial PACE Capital
C-PACE

$50 MM +
OPEN
10:1[2]
smart-e loan
energize CONNECTICUT
Residential Energy

$20 MM
OPEN
4:1
PosiGen Solar Solutions
usbank
EnhancedCapital
Residential Solar &
Energy Efficiency

$50-100 MM
OPEN
9:1
HANNON ARMSTRONG
FINANCING THE FUTURE OF ENERGY
C-PACE

$8 MM
OPEN / PRI
100%
MacArthur Foundation
THE KRESGE FOUNDATION
Multifamily Energy
Solar + Storage

$60+ MM
OPEN
6:1[3]
ONYX
Commercial Solar

$77 MM
PROJECT FINANCE
8:1
fuelcellenergy
FIFTH THIRD BANK
LIBERTY BANK
amalgamated bank
Commercial Solar

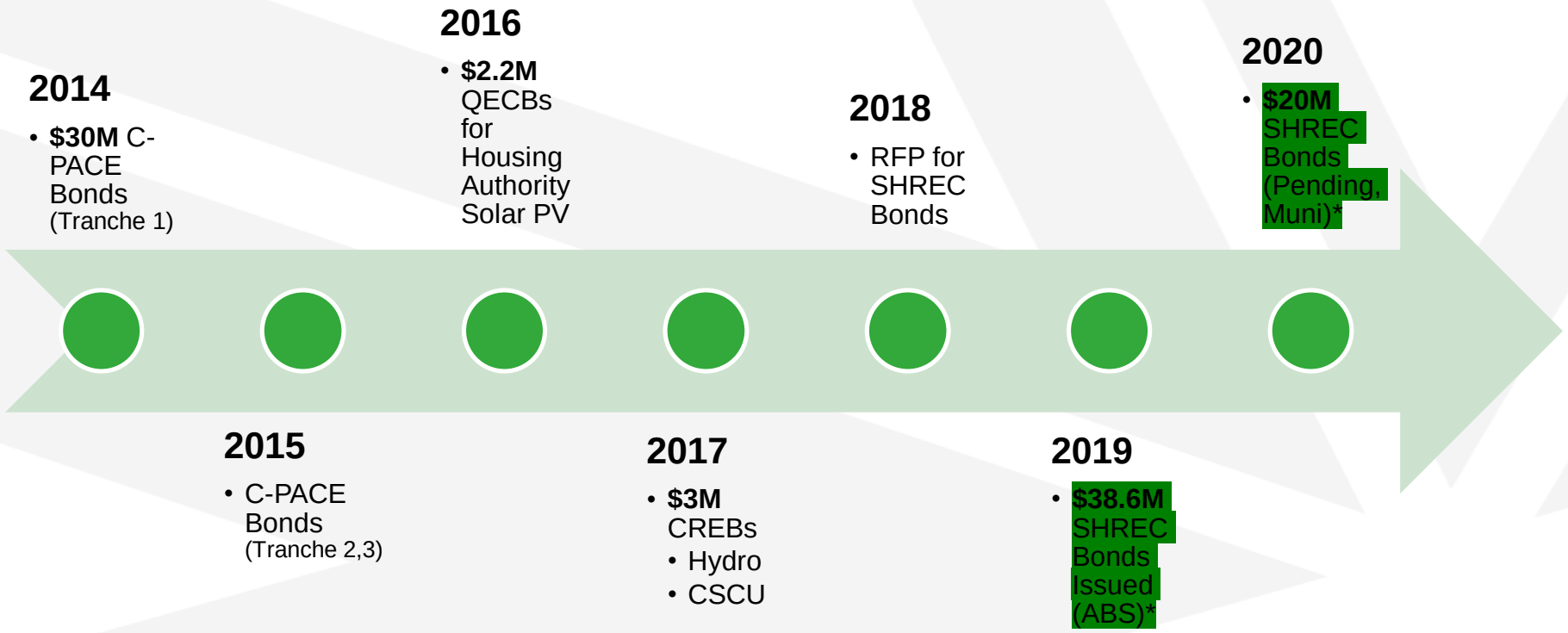
$40 MM
CLOSED
100%[4]
RBC
CT Green Bank
REC Securitization

$56 MM
Open
10:1
EVERSOURCE ENERGY
amalgamated bank
Small Business
Energy Advantage

REFERENCES

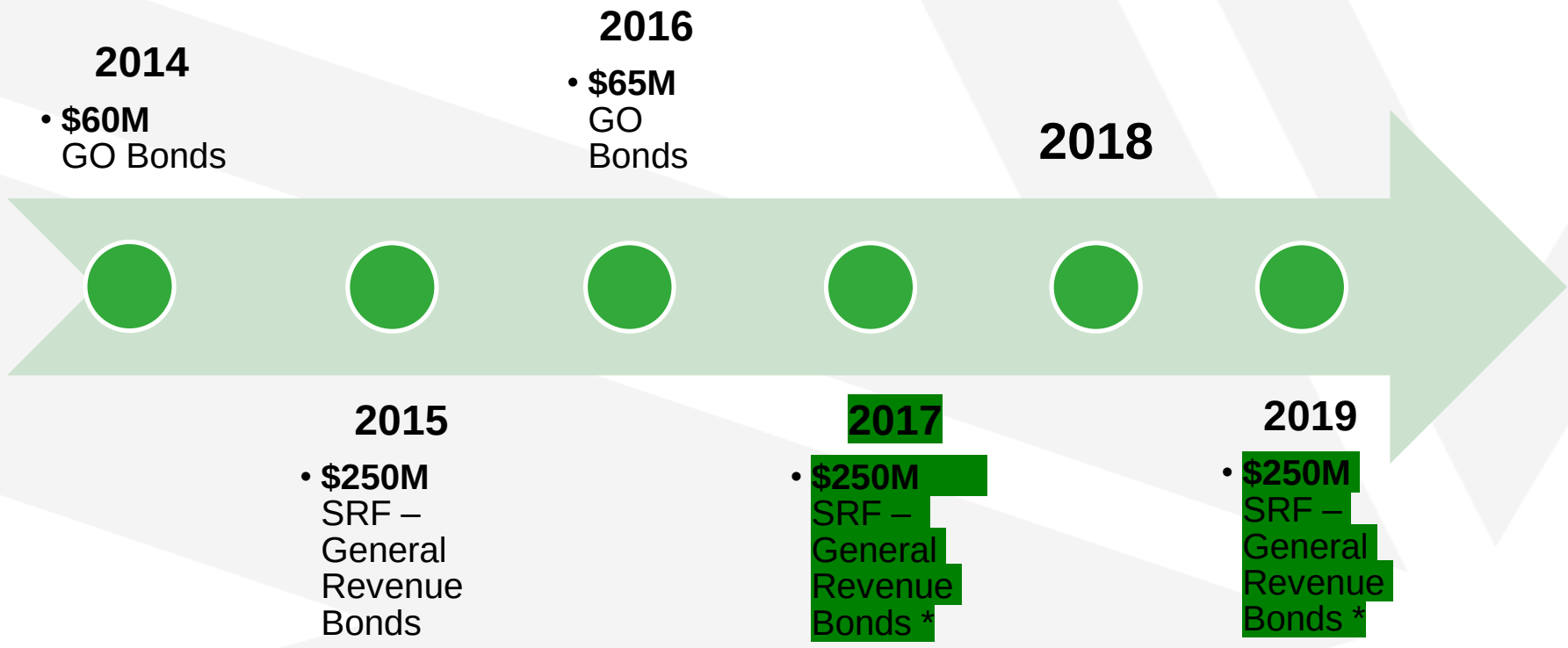
1. Several transactions such as small hydro, wind, microgrid, CHP and anaerobic digestors not represented on slide
2. LLR yields high leverage – and it is 2nd loss and thus with no to low defaults, we haven't used to date. IRB's not considered in the leverage ratio.
3. Onyx Partnership has no upper limit and CGB currently has authorization to commit up to $15mm. The team expects to commit $5mm for the first $60-70mm.
4. Securitization of Solar Home Renewable Energy Credits – approx. $75mm in gross receivables securitized

Green Bond Timeline



*Green Bond Certification, Kestral

Green Bond Timeline



*Green Bond Certification, *Sustainalytics*

Executive Order #1

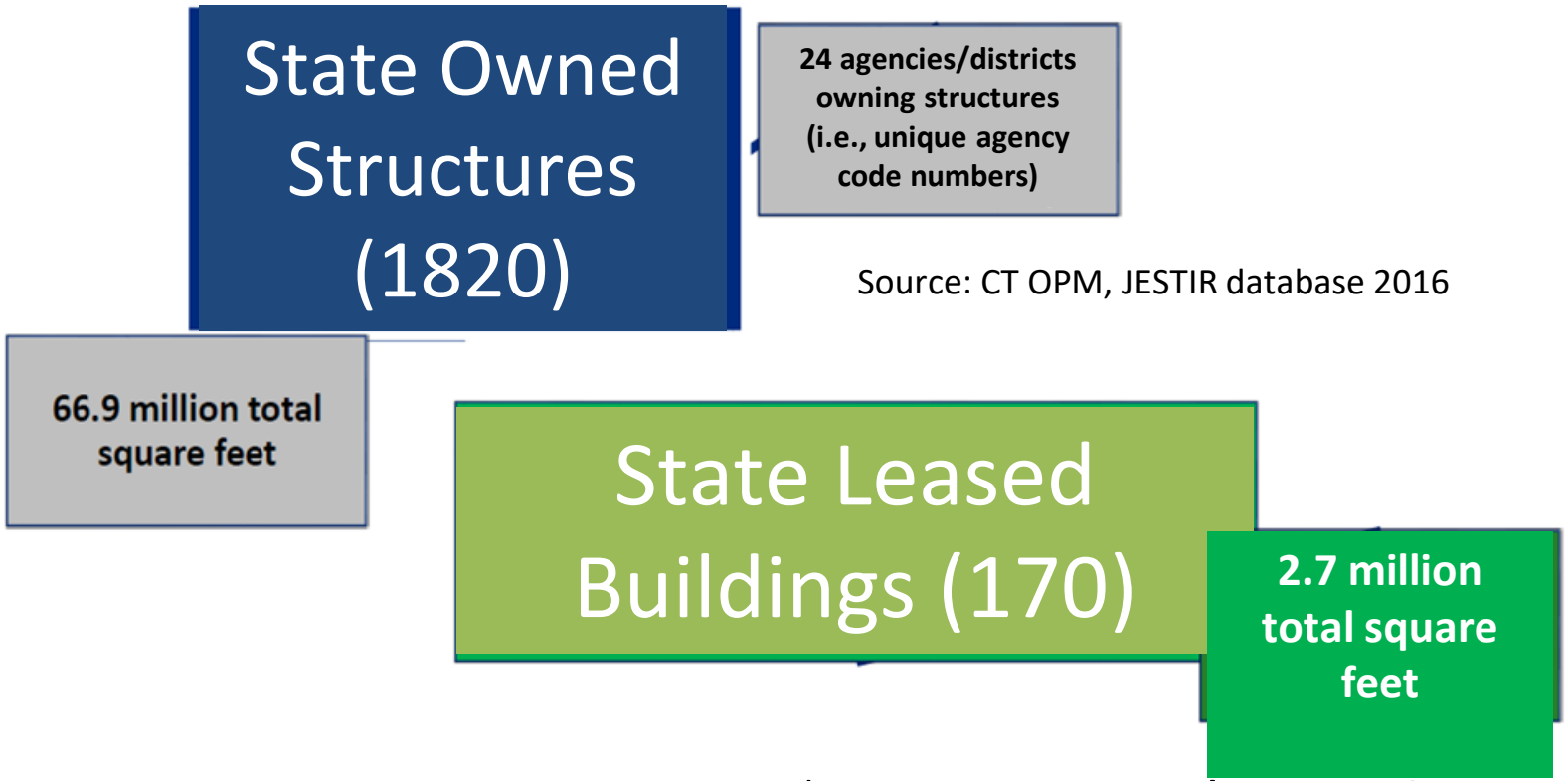
STATE OF CONNECTICUT

GOVERNOR NED LAMONT

04/24/2019

Governor Lamont Signs Order Directing State Agencies to Reduce Energy Consumption and Environmental Impacts

~70 million square feet of state structures



Source: CT OPM, JESTIR database 2016

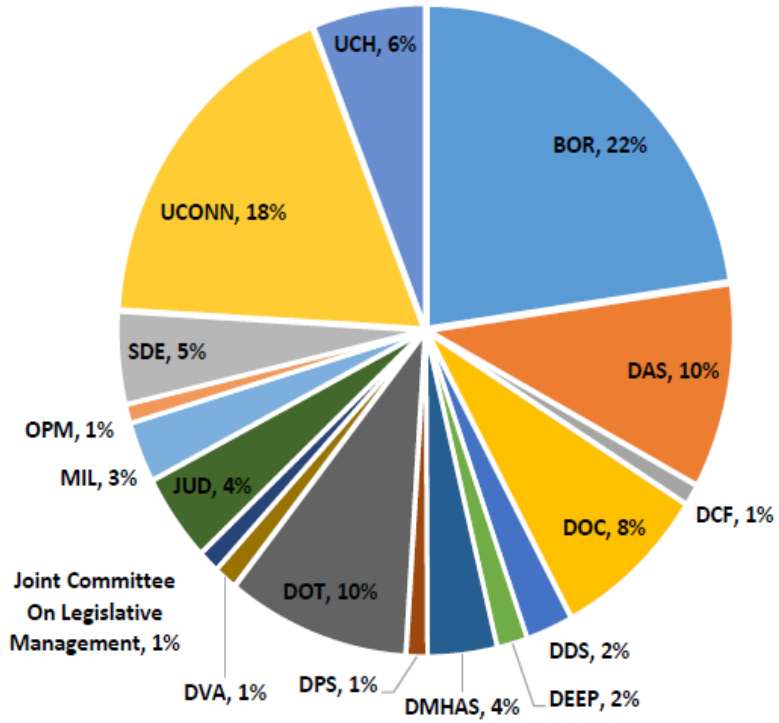
Estimated 611,370,886 kWh ($0.1397/kWh) or **$85 MM/year**
and 25,161,740 Th ($0.6122/Th) or **$15 MM/year**

Source: Best estimates from DEEP as of 4/18/2016

Connecticut's Opportunity

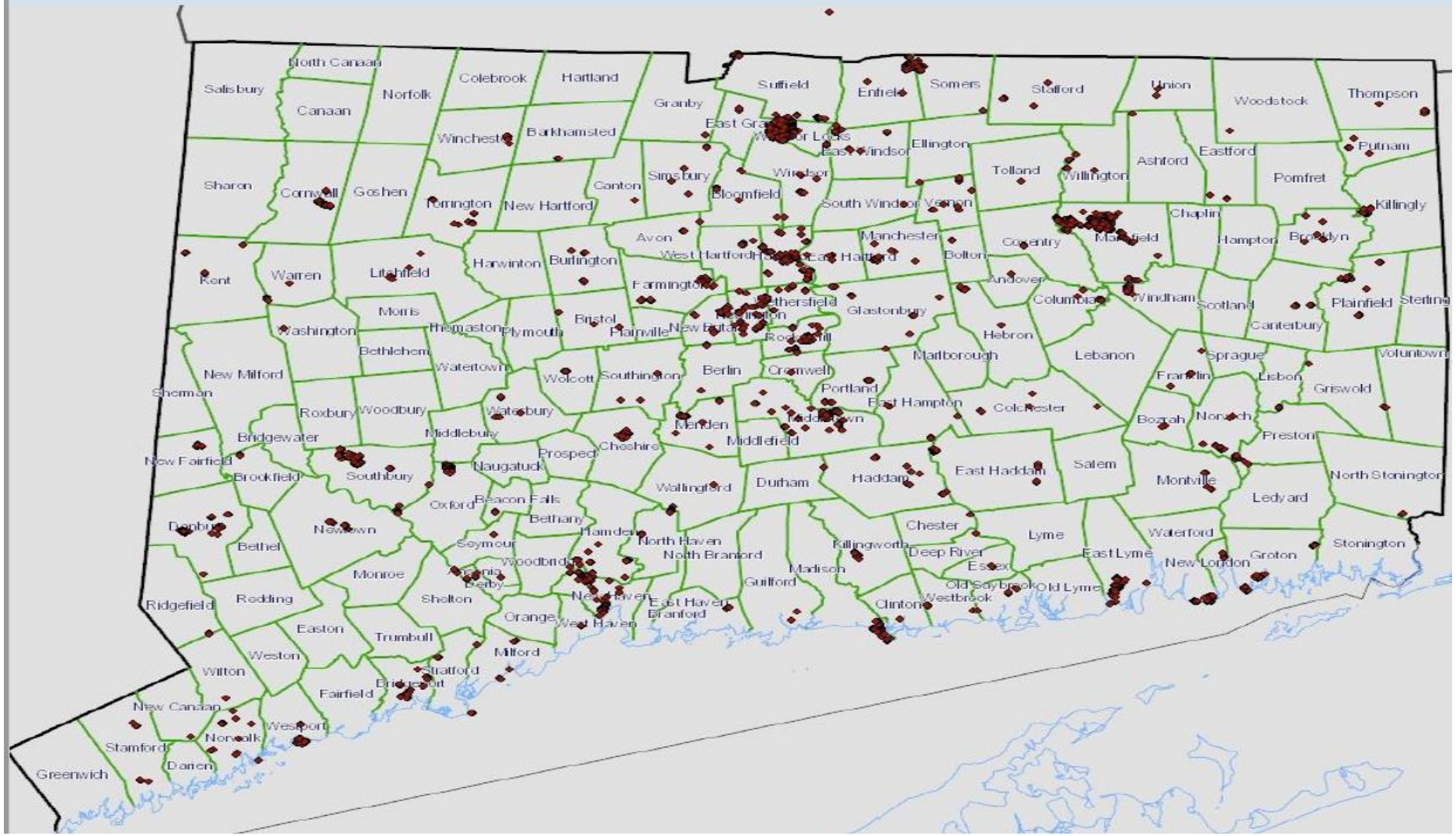
- Approximately 70 million square feet
- Roughly 3800 buildings
- Nearly ½ are educational facilities

Gross Square Feet of Floor Space by Agency



Source: CT Office of Policy and Management, JESTIR database 2016

Many State Facilities = Many Opportunities



Introducing C-PACE financing

C-PACE (Commercial Property Assessed Clean Energy) is an innovative financing solution from Connecticut Green Bank that makes green energy upgrades accessible and affordable. With C-PACE, building owners can:

- **Take control of their energy costs**
- **Act with confidence**
- **Make their buildings more comfortable**

CASE STUDY

CONNECTICUT GREEN BANK

FORSTONE CAPITAL

ENERGY UPGRADES:
VFD, HVAC, Controls, Cooling towers, Energy Management System, Windows, Building Envelope

PROJECTED ENERGY SAVINGS:
$6,156,163 over the life of the upgrades

paceSetters

Brandon Hall, Principal
Brett Wilderman, Principal

CONNECTICUT GREEN BANK℠

FORSTONE CAPITAL

LOCATION:
855 Main Street
Bridgeport, CT

BUILDING SIZE:
112,000 square feet

YEAR BUILT: 1966

TOTAL PROJECT COST:
$2,624,718

INCENTIVE:
$469,317

C-PACE FINANCING: $2,155,401

ENERGY UPGRADE: VFD, HVAC, Controls, Cooling towers, Energy Management System, Windows, Building Envelope

TERM: 20 years

ANNUAL C-PACE ASSESSMENT:
$175,321

ANNUAL ENERGY COST SAVINGS:*
$263,114

LIFETIME ENERGY COST SAVINGS:
$6,156,163

ANNUAL ENERGY SAVINGS:
6,863 MMBtu

*over the financing term

"Energy efficiency is always something we strive for, but due to the size and scope of this particular project, it would not have been possible without C-PACE. The end result will be better comfort for our tenants and a much improved physical asset."

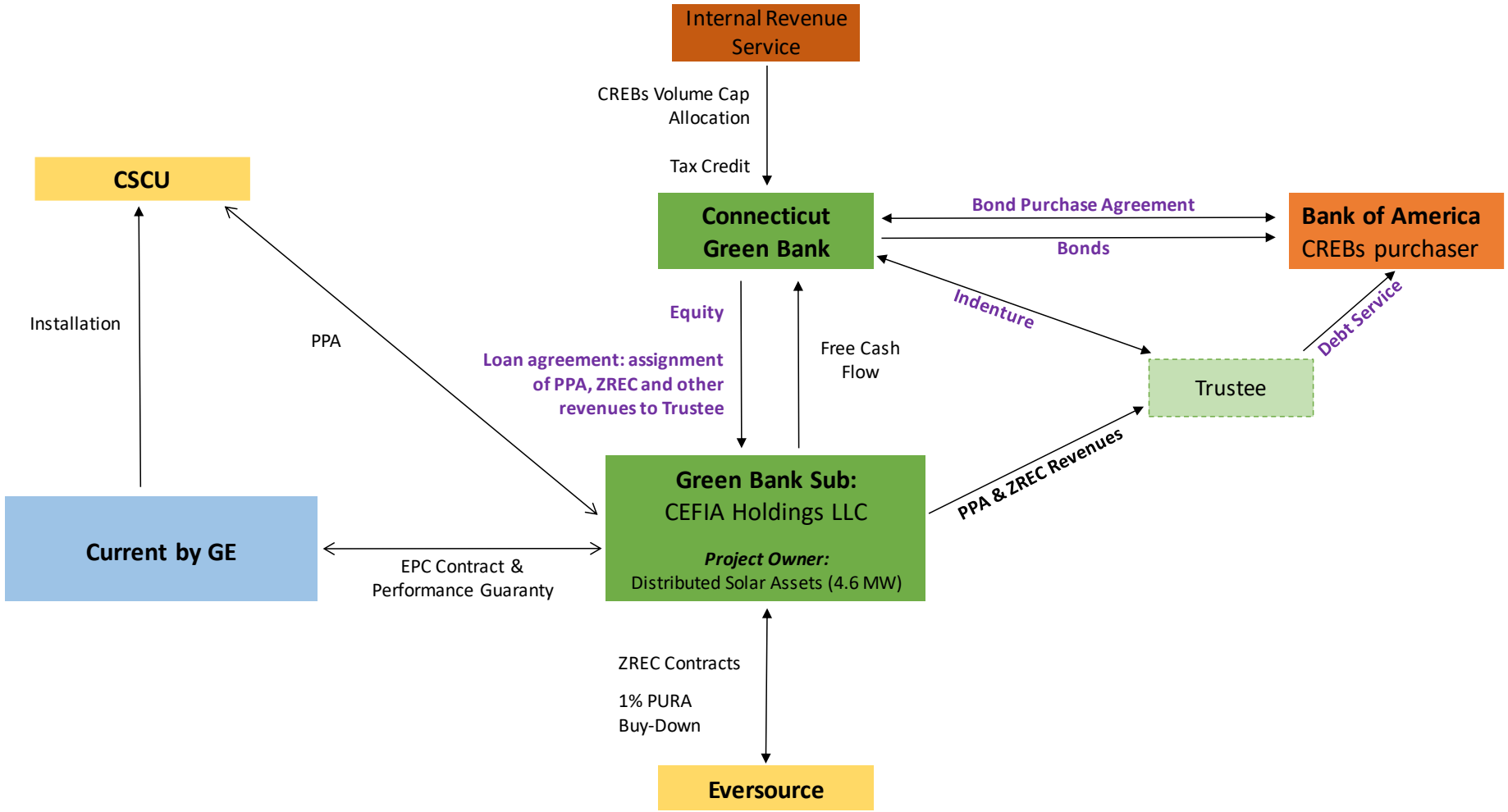
– BRANDON HALL

CREBs for CSCU Solar
Opportunity

- **Connecticut State College and University System** – PPAs signed with GE for nearly 5 MW of solar
- **Attractive Pricing** – Annual savings to CSCU projected to be ~$240,000
- **Financing Strategy** – Clean Renewable Energy Bonds to be purchased by Bank of America ($9.5MM in anticipated capital costs, about 88% to be financed with CREBs)

Project Name	Yield (kWh/kW/yr)	System Size (kWdc)	Ground Mount Size	Rooftop Size	Carport Size	PPA Price ($/kwh)	ZRECs ($/MWh)	Avoided Cost ($/kWh)	Estimated Annual Savings
Quinebaug Valley CC (Roof and Ground)	1,283.5	868.1	744.0	124.1		$0.070	$60.00	$0.11	$44,345
Asnuntuck (Roof Only)	1,145.8	796.0		796.0		$0.080	$60.00	$0.11	$27,726
Tunxis CC (Roof Only)	1,185.9	223.2		223.2		$0.076	$70.00	$0.11	$9,050
Central CT State ITIB (Roof)	1,147.6	110.0		110.0		$0.080	$103.07	$0.11	$3,787
WCSU - West (Ground Only)	1,181.6	239.0	239.0			$0.070	$70.00	$0.11	$11,296
Housatonic - Lafaeyette Hall (Roof Only)	1,183.6	208.1	208.1			$0.078	$65.00	$0.13	$12,784
Housatonic - Garage (Carport)	1,205.4	936.0			936.0	$0.078	$120.00	$0.13	$58,672
Southern CT State (Combined)	1,181.2	1,296.0	561.6	230.4	504.0	$0.083	$60.00	$0.13	$71,947
	kWh / yr	System Size				Wgt Avg PPA	Wgt Avg ZREC		Total Annual Savings
Totals ---------->	5,604,969	4,676.4				$0.078	$74.24		$239,608

CREBs for CSCU Solar
Structure

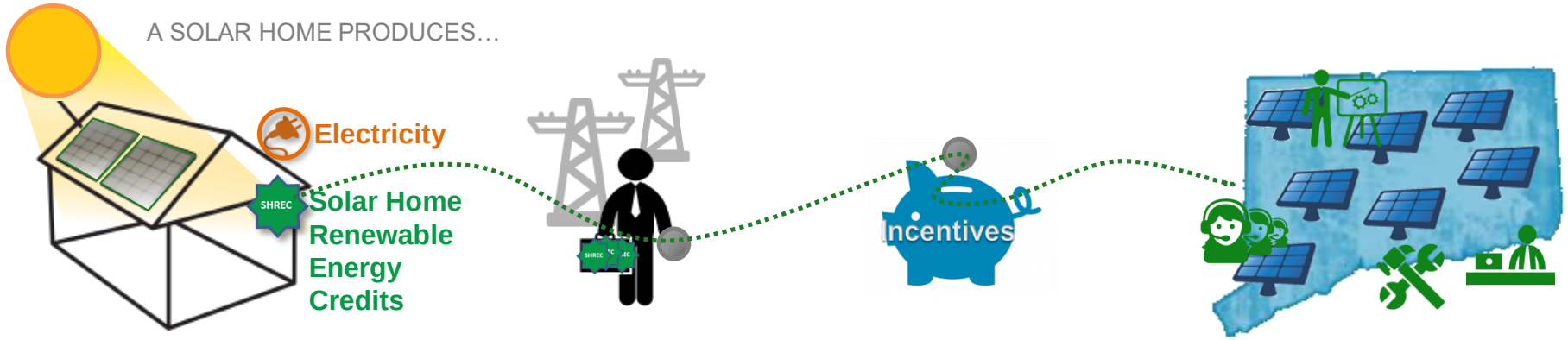


The Residential Solar Investment Program, Solar Home Renewable Energy Credit-Backed Revenue Bonds

(Our first "certified" Green Bonds)

Incentive Business

RSIP and SHREC



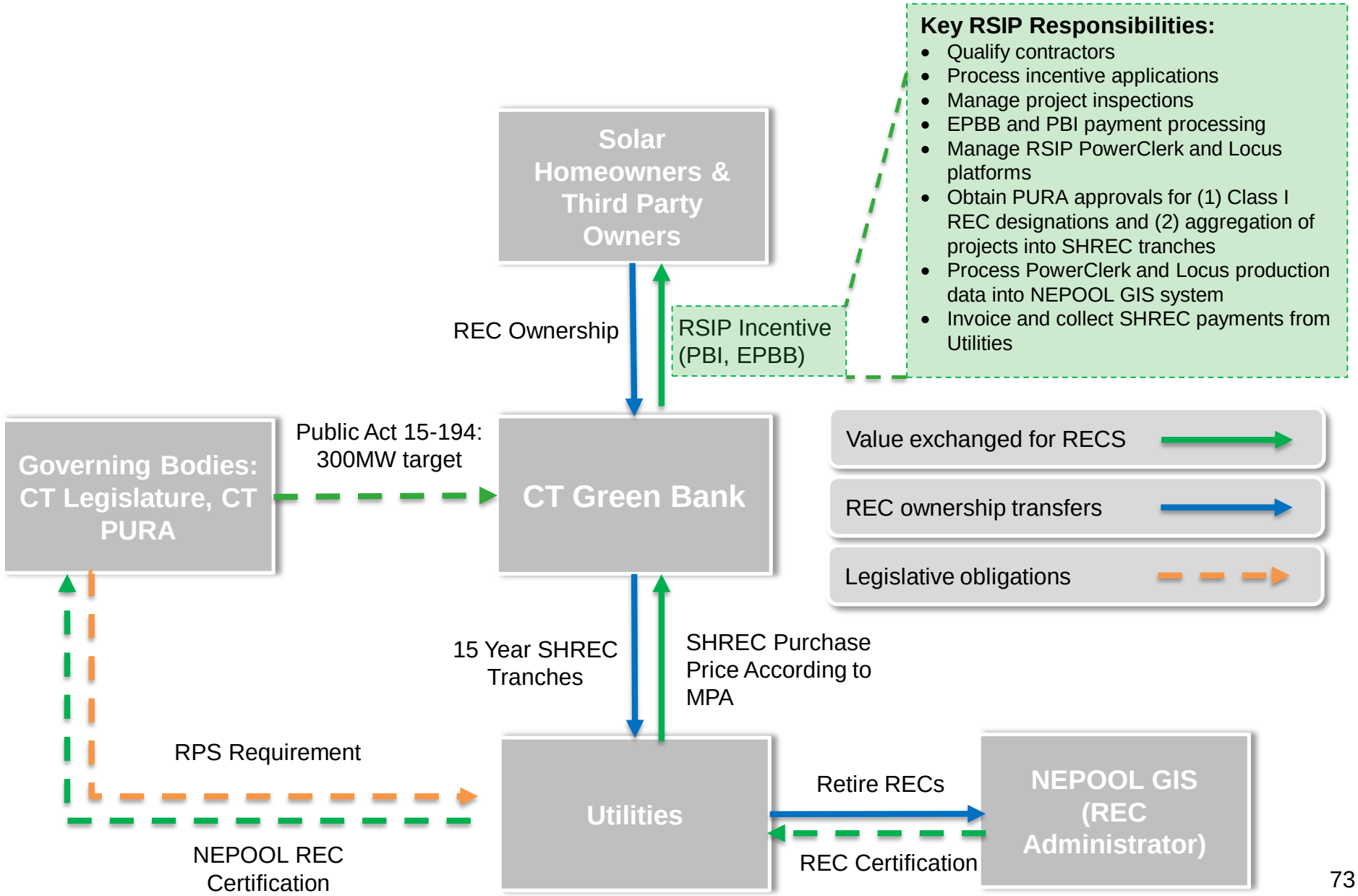
When panels produce electricity for a home, they will also produce Solar Home Renewable Energy Credits (SHRECs). The Green Bank provides upfront incentives through RSIP and collects all the SHRECs produced per statute.

Utilities required to enter into 15-year contracts with the Green Bank to purchase the stream of SHRECs produced. This helps utilities comply with their clean energy goals (i.e., Class I RPS).

The Green Bank would then use the revenues from the 15-year fixed price contracts to support the RSIP incentives (i.e., PBI and EPBB), cover admin costs, and fund securitization or financing costs.

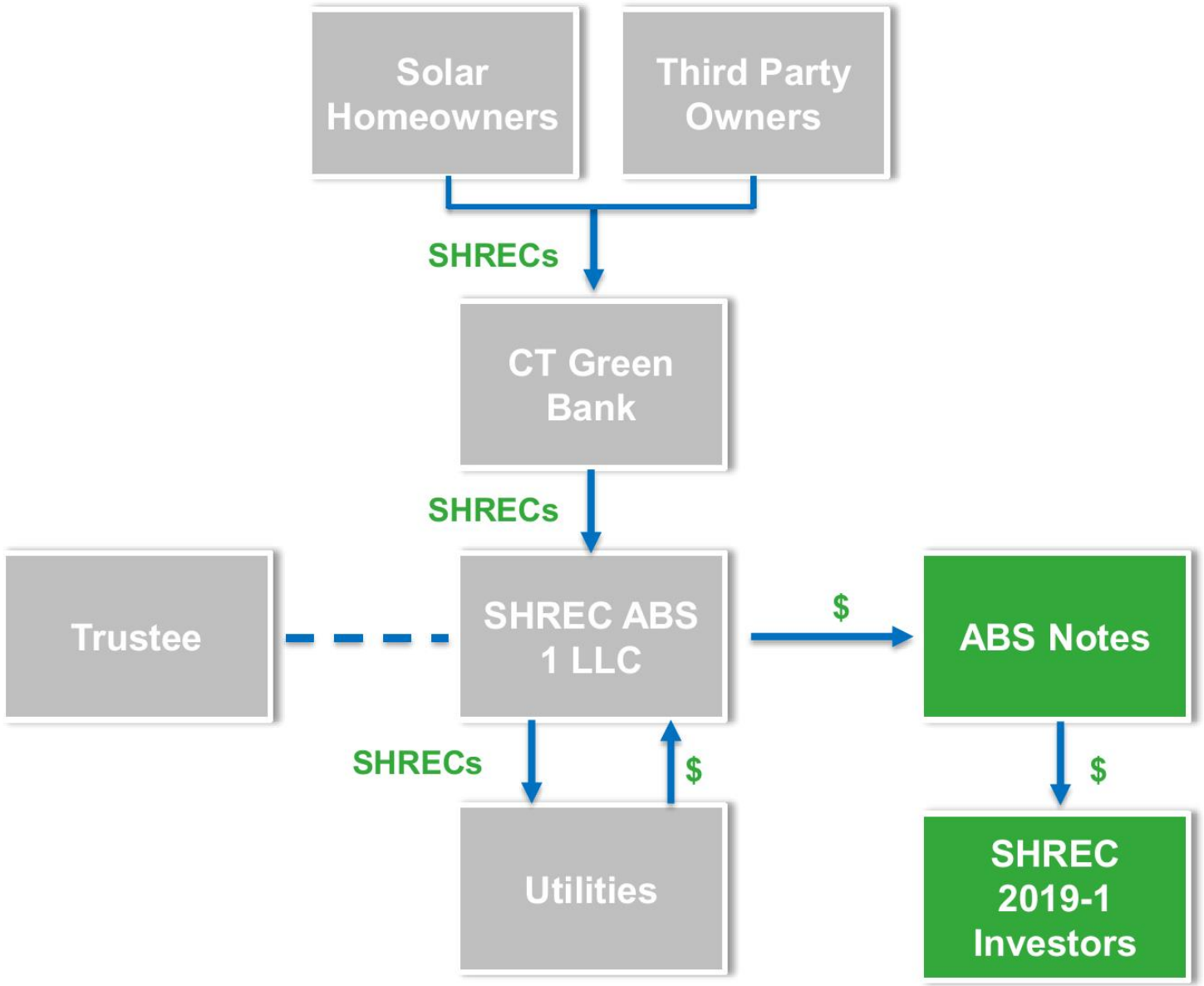
A public policy with 300 MW target will create more locally-sourced sustainable energy, helping make our power grid more secure and less congested, and also curb pollution.

SHREC Creation Process



SHREC 2019-1

Transaction Diagram



Approach

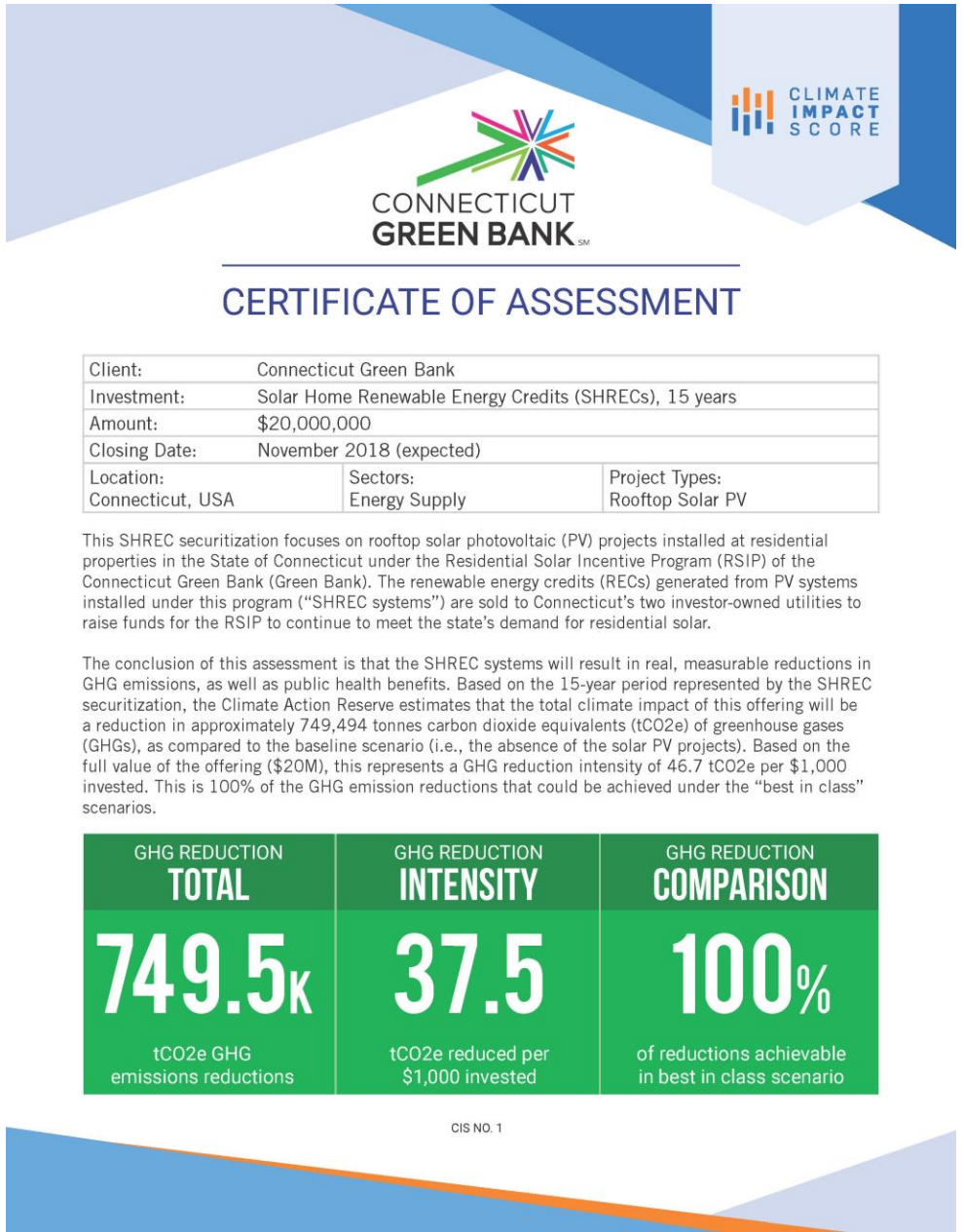
- **Bonds assessed and rated per climate bonds initiative standards**
  - The Green Bank engaged **Kestrel Verifiers** to perform the assessment
  - Certified as a climate bond

Climate Bonds Initiative

Climate Bonds Standard & Certification Scheme

- **Impact**
  - What exactly have these bonds achieved?
  - Environmental and Public Health Impacts using AvERT and CoBRA
  - **Climate Action Reserve** to verify and quantify impact

Climate Impact Score (Climate Action Reserve)



CONNECTICUT GREEN BANK

CLIMATE IMPACT SCORE

CERTIFICATE OF ASSESSMENT

Client:	Connecticut Green Bank	
Investment:	Solar Home Renewable Energy Credits (SHRECs), 15 years	
Amount:	$20,000,000	
Closing Date:	November 2018 (expected)	
Location: Connecticut, USA	Sectors: Energy Supply	Project Types: Rooftop Solar PV

This SHREC securitization focuses on rooftop solar photovoltaic (PV) projects installed at residential properties in the State of Connecticut under the Residential Solar Incentive Program (RSIP) of the Connecticut Green Bank (Green Bank). The renewable energy credits (RECs) generated from PV systems installed under this program ("SHREC systems") are sold to Connecticut's two investor-owned utilities to raise funds for the RSIP to continue to meet the state's demand for residential solar.

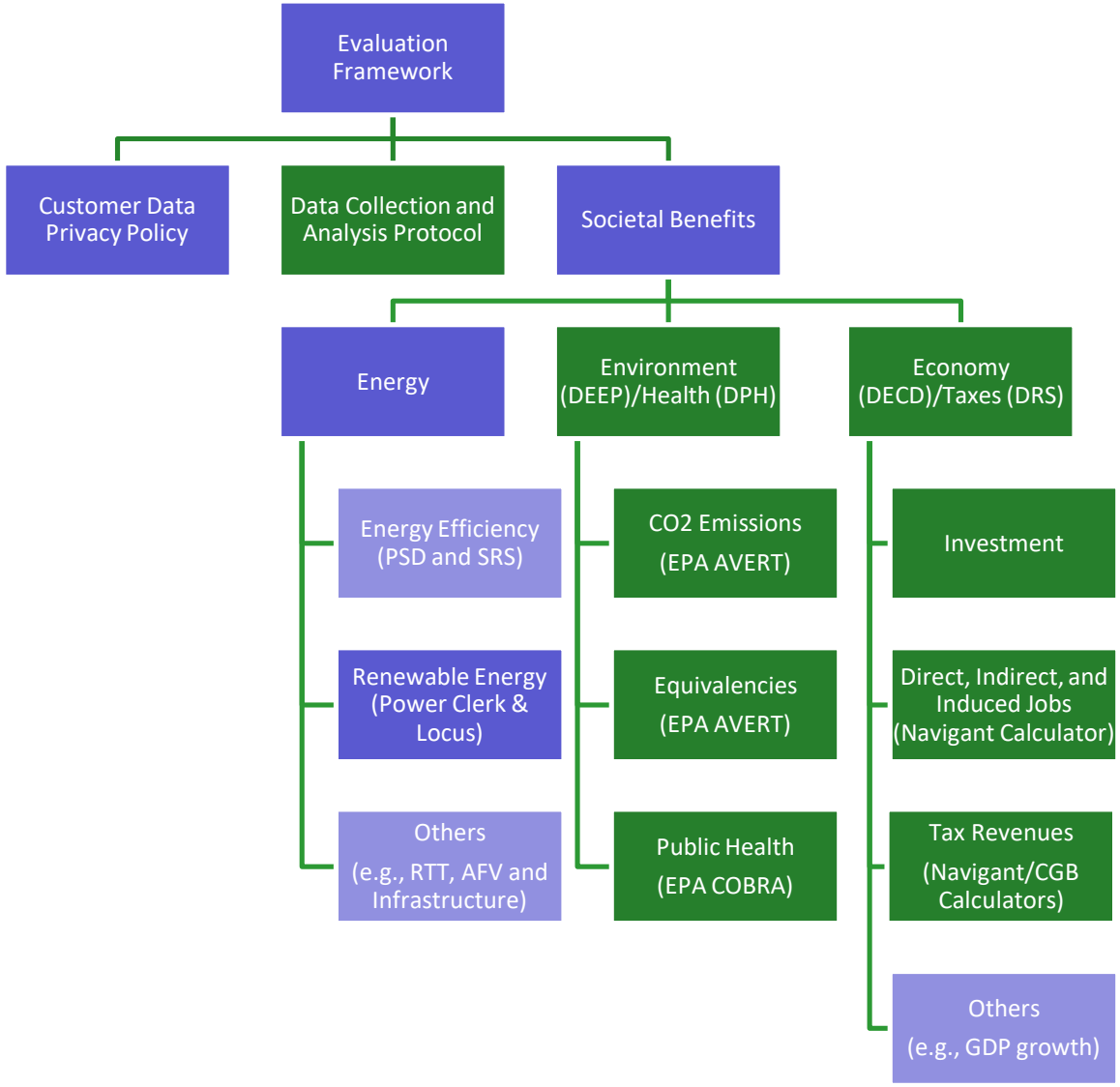
The conclusion of this assessment is that the SHREC systems will result in real, measurable reductions in GHG emissions, as well as public health benefits. Based on the 15-year period represented by the SHREC securitization, the Climate Action Reserve estimates that the total climate impact of this offering will be a reduction in approximately 749,494 tonnes carbon dioxide equivalents (tCO2e) of greenhouse gases (GHGs), as compared to the baseline scenario (i.e., the absence of the solar PV projects). Based on the full value of the offering ($20M), this represents a GHG reduction intensity of 46.7 tCO2e per $1,000 invested. This is 100% of the GHG emission reductions that could be achieved under the "best in class" scenarios.

GHG REDUCTION TOTAL	GHG REDUCTION INTENSITY	GHG REDUCTION COMPARISON
749.5K	37.5	100%
tCO2e GHG emissions reductions	tCO2e reduced per $1,000 invested	of reductions achievable in best in class scenario

CIS NO. 1

Evaluation Framework

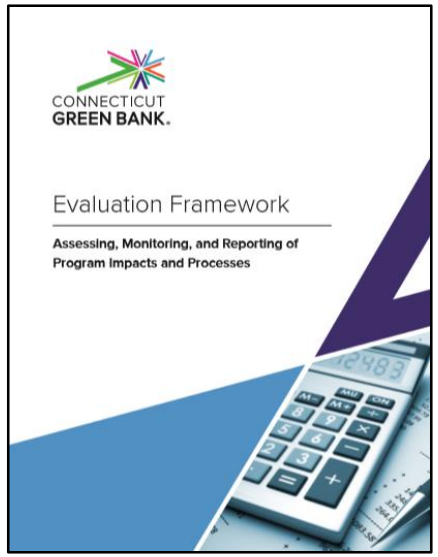
Evaluation Framework



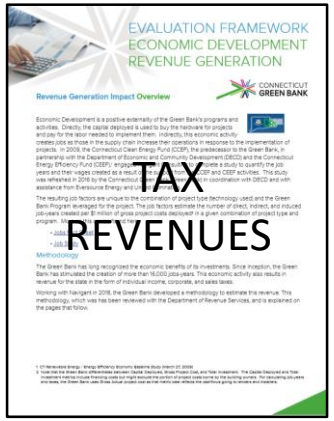
Impact Investment
Measuring Results

CONNECTICUT GREEN BANK

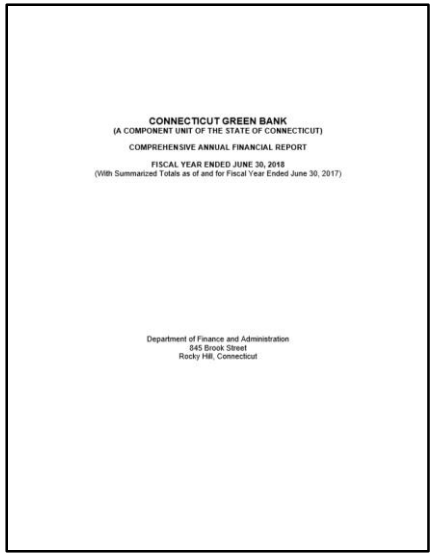
Evaluation Framework



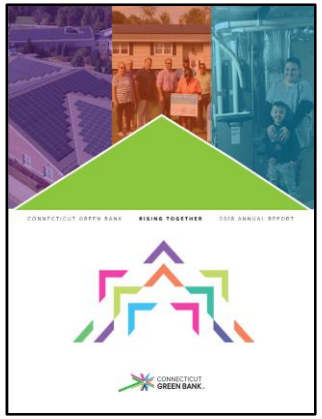
Impact Methodologies

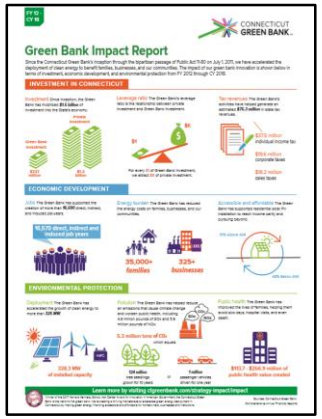


Comprehensive Annual Financial Report



Annual Report / Fact Sheet





Environmental Impact Fact Sheets

EVALUATION FRAMEWORK SOCIETAL PERFORMANCE

CONNECTICUT GREEN BANK

Environmental Impact Overview

An important measurement of success for the Connecticut Green Bank (Green Bank) and its programs is how our investment activity improves the air quality of the state. This will be measured by the decrease in the amount of nitrogen oxides (NO_x), sulfur dioxide (SO_2) and carbon dioxide (CO_2) and particulate matter emitted by the region's fossil fuel electric generation or transportation due to Green Bank projects.

The Green Bank will use the US Environmental Protection Agency's (EPA) Avoided Emissions and Generation Tool (AVERT) to calculate and report on the environmental benefits of the Green Bank's clean energy investment activity in Connecticut.

Estimated Generation/Savings for 2016 is calculated by using the Avert emissions factors in **Table 1**:

Table 1: AVERT Factors

Technology	CO_2 tons / MWh	NO_x lbs / MWh	SO_2 lbs / MWh
Solar PV	0.5621	0.5754	0.4107
Energy Efficiency	0.5432	0.4803	0.3397
Energy Efficiency/PV	0.5528	0.5285	0.3754
Wind	0.5372	0.4284	0.3333

Using this method, the following is an example of changes to emissions based on 60 MW additions of either clean generation or improved energy efficiency:

Table 2: AVERT Examples

Capacity:	60 MW			
Technology	Annual expected generation change (MWh)	CO_2 savings (tons)	NO_x savings (lbs)	SO_2 savings (lbs)
Solar PV	79,220	44,520	45,580	32,480
Energy Efficiency	63,090	34,260	30,300	21,430
Wind	104,930	56,370	44,920	34,980

Using the type of calculation outlined above, the Green Bank will include Societal Perspective benefits as well as the environmental impact of its programs in its Comprehensive Annual Financial Report, green bonds issuances, and other communications. Further information about AVERT is available at: https://www.epa.gov/sites/production/files/2015-08/documents/avert_decision_makers_fact_sheet_2-13-14_final_508.pdf

Methodology

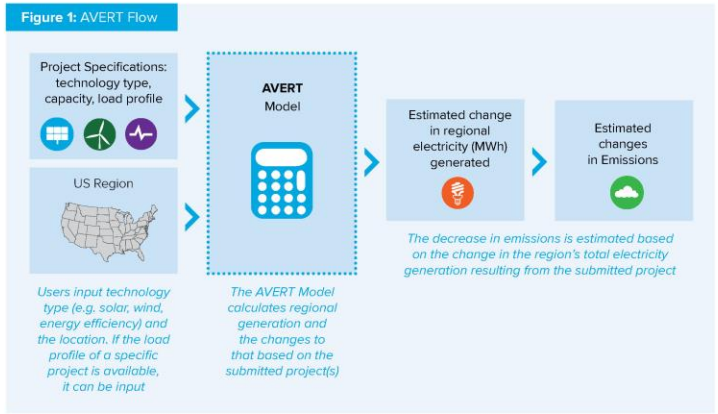
Previously, the Green Bank and its predecessor, the Connecticut Clean Energy Fund, estimated these impacts by using the results of the 2007 New England Marginal Emission Rate Analysis to calculate the expected annual and lifetime kWh savings of energy and production of clean energy. After working with the Connecticut Department of Energy and Environmental Protection (DEEP) and the US Environmental Protection Agency, the Green Bank has adopted the EPA's Avoided Emissions and Generation Tool (AVERT) to calculate the air quality benefits associated with Green Bank projects.

AVERT is a complex model that represents the dynamics of electricity dispatch based on the history of actual generation in a selected year for a specified region. For Green Bank purposes, the model generates the expected annual change to regional electricity generation based on a specific clean energy project or projects, then calculates the decline in emissions based on the reduction in resources required. The graphic below is a simplified representation of the model.

EPA United States Environmental Protection Agency

AVERT Avoided Emissions and generation Tool www.epa.gov/avert

Figure 1: AVERT Flow



To maximize the model's accuracy, the Green Bank has derived average project emissions factors by technology (solar, wind, EE) from its completed projects. It then applies these factors to the annual projected generation for individual projects to calculate the estimates of the expected NO_x, SO_2, and CO_2 savings. The Green Bank will update these factors annually based on changes to the regional generation profile and typical project sizes.

Delaware Sustainable Energy Utility

Green Bond Program

Lead by Example Workshop
National Governors Association
Providence, RI
October 4, 2019

Understanding the DESEU

- Created by Legislation
- Established Governor appointed Board (mostly)
- To Create DESEU as Non-Profit Organization
- Mission: Energy Efficiency & Green Energy Everywhere

DESEU Super Powers

- Financing: Direct Loans, Tax Exempt Bonds & Leases
- 65% of Delaware Regional Green House Gas Initiative Funds
- Solar Renewable Energy Credit Banking
- Prequalify ESCOs allowing ESPC w\o competitive bidding

Revenues Bonds Supported by Appropriations

NEW ISSUE-BOOK-ENTRY ONLY **RATINGS: See "RATINGS herein"**

In the opinion of Drinker Biddle & Reath LLP, Bond Counsel, under existing law as currently enacted and construed, interest on the Bonds is excluded from gross income for federal income tax purposes and is not a specific item of tax preference for purposes of the individual and corporate federal alternative minimum tax; but, interest on the Bonds will be included in "adjusted current earnings" in computing alternative minimum taxable income with respect to certain corporations. The Bonds, and the interest payable thereon, are exempt from taxation by the State of Delaware or any political subdivision thereof. See "CERTAIN TAX MATTERS" herein.

$67,435,000
SUSTAINABLE ENERGY UTILITY, INC.
Energy Efficiency Revenue Bonds, Series 2011

Dated: Date of Issuance **Due: September 15, as shown on inside cover**

NEW ISSUE-BOOK-ENTRY ONLY **RATING: See "RATING" herein**

In the opinion of Drinker Biddle & Reath LLP, Bond Counsel, under existing law as currently enacted and construed, interest on the Bonds is excluded from gross income for federal income tax purposes and is not a preference item for purposes of the federal alternative minimum tax. The Bonds, and the interest payable thereon, are exempt from taxation by the State of Delaware or any political subdivision thereof. See "CERTAIN TAX MATTERS" herein.

$18,650,000
Sustainable Energy Utility, Inc.
Energy Efficiency Revenue Bonds, Series 2019

NOT GENERAL OBLIGATION BONDS

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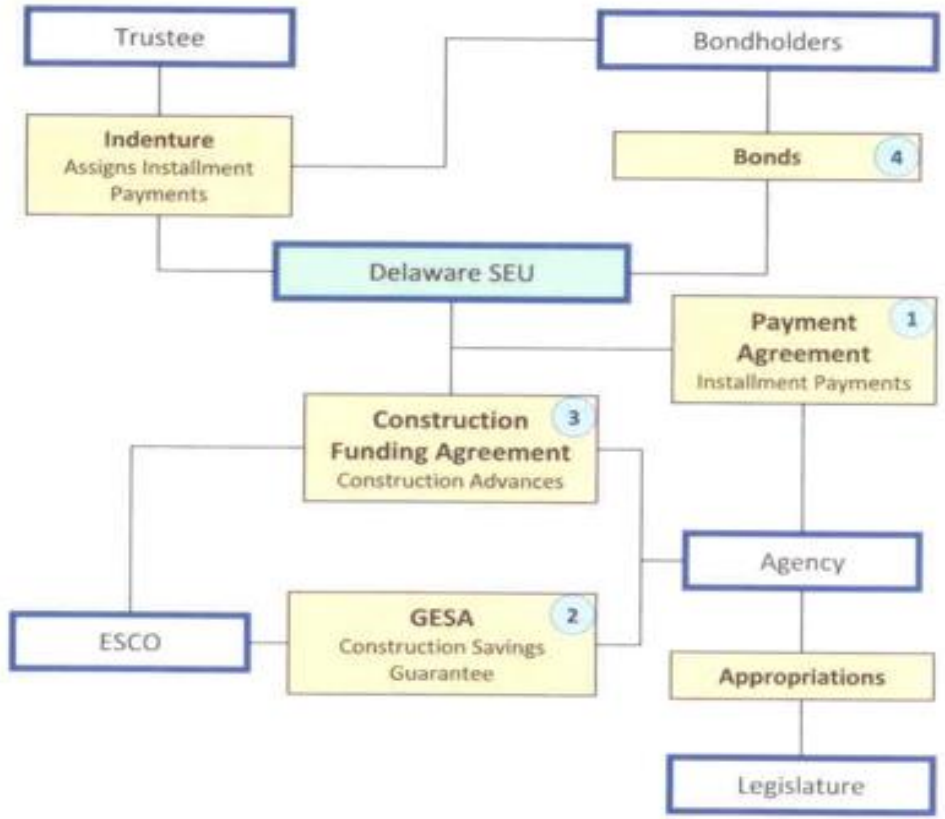
Program Mechanics

1) The Delaware State Agencies ("Agencies") enter into Installment Payment Agreements with the SEU whereby the Agencies agree to make annual payments for installation of energy efficiency upgrades

2) ESCO enters into Guaranteed Energy Savings Agreement ("GESA") with the Agencies, guaranteeing targeted annual savings level for the term of the agreement

3) The SEU enters into Construction Funding Agreement with the Energy Service Company ("ESCO") and the Agency whereby the SEU agrees to provide capital for energy efficiency investments

4) The SEU issues tax-exempt bonds secured by the payments under the Installment Payment Agreement



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Role of the SEU in Green Energy Bonding

- ✓ Financial Advisor & Bond Counsel Contracted
- ✓ Financial Underwriter Contracted
- ✓ Pre-qualified ESCO's – 14 Companies
- ✓ Developed an ESCO Selection Process
- ✓ Provide Technical Assistance to Agencies
- ✓ Monitored energy savings progress

What do Bond Raters Like?

Aa 2 - Moody (2011)

AA+ - S & P (2011 & 2019)

- ✓ Delaware's Triple A Rating and Governance
- ✓ Strength of the GESA's, Installment Payment, and Construction Agreements
- ✓ Require Annual Budget Request of Agencies
- ✓ Prohibiting Budget Reduction As a Result of Savings
- ✓ Date Certain Annual Payments

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Why Do State Agencies Like It?

- ✓ EPC (Engineering, Procurement, Construction) Contracts
- ✓ Funds the mundane –energy efficiency is boring
- ✓ 20 year term allows more choices of ECM's
- ✓ Budgets cannot be reduced as a result of savings
- ✓ Fulfills Governor's Ex. Order 18 (Reduce energy 30%)

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Administrative & Legislative Concerns?

- Bypasses Admin/Legislative Budget Processes
- Bypasses State Procurement – Unions & Local Contractors
- Uncontrolled Debt Threat to States Aaa Bond Rating
- Does Energy Savings Really Cover Debt Service

How Green Are They?
Data from the 2011 Bond Issue in First Year

- ✓ 950 Green Construction Jobs
- ✓ Reduced 20,000 Metric Tons CO2 in year one
- ✓ Reduced 22 MT of SO2 and 6.6 MT of Nox
- ✓ Equivalent of taking 1,350 cars off the road
- ✓ Carbon Sequestered over 5,300 Acres of Forest

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