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
Green Bond Fundamentals

- Why Green Bonds?
- Green Bond Basics
- The Market
- Standards and Certification
- The Path Forward
Climate change will impact infrastructure...

2100 WARMING PROJECTIONS
Emissions and expected warming based on pledges and current policies

Dec 2018 update

Warming projected by 2100
Baseline
4.1 – 4.8°C

Current policies
3.1 – 3.5°C
Optimistic policies
3.0°C
Pledges & Targets
2.7 – 3.0°C
2°C consistent
1.6 – 1.7°C
1.5°C consistent
1.3°C
...and the next 10 years will determine how bad it will get.
“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
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](https://www.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](https://www.mrsb.org)
Essentially...

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 considerations of adding a green label. Throughout this series we will discuss taxonomies that are being developed to help identify qualifying projects or assets. 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

2007/2008
- EIB, World Bank issue first green bonds

2009
- Green bond market takes off with the World Bank issuing first USD green bond

2012
- Launch of Climate Bond Standard
- Start of green definition, clear labeling process

2013
- Green Bond Market takes off with larger deals and increased investor interest

2014
- Green Bond Principles (GBP) published
- First green bond indices
- First US muni issuances

2015/2016
- Maturing market
- Surge of Asian issuance
- Stock exchange launches green segments
- Guidance and regulations begin to emerge

2017
- Continued growth
- Market almost doubles to USD150 billion
- Increasing issuer geographic diversity

2018
- Regulators and central banks come in
- EU leads defining taxonomy
- CA signs Green Bonds Pledge

2019
- Cumulative Muni Issuance tops USD8 billion
- California Green Bond Market Development Committee launched
Continued Market Growth

Green Bond Issuance at End of 2019 Q2

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

Data courtesy of: Climate Bonds

Indication of continued market growth.
Diversification of Proceed Use

Data courtesy of: Climate Bonds
North America Dominated by Fannie Mae

This is the region with the largest and most frequent issuances of green ABS

Green bonds in USA are small in size, but by far prevail in the market

Data courtesy of:

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

<table>
<thead>
<tr>
<th>State</th>
<th>Deals</th>
<th>Issued (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>59</td>
<td>9,560 m</td>
</tr>
<tr>
<td>NY</td>
<td>39</td>
<td>9,112 m</td>
</tr>
<tr>
<td>MA</td>
<td>20</td>
<td>3,062 m</td>
</tr>
<tr>
<td>WA</td>
<td>9</td>
<td>2,004 m</td>
</tr>
<tr>
<td>IN</td>
<td>11</td>
<td>1,437 m</td>
</tr>
</tbody>
</table>

Data courtesy of: [Climate Bonds](https://www.climatebonds.net)
Broadening Issuances: Recent & Upcoming Green Bonds per MuniOS

<table>
<thead>
<tr>
<th>State</th>
<th>Issuer</th>
<th>Details</th>
<th>Creditors</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA</td>
<td>Massachusetts Clean Water Trust (205,680,000) State Revolving Fund Bond, Series 22 (Green Bond)</td>
<td>Jefferies</td>
<td>FPM Financial Advisors LLC (MA)</td>
<td>09/30/19</td>
</tr>
<tr>
<td>DC</td>
<td>District of Columbia Water and Sewer Authority (502,720,000) Public Utility Subordinate Lien Revenue Bonds, Series 2019A (Green Bond) and Series 2019B (Green Bond) and Public Utility Subordinate Lien Revenue Refunding Bonds, Series 2019D (Federally Taxable)</td>
<td>Siebert Croner &amp; Co., LLC. J.P. Morgan FPM Financial Advisors LLC (MA)</td>
<td></td>
<td>09/27/19</td>
</tr>
<tr>
<td>MD</td>
<td>The Conservation Fund (150,000,000) Taxable Green Bonds (Working Forest Conservation Program), Series 2019</td>
<td>Goldman Sachs &amp; Co. LLC.</td>
<td></td>
<td>09/23/19</td>
</tr>
<tr>
<td>CO</td>
<td>The Regents of the University of Colorado (288,440,000) University Enterprise Revenue and Refunding Revenue Bonds, Series 2019D and Series 2019C (Term Rate Bonds) (Green Bond)</td>
<td>Stifel, Goldman Sachs North Slope Capital Advisors (MA)</td>
<td></td>
<td>09/19/19</td>
</tr>
<tr>
<td>NY</td>
<td>Dormitory Authority of the State of New York (121,415,000) Cornell University Revenue Bonds, Series 2019D (Green Bond)</td>
<td>Morgan Stanley, The Yuba Group LLC (MA)</td>
<td></td>
<td>09/13/19</td>
</tr>
<tr>
<td>IN</td>
<td>Indiana Finance Authority (405,000,000) First Lien Wastewater Utility Revenue Bonds, Series 2018A (CWA Authority Project) (Green Bond)</td>
<td>CITICROUD</td>
<td></td>
<td>09/12/19</td>
</tr>
<tr>
<td>CA</td>
<td>Harbor Department of the City of Los Angeles (163,000,000) Refunding Revenue Bonds 2019 Series A (AMT), 2019 Series D (Non-AMT), 2019 Series C-1 (AMT) (Green Bond) and 2019 Series C-2 (Non-AMT) (Green Bond)</td>
<td>Jefferies, KNN Public Finance, LLC (MA)</td>
<td></td>
<td>09/04/19</td>
</tr>
<tr>
<td>IN</td>
<td>Indiana Finance Authority (200,000,000) State Revolving Fund Program Bonds, Series 2019A (Green Bond)</td>
<td>Morgan Stanley, Wells Fargo Securities FPM Financial Advisors LLC (MA)</td>
<td></td>
<td>09/30/19</td>
</tr>
<tr>
<td>CA</td>
<td>Private Colleges and Universities Authority (297,940,000) Emory University revenue Bonds, Series 2019A and Series 2019B (Green Bond)</td>
<td>Goldman Sachs &amp; Co. LLC, Barclays, Yuba Group LLC (MA)</td>
<td></td>
<td>08/21/19</td>
</tr>
<tr>
<td>PA</td>
<td>Pennsylvania Economic Development Financing Authority (50,000,000) Solid Waste Disposal Revenue Bonds, Series 2019A (Covanta Project) (Green Bond)</td>
<td>BofA Merrill Lynch</td>
<td></td>
<td>08/16/19</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Pre-issuance review</th>
<th>Scope</th>
<th>Providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assurance</td>
<td>Positive or negative assurance on compliance with the Green Bond Principles (GBP) or the Green Loan Principles (GLP)</td>
<td>EY, Deloitte, KPMG, etc</td>
</tr>
<tr>
<td>Second Party</td>
<td>Confirm compliance with GBP / GLP. Provide assessment of issuer’s green bond framework, analysing the “greenness” of eligible assets</td>
<td>CICERO, Sustainalytics, Vigeo-Eiris, DNV GL, SynTao Green Finance, CECEP Consulting, etc</td>
</tr>
<tr>
<td>Green bond rating</td>
<td>Rating agencies assess the bond’s alignment with the Green Bond Principles and the integrity of its green credentials</td>
<td>Moody’s, S&amp;P, CCX (China), ChinaBond Rating, R&amp;l and JCR (Japan), RAM (Malaysia)</td>
</tr>
<tr>
<td>Pre-issuance verification</td>
<td>Third party verification confirms that the use of proceeds adheres to the Climate Bonds Standard and sector specific criteria</td>
<td>Approved verifiers under the Climate Bonds Standard scheme</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post-issuance review</th>
<th>Scope</th>
<th>Providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assurance or SPO</td>
<td>Assurance of allocation of proceeds to eligible green projects</td>
<td>Audit firms, ESG service providers, scientific experts</td>
</tr>
<tr>
<td>Impact report</td>
<td>Reporting that seeks to quantify the climate or environmental impact of a project/asset numerically</td>
<td>As above</td>
</tr>
<tr>
<td>Post-issuance verification</td>
<td>Assurance against the Climate Bonds Standard, including allocation of proceeds to eligible green projects and types of green projects</td>
<td>Approved verifiers</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th></th>
<th>GBP</th>
<th>CBI</th>
<th>EU GBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligibility Criteria</td>
<td>High-level</td>
<td>CBI Taxonomy</td>
<td>EU Taxonomy</td>
</tr>
<tr>
<td>External Review</td>
<td>Recommended</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Not Required</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Publication of External</td>
<td>No</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Review</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accreditation of Reviewers</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>New EU system</td>
</tr>
<tr>
<td>Impact Reporting</td>
<td>Recommended</td>
<td>Recommended</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td>Not Required</td>
<td>Required Eligibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reporting</td>
<td></td>
</tr>
<tr>
<td>Use of Proceeds in Legal</td>
<td>Recommended</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Documentation</td>
<td>Not Required</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Need To Define ‘Green’

The aim of a taxonomy is to:

- Create a uniform and harmonised classification system - this can be used for reference internationally.
- Avoid market fragmentation.
- Protect against greenwashing.
- Provide the basis for further policy action such as standards, labels, incentives, etc.
Climate Bond Standards Taxonomy
Climate Bonds Sector Criteria

<table>
<thead>
<tr>
<th>Sector</th>
<th>Criteria Available for Certification</th>
<th>Criteria in development</th>
<th>TWGs launching soon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Wind, Solar, Geothermal, Wave</td>
<td>Firepower, Bioenergy</td>
<td>Distribution &amp; Mgmt</td>
</tr>
<tr>
<td>Transport</td>
<td>Rail, Road, Maritime</td>
<td></td>
<td>Rail &amp; Road Passes</td>
</tr>
<tr>
<td>Utilities</td>
<td>Water, Recycling &amp; Waste</td>
<td></td>
<td>IT, Communications</td>
</tr>
<tr>
<td>Buildings</td>
<td>Residential, Commercial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Resources</td>
<td>Forestry, Agriculture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>Fishing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Developing Sector Criteria

Formula

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

CBI’s Sector Criteria

Process

- Technical and industry working groups
- Working groups draft criteria
- Draft criteria for public review
- Climate Bond Standard Board approval
- Publish final criteria for Certification use
- 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

1. Prepare the bond
   - Identify assets that meet the relevant sector criteria and compile supporting information
   - Create Green Bond Framework setting out how proceeds of the bond will be used

2. Engage a verifier
   - Engage an Approved Verifier for pre- and post-issuance Certification
   - Provide them with relevant information
   - Receive a Verifier’s Report giving assurance that Climate Bonds Standard requirements are met

3. Confirm the Certification post-issuance
   - Submit the Verifier’s Report and Information Form to the Climate Bonds Initiative
   - Receive a decision on pre-issuance Certification
   - Issue your bond, using the Certified Climate Bond mark

4. Report annually
   - Within 12 months of issuance, submit the Verifiers post-issuance report
   - Receive notification of post-issuance certification

5. Get Certified & issue a Certified Climate Bond
   - Prepare a simple report each year for term of the bond
   - Provide it to bond holders and Climate Bonds Initiative
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

The Green & Social Bond Principles

**Pillar 1**
Use of proceeds – Identifying eligible projects

**Pillar 2**
Process for project evaluation and selection

**Pillar 3**
Management of Proceeds: Ring-fencing or notional equivalence

**Pillar 4**
Reporting: use of proceeds, impact etc.

External review recommendation

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

Link to Governance Framework on ICMA's Website (accessible in PDF)
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

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

Source: ICMA Presentation to ECB 2/6/18
Consistent Rules Support Market Growth

Voluntary rules drove early market growth and allowed global consistency.
External Reviews Are Now Dominant

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

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

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

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

Data courtesy of:

Climate Bonds
2018 Approved Verifier Activity Globally

Data courtesy of:

Climate Bonds
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

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

Analysis covers all Green Bonds issued up to November 2017.

Data courtesy of: Climate Bonds
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

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)

https://gspp.berkeley.edu/centers/cepp/projects/green-bonds-market-development-committee
California Green Bond Market Development Committee

**Chair**
California State Treasurer
Fiona Ma, CPA

**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
Volume 1: The Barriers and Challenges
Volume 2: Actionable Strategies and Solutions
• 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.

• [website]
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
Great Overview of Green Bonds 2
California Treasurer’s Green Bond Webinar Series
Powerpoints, Background Docs, Webinar Replay

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

Or use direct link:
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
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 “CO² 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

BEFORE

Energy Bill

AFTER

Clean Energy Project Financing Payment

Net Savings

- Cheaper
- Cleaner
- Reliable
- Healthier

Clean Energy Improvement (Behind the Meter)

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

Clean Energy Fund/RGGI

1. Capitalization of Green Bank
2. Innovative financing structures
3. Private investment flows

Connecticut Green Bank

1. Creation & Public Capitalization

2. Public Investment ($1.00)
3. Private Investment ($6.00)

Clean Energy Projects (Families, Businesses & Government)

Private Investors

Financial Return

Social & Environmental Return
Financing Program
Public Private Partnership Examples

**Smart-E Loan**
Reducing the burden of energy costs on families in partnership with local contractors and community banks and credit unions.

**RSIP**

**Solar for All**

**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**
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

### Financing Programs

#### Credit Enhance
- **$59 MM OPEN**
  - 20:1<sup>1</sup>
  - Residential Energy
- **$50+ MM CLOSED**
  - 9:1
  - C-PACE

#### Warehousing
- **$75 MM CLOSED**
  - 7.5:1
  - Residential Solar
  - Commercial Solar
- **$60+ MM CLOSED**
  - 6:1<sup>3</sup>
  - Residential Solar
  - Commercial Solar

#### Tax Equity Finance
- **$65 MM CLOSED**
  - 10:1
  - Green Bank Solar PPA

#### Project Finance
- **$5 MM OPEN**
  - 100%<sup>2</sup>
  - Grid-Tied
  - Multifamily Energy
- **$9 MM CLOSED**
  - 9:1
  - Green Bank Solar PPA

#### PRI
- **$65 MM CLOSED**
  - 10:1
  - Grid-Tied
  - Multifamily Energy

#### Tax Credit Bonds
- **$65 MM CLOSED**
  - 10:1
  - Grid-Tied
  - Multifamily Energy
- **$9 MM CLOSED**
  - 9:1
  - Green Bank Solar PPA

### REFERENCES
1. LLR yields high leverage – and it is 2<sup>nd</sup> 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)

---

\begin{tabular}{|c|c|c|c|c|}
\hline
\textbf{Projects} & \textbf{Raised} & \textbf{Leverage} & \textbf{Status} & \textbf{References} \\
\hline
Residential Solar & $90$ MM & 7.5:1 & CLOSED & 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. \\
Commercial Solar & $30$ MM & 4:1 & CLOSED & 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. \\
C-PACE & $90$ MM & 5:1 & CLOSED & \\
Residential Solar & $80$ MM & 15:1 & OPEN & \\
Commercial Solar & $60+$ MM & 6:1\(^3\) & OPEN & \\
Commercial Solar & $77$ MM & 8:1 & CLOSED & \\
CT Green Bank & $40$ MM & 100\(^%\)\(^4\) & OPEN & \\
REC Securitization & $20$ MM & 4:1 & OPEN & \\
Small Business Energy Advantage & $56$ MM & 10:1 & OPEN & \\
\hline
\end{tabular}

---

**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

- **2014**
  - $30M C-PACE Bonds (Tranche 1)

- **2015**
  - C-PACE Bonds (Tranche 2,3)

- **2016**
  - $2.2M QECBs for Housing Authority Solar PV

- **2017**
  - $3M CREBs
    - Hydro
    - CSCU

- **2018**
  - RFP for SHREC Bonds

- **2019**
  - $38.6M SHREC Bonds (Issued, ABS)

- **2020**
  - $20M SHREC Bonds (Pending, Muni)

*Green Bond Certification, Kestral*
Green Bond Timeline

2014
• $60M GO Bonds

2015
• $250M SRF – General Revenue Bonds
• $65M GO Bonds

2016
• $65M GO Bonds

2017
• $250M SRF – General Revenue Bonds

2018

2019
• $250M SRF – General Revenue Bonds

*Green Bond Certification, Sustainalytics
Executive Order #1

Governor Lamont Signs Order Directing State Agencies to Reduce Energy Consumption and Environmental Impacts
~70 million square feet of state structures

**State Owned Structures (1820)**
- 66.9 million total square feet

**State Leased Buildings (170)**
- 2.7 million total square feet

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: CT OPM, JESTIR database 2016

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

Connecticut Department of Energy and Environmental Protection
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
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
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

"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)

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Yield (kWh/kW/yr)</th>
<th>System Size (kWdc)</th>
<th>Ground Mount Size</th>
<th>Rooftop Size</th>
<th>Carport Size</th>
<th>PPA Price ($/kWh)</th>
<th>ZRECs ($/MWh)</th>
<th>Avoided Cost ($/kWh)</th>
<th>Estimated Annual Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quinebaug Valley CC (Roof and Ground)</td>
<td>1,283.5</td>
<td>868.1</td>
<td>744.0</td>
<td>124.1</td>
<td></td>
<td>$0.070</td>
<td>$60.00</td>
<td>$0.11</td>
<td>$44,345</td>
</tr>
<tr>
<td>Asnuntuck (Roof Only)</td>
<td>1,145.8</td>
<td>796.0</td>
<td>796.0</td>
<td></td>
<td></td>
<td>$0.080</td>
<td>$60.00</td>
<td>$0.11</td>
<td>$27,726</td>
</tr>
<tr>
<td>Tunxis CC (Roof Only)</td>
<td>1,185.9</td>
<td>223.2</td>
<td>223.2</td>
<td></td>
<td></td>
<td>$0.076</td>
<td>$70.00</td>
<td>$0.11</td>
<td>$9,050</td>
</tr>
<tr>
<td>Central CT State ITIB (Roof)</td>
<td>1,147.6</td>
<td>110.0</td>
<td>110.0</td>
<td></td>
<td></td>
<td>$0.080</td>
<td>$103.07</td>
<td>$0.11</td>
<td>$3,787</td>
</tr>
<tr>
<td>WCSU - West (Ground Only)</td>
<td>1,181.6</td>
<td>239.0</td>
<td>239.0</td>
<td></td>
<td></td>
<td>$0.070</td>
<td>$70.00</td>
<td>$0.11</td>
<td>$11,296</td>
</tr>
<tr>
<td>Housatonic - Lafayette Hall (Roof Only)</td>
<td>1,183.6</td>
<td>206.1</td>
<td>206.1</td>
<td></td>
<td></td>
<td>$0.076</td>
<td>$65.00</td>
<td>$0.13</td>
<td>$12,784</td>
</tr>
<tr>
<td>Housatonic - Garage (Carport)</td>
<td>1,205.4</td>
<td>936.0</td>
<td>936.0</td>
<td></td>
<td></td>
<td>$0.078</td>
<td>$120.00</td>
<td>$0.13</td>
<td>$58,672</td>
</tr>
<tr>
<td>Southern CT State (Combined)</td>
<td>1,181.2</td>
<td>1,296.0</td>
<td>561.6</td>
<td>230.4</td>
<td>504.0</td>
<td>$0.083</td>
<td>$60.00</td>
<td>$0.13</td>
<td>$71,947</td>
</tr>
</tbody>
</table>

**Totals**

<table>
<thead>
<tr>
<th>kWh / yr</th>
<th>System Size</th>
<th>Wgt Avg PPA</th>
<th>Wgt Avg ZREC</th>
<th>Total Annual Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totals</td>
<td>5,604,969</td>
<td>4,976.4</td>
<td>$0.078</td>
<td>$74.24</td>
</tr>
</tbody>
</table>
CREBs for CSCU Solar
Structure

- **CSCU**
  - Installation

- **Current by GE**
  - EPC Contract & Performance Guaranty

- **Connecticut Green Bank**
  - CREBs Volume Cap Allocation
  - Tax Credit
  - Connecticut Green Bank Sub: CEFIA Holdings LLC
    - Project Owner: Distributed Solar Assets (4.6 MW)
      - Equity
      - Loan agreement: assignment of PPA, ZREC and other revenues to Trustee
      - Free Cash Flow
  - Loan agreement: assignment of PPA, ZREC and other revenues to Trustee
  - Bond Purchase Agreement
  - PPA & ZREC Revenues
  - Trustee
  - Bank of America CREBs purchaser
  - Debt Service
  - Interest

- **Eversource**
  - ZREC Contracts
  - 1% PURA Buy-Down

- **Internal Revenue Service**
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

**Governing Bodies:**
- CT Legislature, CT PURA

**Public Act 15-194:**
- 300MW target

**RPS Requirement**

**NEPOOL REC Certification**

**CT Green Bank**
- Solar Homeowners & Third Party Owners
- REC Ownership
- RSIP Incentive (PBI, EPBB)

**15 Year SHREC Tranches**

**SHREC Purchase Price According to MPA**

**Utilities**
- Retire RECs
- REC Certification

**NEPOOL GIS (REC Administrator)**
- Value exchanged for RECS
- REC ownership transfers
- Legislative obligations

**Key RSIP Responsibilities:**
- Qualify contractors
- Process incentive applications
- Manage project inspections
- EPBB and PBI payment processing
- Manage RSIP PowerClerk and Locus platforms
- Obtain PURA approvals for (1) Class I REC designations and (2) aggregation of projects into SHREC tranches
- Process PowerClerk and Locus production data into NEPOOL GIS system
- Invoice and collect SHREC payments from Utilities

**NEPOOL REC Certification**

**Value exchanged for RECS**

**REC ownership transfers**

**Legislative obligations**
SHREC 2019-1
Transaction Diagram

Solar Homeowners

Third Party Owners

CT Green Bank

SHREC ABS 1 LLC

Trustee

Utilities

SHREC 2019-1 Investors

ABS Notes

SHRECs

SHRECs

SHRECs

$
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 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
### CERTIFICATE OF ASSESSMENT

<table>
<thead>
<tr>
<th>Client:</th>
<th>Connecticut Green Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment:</td>
<td>Solar Home Renewable Energy Credits (SHRECs), 15 years</td>
</tr>
<tr>
<td>Amount:</td>
<td>$20,000,000</td>
</tr>
<tr>
<td>Closing Date:</td>
<td>November 2018 (expected)</td>
</tr>
<tr>
<td>Location:</td>
<td>Connecticut, USA</td>
</tr>
<tr>
<td>Sectors:</td>
<td>Energy Supply</td>
</tr>
<tr>
<td>Project Types:</td>
<td>Rooftop Solar PV</td>
</tr>
</tbody>
</table>

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 45.7 tCO2e per $1,000 invested. This is 100% of the GHG emission reductions that could be achieved under the "best in class" scenarios.

<table>
<thead>
<tr>
<th>GHG REDUCTION TOTAL</th>
<th>749.5K tCO2e GHG emissions reductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG REDUCTION INTENSITY</td>
<td>37.5 tCO2e reduced per $1,000 invested</td>
</tr>
<tr>
<td>GHG REDUCTION COMPARISON</td>
<td>100% of reductions achievable in best in class scenario</td>
</tr>
</tbody>
</table>
Evaluation Framework
Evaluation Framework

Customer Data Privacy Policy

Data Collection and Analysis Protocol

Societal Benefits

Energy
- Energy Efficiency (PSD and SRS)
- Renewable Energy (Power Clerk & Locus)
- Others (e.g., RTT, AFV and Infrastructure)

Environment (DEEP)/Health (DPH)
- CO2 Emissions (EPA AVERT)
- Equivalencies (EPA AVERT)
- Public Health (EPA COBRA)

Economy (DECD)/Taxes (DRS)
- Investment
  - Direct, Indirect, and Induced Jobs (Navigant Calculator)
- Tax Revenues (Navigant/CGB Calculators)
- Others (e.g., GDP growth)
Impact Investment
Measuring Results

Evaluation Framework
Impact Methodologies
Comprehensive Annual Financial Report
Annual Report / Fact Sheet
Environmental Impact Fact Sheets

Methodology

Producing the Green Bank and its predecessor, the Connecticut Clean Energy Fund, eliminates these impacts by using the results of the 2007 New England Merganser Emission Rate Analysis to calculate the expected annual and lifetime MWh 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 Averted 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

<table>
<thead>
<tr>
<th>Technology</th>
<th>CO2 lbs / MWh</th>
<th>NOx lbs / MWh</th>
<th>SO2 lbs / MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar PV</td>
<td>0.4423</td>
<td>0.5018</td>
<td>0.6017</td>
</tr>
<tr>
<td>Energy Efficiency PV</td>
<td>0.5528</td>
<td>0.3585</td>
<td>0.2859</td>
</tr>
<tr>
<td>Wind</td>
<td>0.5322</td>
<td>0.4028</td>
<td>0.3283</td>
</tr>
</tbody>
</table>

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

Table 2: AVERT Example

<table>
<thead>
<tr>
<th>Capacity</th>
<th>60 MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Annual expected generation change (MWh)</td>
</tr>
<tr>
<td>Solar PV</td>
<td>79,220</td>
</tr>
<tr>
<td>Energy Efficiency PV</td>
<td>62,000</td>
</tr>
<tr>
<td>Wind</td>
<td>104,500</td>
</tr>
</tbody>
</table>

Using the type of calculation outlined above, the Green Bank will include Societal Benefits as well as the environmental impact of the programs in its Comprehensive Annual Financial Report, green bonds issuance, and other communications. Further information about AVERT is available at: https://www.epa.gov/oar/avert/download/20160524/avert_user_documentation/reports/a2_mwh_table_03-31-16.xlsx.footnote.pdf
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

www.EnergizeDelaware.org
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.
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)

- 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
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%)
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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