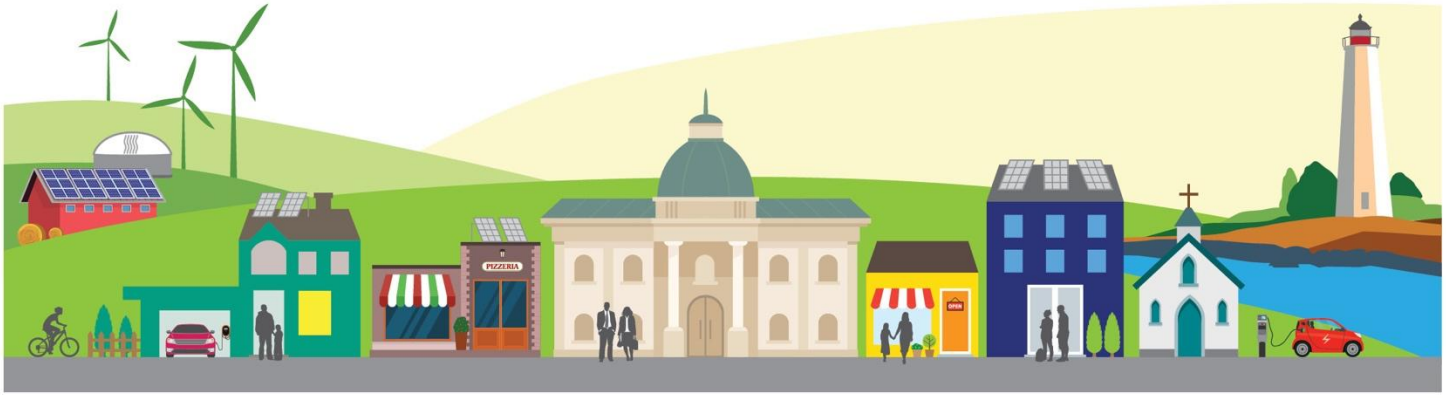
CONNECTICUT GREEN BANK®

Deployment Committee

MEETING DATE: WEDNESDAY, FEBRUARY 18, 2026 • 2:00PM



The Green Bank Model

A Planet Protected by the Love of Humanity

1 Attract Private Investment by Leveraging Public Funding

Public Funding
Ratepayer dollars, taxpayer dollars

CONNECTICUT GREEN BANK

Private Investment
Individuals, credit unions, banks, bond buyers

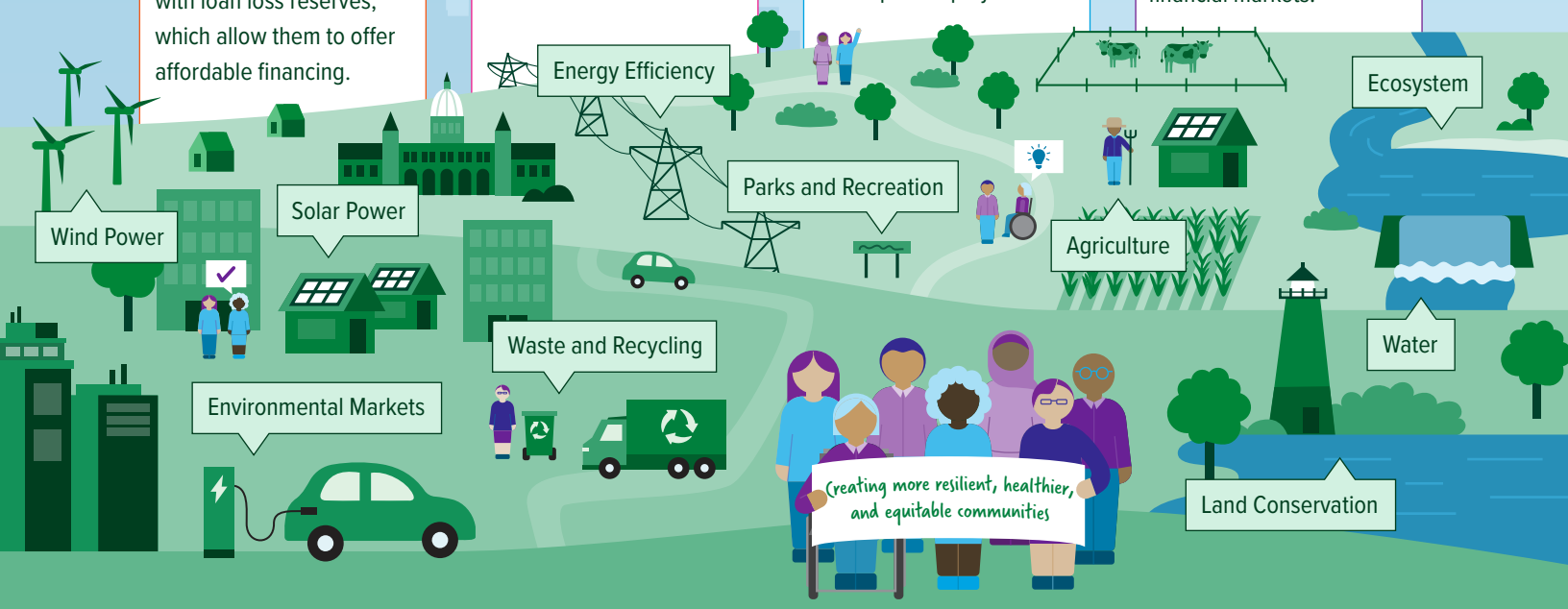
2 Apply Innovative Financial Tools to Deploy Investment Towards Our Mission

Generate **credit support** by providing local community banks with loan loss reserves, which allow them to offer affordable financing.

Initiate **co-investment** through public-private partnerships.

Support **performance-based incentives** to increase private investment and capital deployment.

Convert assets into **green bonds and notes** to be bought and sold in the financial markets.



3 Deliver Benefits to Connecticut's Families, Businesses, and Communities

Economic Development

- Creating thousands of jobs
- Generating millions in tax revenue

Ecological Resilience

- Driving environmental conservation, restoration, stewardship, and resilience

Energy

- Reducing energy burden by deploying clean energy
- Increasing energy security by deploying clean energy

Environmental Protection

- Reducing greenhouse gas emissions
- Improving the health of our residents by reducing air pollution

Equity

- No less than 40% of investment and benefits must reach vulnerable communities

CONNECTICUT GREEN BANK

Societal Impact Report

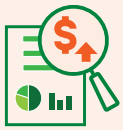
FY12 FY25

Since the Connecticut Green Bank's inception through the bipartisan legislation in July 2011, we have mobilized more than **$3.11 billion of investment** into the State's green economy. To do this, we used **$463.3 million** in Green Bank dollars to attract **$2.65 billion** in private investment, a leverage ratio of **$6.70 for every $1**. The impact of our deployment of renewable energy and energy efficiency to families, businesses, and our communities is shown in terms of economic development, environmental protection, equity, and energy (data from FY 2012 through FY 2025).*

ECONOMIC DEVELOPMENT

JOBS The Green Bank has supported the creation of more than **30,539** direct, indirect, and induced job-years.

TAX REVENUES
The Green Bank's activities have helped generate an estimated **$157.9** million in state tax revenues.



$60.6 million individual income tax

$60.6 million corporate taxes

$35.4 million sales taxes

$1.2 million property taxes

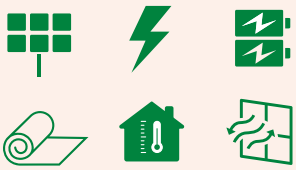
ENERGY

ENERGY BURDEN
The Green Bank has reduced the energy costs on families, businesses, and our communities.

69,000+
families

8,500+
businesses

DEPLOYMENT
The Green Bank has accelerated the growth of renewable energy to more than **732.2 MW** and lifetime savings of over **93.9 million MMBTUs** through energy efficiency projects.



ENVIRONMENTAL PROTECTION

POLLUTION The Green Bank has helped reduce air emissions that cause climate change and worsen public health, including **7.4** million pounds of SOx and **9.3** million pounds of NOx lifetime.

11.8 MILLION tons of CO_2 : EQUALS

178 MILLION tree seedlings grown for 10 years

OR

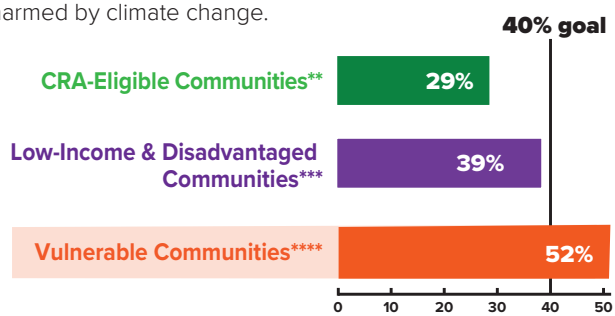
2.3 MILLION passenger vehicles driven for one year

PUBLIC HEALTH The Green Bank has improved the lives of families, helping them avoid sick days, hospital visits, and even death.

$234.7 – $530.8 million of lifetime public health value created

EQUITY

INVESTING in vulnerable communities, The Green Bank has set **goals** to reach **40% investment** in communities that may be disproportionately harmed by climate change.



** Community Reinvestment Act (CRA) Eligible Communities – households at or below 80% of Area Median Income (AMI)

*** Low-Income and Disadvantaged Communities – those within federal Climate and Economic Justice Screening Tool and Environmental Justice Screening Tool

**** Vulnerable Communities – consistent with the definition of Public Act 20-05, including low- to moderate-income communities (i.e., less than 100% AMI), CRA-eligible communities, and environmental justice communities (e.g., including DECD distressed communities)

* Includes projects, deployment, and investments approved, but not yet interconnected under Energy Storage Solutions.

Learn more by visiting ctgreenbank.com/strategy-impact/societal-impact/

Winner of the 2017 Harvard Kennedy School Ash Center Award for Innovation in American Government, the Connecticut Green Bank is the nation's first green bank.

Sources: Connecticut Green Bank Comprehensive Annual Financial Reports

Deployment Committee

Joseph DeNicola

Chair of Deployment Committee

E: Joseph.DeNicola@ct.gov **P: 203-561-2279**

Joe DeNicola serves as the Deputy Commissioner of Energy at the Connecticut Department of Energy and Environmental Protection (DEEP), appointed in January 2024. As Deputy Commissioner, Joe leads DEEP's Energy Branch as Connecticut transitions to a zero-carbon electric grid by 2040 and economy-wide greenhouse gas (GHG) reductions of 80 percent below 2001 levels by 2050. He oversees development of Connecticut's Integrated Resources Plan and Comprehensive Energy Strategy, clean energy procurements, and policies and programs to achieve universal broadband access, energy affordability, energy efficiency, strategic electrification of the transportation and housing sectors, and efforts to reduce state agency emissions, waste, and water use.

James B. Cosgrove

Board Member

E: JCosgrove@branford-ct.gov **P: 203-315-0620**

First Selectman James B. Cosgrove graduated from Branford High School and went on to receive a bachelor's degree in finance from the University of New Haven in 1996. James B. Cosgrove was elected as First Selectman in November 2013, after serving on the Board of Selectmen from 2011 to 2013. In addition, he previously served on the Branford Representative Town Meeting (RTM), the town's legislative body from 2009 to 2011. Currently, he serves as a member of South Central Connecticut Council of Governments; South Central Connecticut Council of Governments Transportation Committee; Regional Economic Xcelleration Executive Board and Workforce Alliance Executive Board. In addition, he serves as the President of the Bristol Resource Recovery Facility Operating Committee.

Dominick Grant

Board Member

E: Dominick@dirtpartners.com **P: 518-225-4334**

Dominick joined Dirt Capital Partners in 2021 as Director of Investment and manages the company's investment evaluation, due diligence and related reporting. Dominick has worked extensively in land-based investing, including for seven years at BioCarbon Group, a global private-equity impact investment firm backed by institutional investors. In addition to serving on the Connecticut Green Bank's Board of Directors, Dominick serves on the Board for the CT Department of Agriculture Diversity Equity and Inclusion Working Group.

Joins on an as needed basis for quorum

Deployment Committee

Erick Russell

Board Member

E: Kimberly.Mooers@ct.gov **P: 860-702-3288**

Erick Russell was sworn in as Connecticut's 84th State Treasurer on January 4, 2023. He is currently serving his first term. As treasurer, Russell administers Connecticut's pension funds holding over $40 billion in assets, oversees the state's debt and cash management, collects and returns unclaimed property, and manages the Connecticut Higher Education Trust (CHET), a 529 plan that helps students and families save for higher education. Russell continues to advocate for people traditionally left out of the political process and denied economic opportunity.

Lisa Shanahan

Board Member

E: lisashan@msn.com **P: 773-502-8629**

Lisa Shanahan grew up in Norwalk and Darien. After she graduated from Dartmouth College and the University of Pennsylvania Law School, she joined the law firm of McDermott Will & Emery in Chicago and subsequently moved to The Northern Trust Company. After her family returned to Connecticut, she served on several boards and has joined the Norwalk Land Trust (NLT) as a board member around 2012, serving as vice president from 2016-2021, and president from 2021 until this fall when the Norwalk Land Trust merged with the Aspetuck Land Trust (ALT) and has undertook several interesting initiatives including a first of its kind urban conservation mapping project in partnership with the Hudson.

Lonnie Reed

Board Chair

E: Lonnie.Reed@ctgreenbank.com **P: 203-481-4474**

Lonnie Reed serves as the Chair of the Green Bank's Board of Directors. Ms. Reed brings significant experience in environmental policy leadership, job creation, and a deep understanding of the climate challenges facing Connecticut. Reed served in the Connecticut State House of Representatives for five terms, from 2009 to 2019, before choosing not to run for reelection. She also served on the Bi-State NY & CT Long Island Sound Committee and helped lead the successful battle to stop Broadwater, a floating liquefied natural gas plant with a 22-mile pipeline proposed for Long Island Sound. Ms. Reed was appointed as Chair in October 2019 by Governor Ned Lamont.

Joins on an as needed basis for quorum

Deployment Committee
Meeting Schedule

Wednesday, February 18th 2026
Wednesday, May 20th 2026
Wednesday, September 16th 2026
Wednesday, November 18th 2026

*all meetings from 2:00pm-3:00pm

75 Charter Oak Avenue, Suite 1 - 103, Hartford, CT 06106
T 860.563.0015
ctgreenbank.com

CONNECTICUT
GREEN BANK

February 11, 2026

Dear Deployment Committee Members:

We have a regular meeting of the Deployment Committee scheduled for **Wednesday, February 18, 2026 from 2:00-3:00 p.m.**

As we have two (2) new members of the Deployment Committee – James Cosgrove and Lisa Shanahan (welcome!) – we would invite members of the committee to join in person if able, if not, please join us online.

Please let Cheryl know if you will be online or in-person through the Diligent platform.

For the brief agenda, we have the following:

- **Consent Agenda** – we have several items on the consent agenda, including:
    - Meeting Minutes for November 12, 2025

  And, we have also included:

    - Report-outs of staff approved transactions under $500,000 and no more in aggregate than $2,000,000 for C-PACE and ESS.
    - Report-outs of staff approved transactions under $100,000 and no more in aggregate than $500,000 restructurings and write-offs.

- **Evaluation Framework** – since we have no transactions, and we have new members on the committee, we thought that we would spend time working everyone through our Evaluation Framework, including our impact metrics for Environment, Public Health, Economic Development, Tax Revenue, and Energy Burden. We have built a robust data collection and analysis system over the years and look forward to continue to build this capacity out through processes and procedures.

Also, I am currently on vacation in Palm Springs, but the Green Bank leadership will support the meeting.

Have a great rest of the week and weekend ahead.

Sincerely,

Bryan Garcia

President and CEO

AGENDA

Deployment Committee of the
Connecticut Green Bank
75 Charter Oak Avenue
Hartford, CT 06106

Wednesday, February 18, 2026
2:00-3:00 p.m.
Dial +1 860-924-7736
Phone Conference ID: 501 720 842#
Dial +1 860-924-7736,,501720842#

Staff Invited: Sergio Carrillo, Mackey Dykes, Brian Farnen, Bryan Garcia, Sara Harari, Bert Hunter, Jane Murphy, Eric Shrago, Dan Smith, Rudy Sturk, and Leigh Whelpton

1. Call to order
2. Public Comments – 5 minutes
3. Consent Agenda – 5 minutes
4. Evaluation Framework: An Overview of Environmental, Public Health, Economic Development, Tax Revenue, and Energy Burden Impact Frameworks – 45 minutes
5. Other Business – 5 minutes
6. Adjourn

Click here to join the meeting
Meeting ID: 298 882 609 308 1
Passcode: bK9vS9e9
Or Call in using your telephone:
Dial +1 860-924-7736
Phone Conference ID: 501 720 842#

Next Regular Meeting: Wednesday, May 20, 2026 from 2:00-3:00 p.m.
Colonel Albert Pope Board Room at the
Connecticut Green Bank, 75 Charter Oak Avenue, Hartford

RESOLUTIONS

Deployment Committee of the
Connecticut Green Bank
75 Charter Oak Avenue
Hartford, CT 06106

Wednesday, February 18, 2026
2:00-3:00 p.m.
Dial +1 860-924-7736
Phone Conference ID: 501 720 842#
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Staff Invited: Sergio Carrillo, Mackey Dykes, Brian Farnen, Bryan Garcia, Sara Harari, Bert Hunter, Jane Murphy, Eric Shrago, Dan Smith, Rudy Sturk, and Leigh Whelpton

1. Call to order

2. Public Comments – 5 minutes

3. Consent Agenda – 5 minutes

Resolution #1

Motion to approve the meeting minutes of the Deployment Committee for November 12, 2025

4. Evaluation Framework: An Overview of Environmental, Public Health, Economic Development, Tax Revenue, and Energy Burden Impact Frameworks – 45 minutes

5. Other Business – 5 minutes

6. Adjourn

Click here to join the meeting
Meeting ID: 298 882 609 308 1
Passcode: bK9vS9e9
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Next Regular Meeting: Wednesday, May 20, 2026 from 2:00-3:00 p.m.
Colonel Albert Pope Board Room at the
Connecticut Green Bank, 75 Charter Oak Avenue, Hartford

Announcements

- **In-Person Option** – if anyone wants to join future BOD or Committee meetings in person, we are inviting you to our offices in Hartford

- **Mute Microphone** – in order to prevent background noise that disturbs the meeting, if you aren't talking, please mute your microphone or phone.

- **Chat Box** – if you aren't being heard, please use the chat box to raise your hand and ask a question.

- **Recording Meeting** – we continue to record and post the board meetings.

- **State Your Name** – for those talking, please state your name for the record.

Deployment Committee Meeting

February 18, 2026

CONNECTICUT GREEN BANK®

Deployment Committee

Agenda Item #1
Call to Order

Deployment Committee

CONNECTICUT GREEN BANK

Agenda Item #2
Public Comments

Deployment Committee

CONNECTICUT GREEN BANK

Agenda Item #3
Consent Agenda

Consent Agenda
Resolution #1

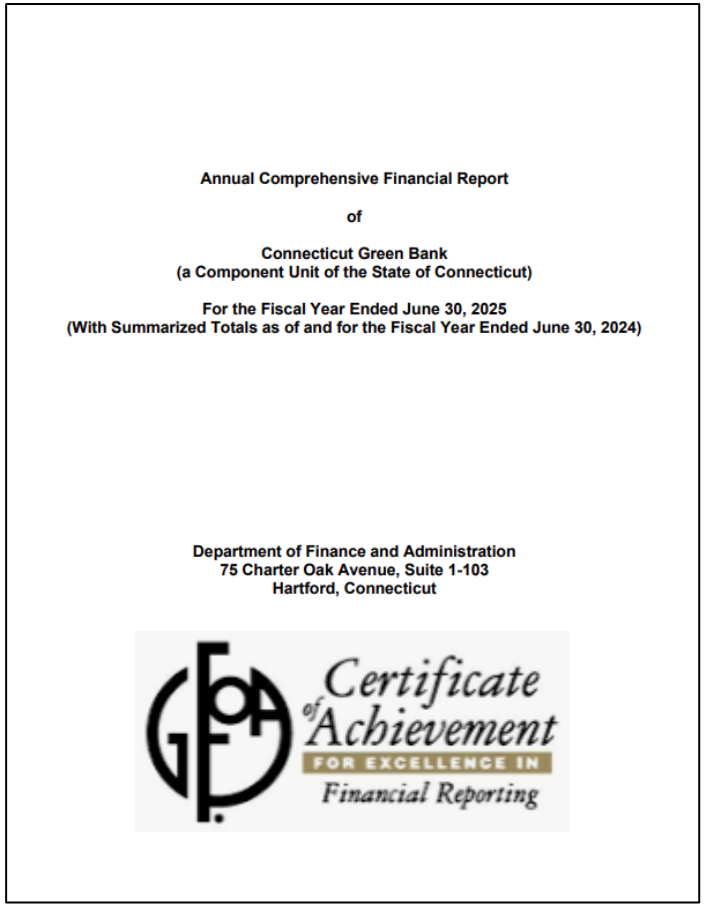
1. **Meeting Minutes** – approve meeting minutes of November 12, 2025

- **Under $500,000 and No More in Aggregate than $1,000,000** – in staff approved transactions for zero (0) transactions
- **Under $100,000 and No More in Aggregate than $500,000** – in staff approved restructurings or write-offs for zero (0) transactions

Agenda Item #4

Evaluation Framework: An Overview of Environmental, Public Health, Economic Development, and Community Impact Frameworks

Reporting Deliverables
From Financial Statements to Societal Impacts


Annual Comprehensive Financial Report

of

Connecticut Green Bank
(a Component Unit of the State of Connecticut)

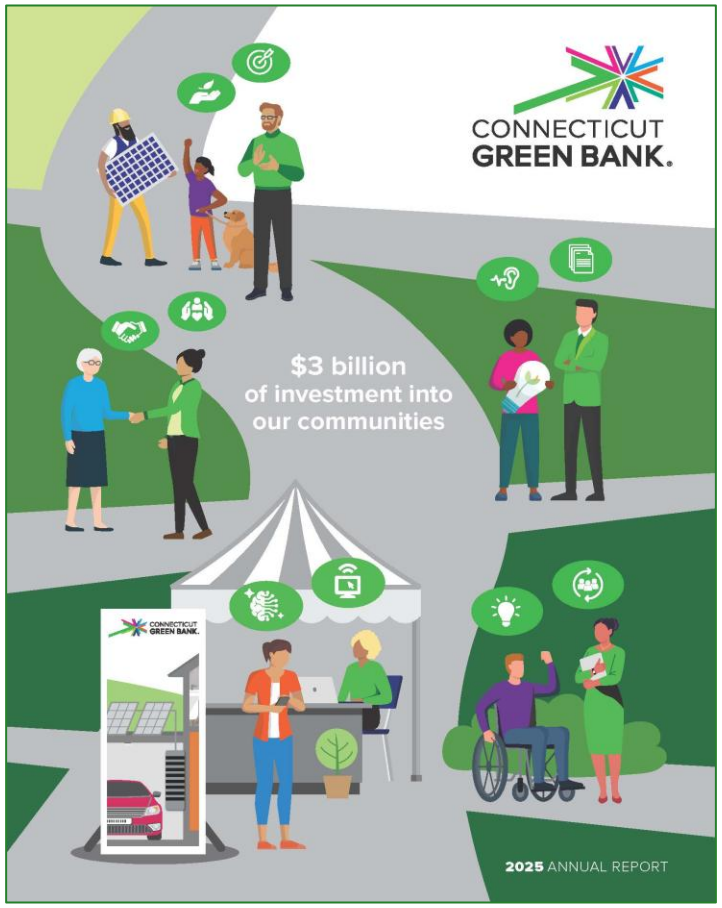
For the Fiscal Year Ended June 30, 2025
(With Summarized Totals as of and for the Fiscal Year Ended June 30, 2024)

Department of Finance and Administration
75 Charter Oak Avenue, Suite 1-103
Hartford, Connecticut

GFOA Certificate of Achievement FOR EXCELLENCE IN Financial Reporting

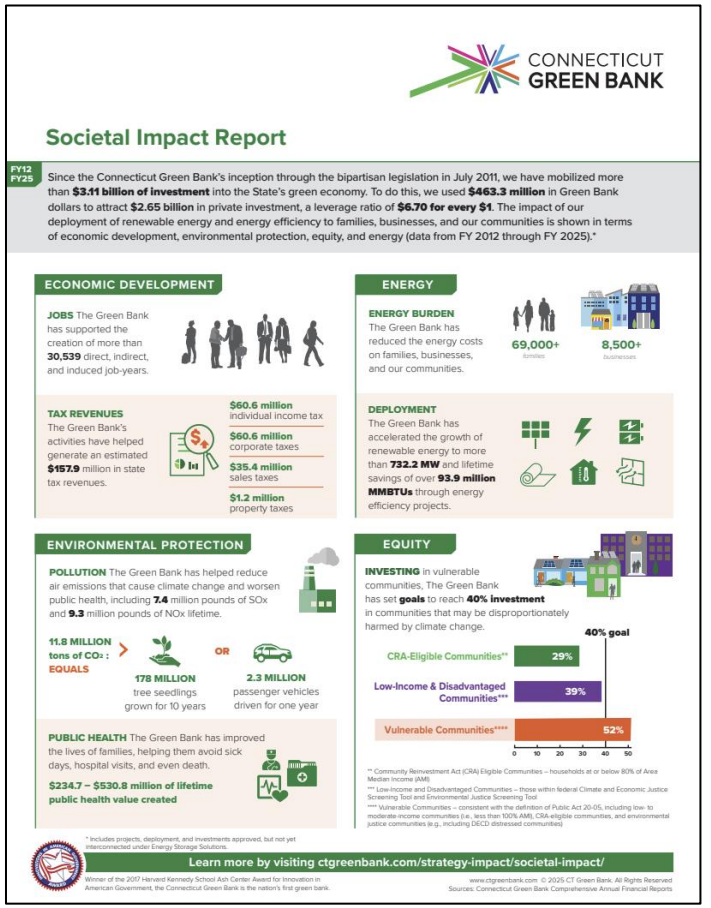
Annual Comprehensive Financial Report

Click Here



Annual Report

Click Here

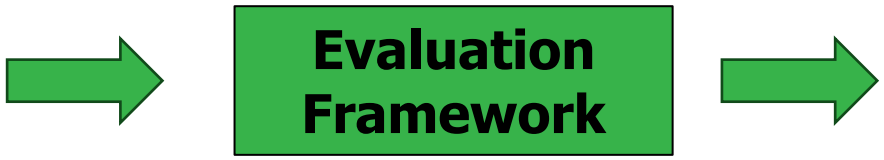


Societal Impact Report

Click Here

From Investing in Projects to Reporting Impact through Metrics

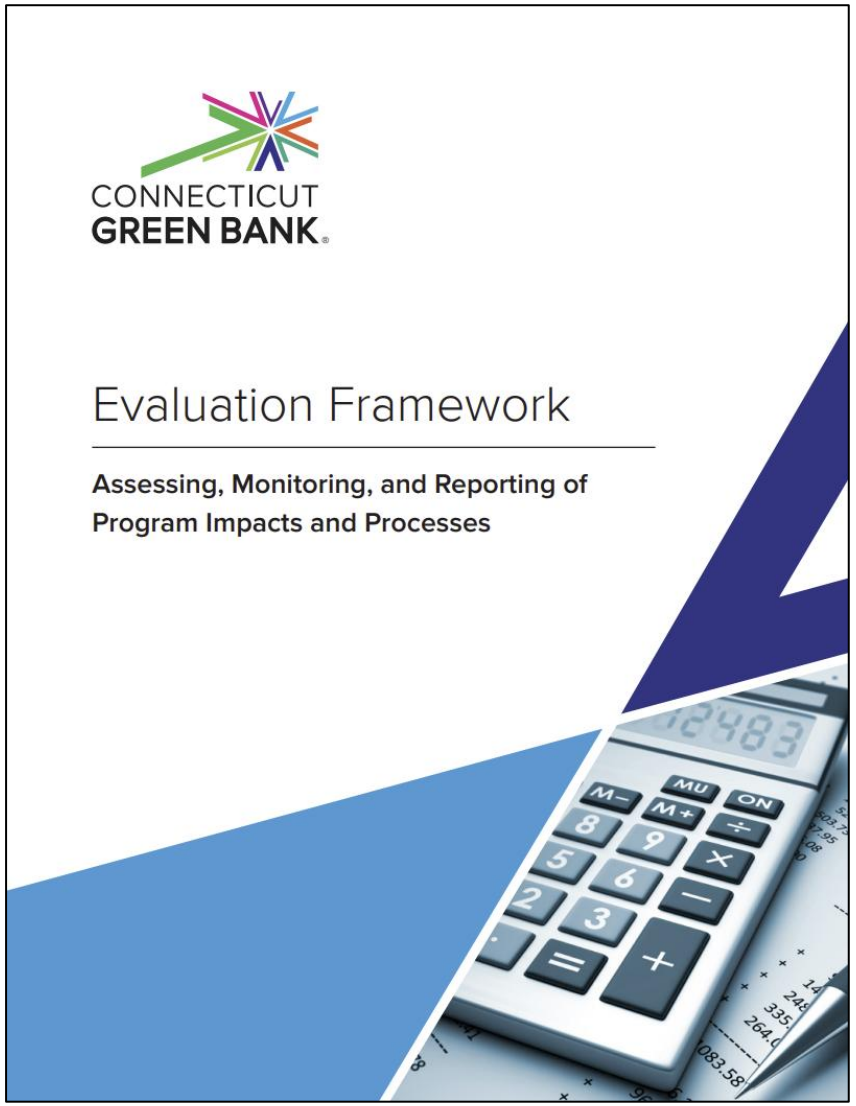
- **# of Projects**
- **Location**
- **Installed Capacity (kW)**
  - Estimated and Actual Generation (kWh or MMBtu)
- **Capital Deployed**

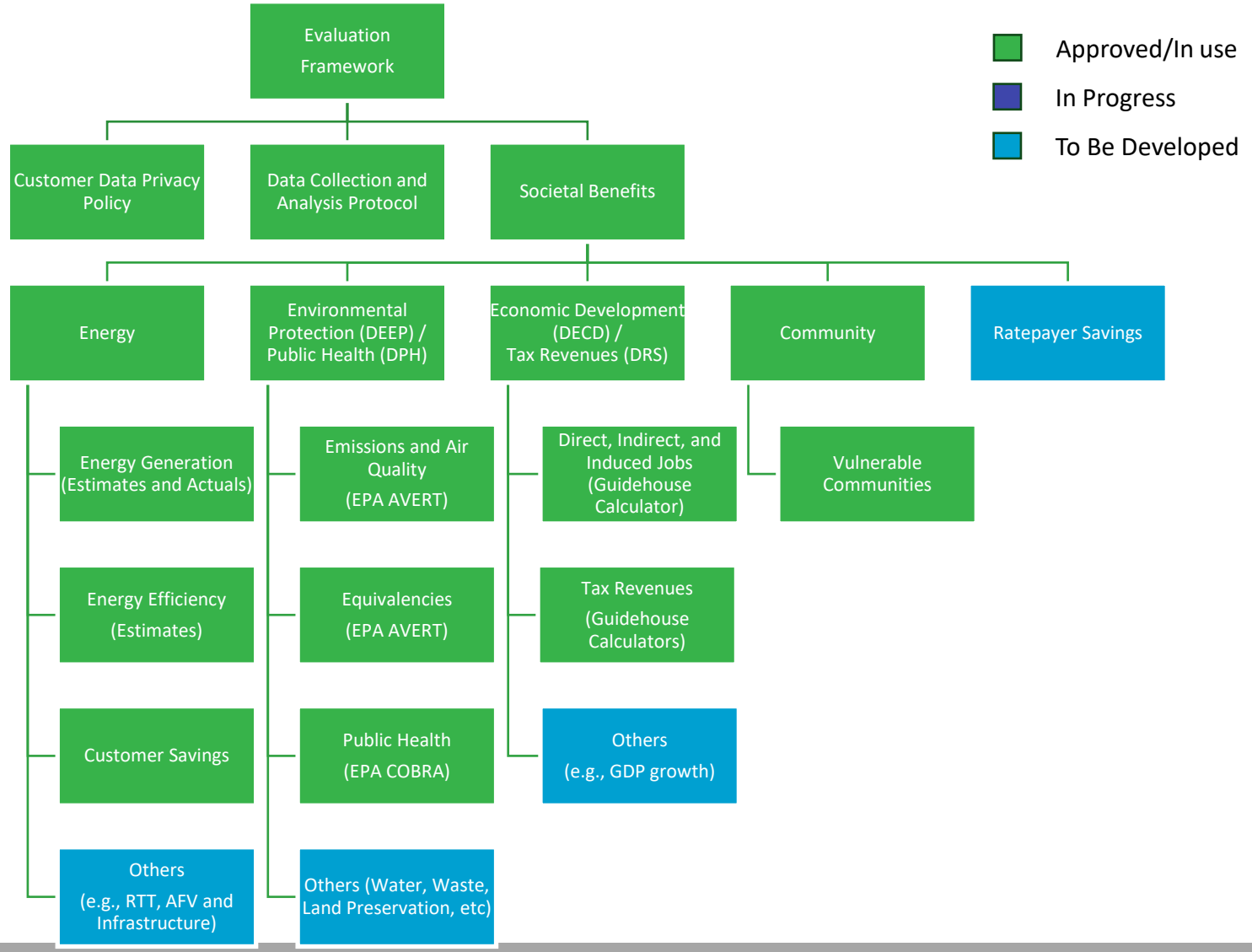


- **Annual Comprehensive Financial Report (ACFR)**
- **Annual Report**
- **Other Impact Reporting**

The Evaluation Framework guides the translation of key performance metrics into real-world societal impacts

Evaluation Framework
Overview





Evaluation Framework
Energy Impacts


EVALUATION FRAMEWORK
ENERGY BURDEN REDUCTION
FOR SOLAR CUSTOMERS

Savings in Dollars from Commercial & Residential Solar Installations

CONNECTICUT GREEN BANK

Overview

The Connecticut Green Bank measures its positive societal impacts across a number of categories, including economic development, environmental impact, and public health. Another area of impact the Green Bank seeks to track is the financial savings achieved by residents and businesses that install solar photovoltaic (PV) systems at their homes or commercial properties. While these systems are helping to create jobs and tax revenues, and decreasing greenhouse gas emissions, there is also often a direct financial benefit in the form of a reduced energy burden to the participating family or business. To those considering going solar, the financial savings can be a key motivator.

Solar Deployment Structures

The Green Bank has used both property-owner (loans) and third-party ownership structures (leases and power purchase agreements) to deploy distributed solar generation in Connecticut in the residential and commercial sectors. Regardless of the structure, these products have a common aim of providing the building owner with clean energy at a price (inclusive of financing) that is less than what they would have paid for electricity from the utilities.

A drone photo of the solar PV system at the Solar Ice House, a state-of-the-art facility featuring two ice skating rinks, in South Norwalk.

Report Usage

The Connecticut Green Bank proposes to use the Energy Burden Reduction Methodology shown in formula 1 to calculate estimated Savings in Dollars for their residential and commercial solar PV customers. The difference between the cost of electricity for a customer using a Green Bank supported solar PV system and a customer not using such a system is equal to the dollars a customer has saved (i.e., energy burden reduction). Our goal is to make this Energy Burden Reduction for Solar Customers report into the official methodology for calculating actual savings in our Solar Lease and Solar Loan portfolios.

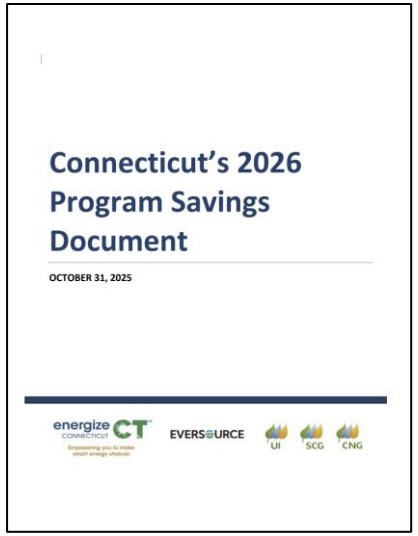
Solar Generation:

- Estimates of generation for all projects
- Actuals from monitoring for projects the Green Bank owns (e.g., RSIP, SL2)
- Estimates/Actuals reported from borrowers

ISO new england

NEPOOL NEW ENGLAND POWER POOL

Using same figures submitted for REC creation and methods are approved by NEPOOL/ISONE


Connecticut's 2026 Program Savings Document

OCTOBER 31, 2025

energize CT CONNECTICUT

EVERSOURCE UI SCG CNG

Energy Efficiency:

- Estimates from Program Savings Documents (Conservation and Load Management Fund) or from technical underwriters

energize CONNECTICUT CT

PSD approved by EEB and used by Utilities

Customer Savings:

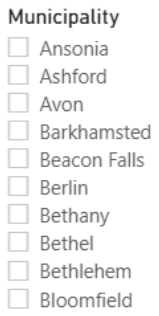
- (Energy generation (or savings) X customer rate) – Financing cost = customer savings

QUI TRANSTULIT SUSTINET

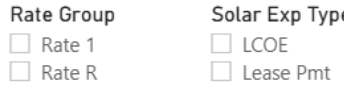
Reviewed and endorsed by PURA

Evaluation Framework
Energy Impacts (cont'd)

- **Energy Example** – Solar Lease 2 Resi Customer Savings for Q3 2025



Residential Solar Lease 2
Product Owners: Stephanie A, Joe B, Bill C, Karl J



Count of SL2 Projects	Sum of kW
1158	9,323.54

RPV #	Municipality	Lease Start Date	Rate Class	System Size (kW)	Estimated Generation	Solar PV Generation	HypotheticalUtilityExp	Solar Expense	Savings	Savings per kWh Produced
RPV-10898	West Haven	5/27/16	Rate R	10.80	3,759.13	4,004.11	1,313.50	417.27	896.23	0.22
RPV-13736	Brookfield	11/14/15	Rate 1	10.40	3,363.18	4,012.52	1,156.73	431.99	724.74	0.18
RPV-04099	Harwinton	12/12/14	Rate 1	10.80	3,762.94	4,031.55	1,162.21	314.73	847.48	0.21
RPV-09658	Watertown	8/28/15	Rate 1	10.97	3,658.08	4,090.59	1,179.24	352.50	826.74	0.20
RPV-10615	Windsor	8/9/16	Rate 1	8.00	2,830.41	4,108.10	1,184.28	299.88	884.40	0.22
RPV-13973	Southington	12/1/15	Rate 1	10.92	3,621.44	4,135.25	1,192.11	459.15	732.96	0.18
RPV-13115	Bristol	2/12/16	Rate 1	8.10	2,622.70	4,162.96	1,200.10	372.86	827.23	0.20
RPV-11441	Bethlehem	11/14/15	Rate 1	10.92	3,801.12	4,169.61	1,202.02	342.81	859.21	0.21
RPV-11162	Litchfield	9/18/15	Rate 1	10.92	3,724.99	4,173.17	1,203.04	323.25	879.79	0.21
RPV-07181	East Lyme	4/29/16	Rate 1	10.80	3,744.12	4,178.55	1,204.59	327.24	877.35	0.21
RPV-14027	Somers	2/10/16	Rate 1	10.40	3,784.63	4,183.08	1,205.90	341.82	864.08	0.21
RPV-03282	Waterford	10/31/14	Rate 1	10.81	3,772.01	4,201.58	1,211.23	555.81	655.42	0.16
RPV-03644	Woodbridge	12/2/14	Rate R	10.97	3,723.23	4,284.92	1,405.62	439.35	966.27	0.23
RPV-13377	Southington	1/12/16	Rate 1	10.92	3,916.38	4,312.67	1,243.26	444.00	799.26	0.19
RPV-13307	New Hartford	2/29/16	Rate 1	10.92	3,686.55	4,342.42	1,251.83	408.45	843.38	0.19
RPV-13298	Watertown	12/9/15	Rate 1	10.92	4,011.84	4,383.05	1,263.54	507.86	755.69	0.17
RPV-10234	Milford	10/14/15	Rate R	10.80	4,126.88	4,409.82	1,446.59	401.40	1,045.19	0.24
RPV-13822	Bridgewater	4/1/16	Rate 1	10.92	4,147.22	4,823.34	1,390.47	427.29	963.18	0.20
RPV-08588	East Haven	8/28/15	Rate R	10.71	3,483.04	5,046.38	1,655.41	234.75	1,420.66	0.28
RPV-07116	Haddam	9/13/15	Rate 1	11.00	3,734.73	5,264.80	1,517.74	327.90	1,189.84	0.23
RPV-02733	Stonington	7/21/14	Rate 1	9.25	3,402.55	5,759.46	1,660.34	705.72	954.62	0.17
RPV-12581	Stamford	2/29/16	Rate 1	10.40	3,657.25	7,456.14	2,149.46	347.88	1,801.58	0.24
-					**3,139,474.29**	**2,693,131.63**	**802,931.17**	**323,930.02**	**479,001.14**	**0.18**

Evaluation Framework
Energy Impacts (cont'd)

Earliest date/time	1/1/2025
Latest date/time	2/10/2026

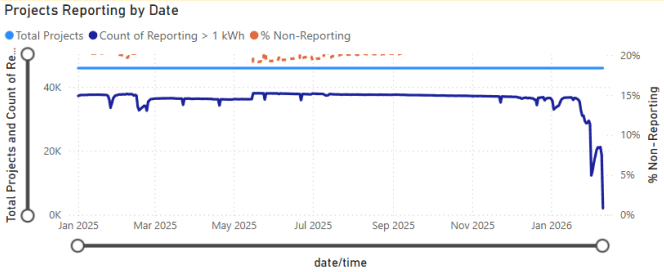
Projects Reporting in Last 7 Days

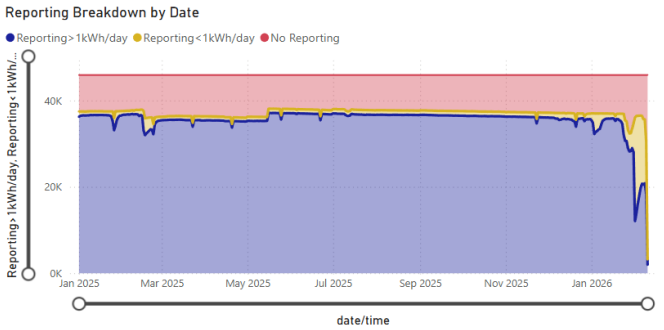
Has No Reporting Last 7 Days	9193
Has_<1_kWh_Last7Days	11343
Has_kWh_Last7Days	25373
Total Projects	45913
% Reporting	55.3%
% Non-Reporting	44.7%

2025 status	Count of 2025 status
NR,NR	7310
NR,R	1834
R,NR	13230
R,R	23539
Total	**45913**

Table above counts of projects based on reporting status for the same project at two points in time: reporting status on 1/1/2025, reporting status last 7 days

R= reporting, kWh/day > 1
NR = Non-Reporting, kwh<1 kwh/day (i.e. meter working no production) or blank (i.e. no data)





Current Status	Total Project Count
PBI Buyout Completed	732
PBI - In Payment	11877
Completed	13125
Total	**45913**

Current Status
- Completed
- PBI - Completed
- PBI - In Payment

Eligible System Owner Final
- CT Solar Lease II
- Direct Energy Solar
- IGS Solar

Eligible Contractor
- 1st Light Energy
- 31Solar
- AEC Solar

Data Gatekeeper
- 1st Light Energy
- 31Solar
- AEC Solar
- Aegis Electrical Systems

ENERGY

ENERGY BURDEN

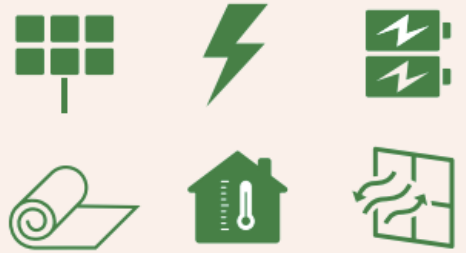
The Green Bank has reduced the energy costs on families, businesses, and our communities.

69,000+
families

8,500+
businesses

DEPLOYMENT

The Green Bank has accelerated the growth of renewable energy to more than **732.2 MW** and lifetime savings of over **93.9 million MMBTUs** through energy efficiency projects.



Evaluation Framework
Environmental & Public Health Impacts


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) emitted by the region's fossil fuel electric generation 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


EVALUATION FRAMEWORK
SOCIETAL PERFORMANCE

CONNECTICUT GREEN BANK

Public Health 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 are measured by the decrease in the amount of nitrogen oxides (NO_x), sulfur dioxide (SO_2), and particulate matter ($PM_{2.5}$) emitted by the region's fossil fuel electric generation due to Green Bank projects

The changes in quantities of these emissions impacts the quality of health of those that breathe this air. Air pollution influences the prevalence and severity of asthma, bronchitis, coronary disease, and even death.

The Green Bank uses the US Environmental Protection Agency's (EPA) Co-Benefit Risk Assessment (CoBRA) model to calculate and report on the public health benefits of the Green Bank's clean energy investment activity in Connecticut.

The Green Bank will include public health impacts of its programs as part of the Societal Benefits in its Comprehensive Annual Financial Report, green bonds issuances, and other communications.

Methodology

The Green Bank has long recognized the environmental benefits of its investments. After working with the Connecticut Department of Energy and Environmental Protection (DEEP), Connecticut Department of Public Health (DPH) and the US Environmental Protection Agency (EPA), the Green Bank adopted the EPA's CoBRA to model the public health impacts of the air quality benefits associated with Green Bank projects.

CoBRA is a complex model that uses a baseline of emissions and models the increase or decrease in public health incidents and their costs based on the change in emissions of nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter ($PM_{2.5}$), volatile organic compounds (VOC) and ammonia (NH_3). The tool takes into account the method through which these are emitted (vehicles, energy production, type of industry, etc) and their location. It uses an air dispersion model (Source-Receptor (S-R) Matrix) and standard EPA epidemiological estimation methods to gauge the change in number of incidents, and then applies monetary factors to give an economic impact of these emissions changes.

Air Quality:

- CGB adopted the Environmental Protection Agency (EPA)'s Avoided Emissions and Generation Tool (AVERT) in 2018
- CGB operationalized AVERT as part of our Data Warehouse which EPA approved and replicated
- AVERT is an Air Dispersion Model joined with generation profiles and annual Merit Order Dispatch records that show what generation and its emissions are being offset
- Estimates CO2, NOx, SOx, PM2.5, VOC, NH3, Ozone

Equivalencies:

- Equivalencies that translate emissions reductions into other actions that make them more relatable such as planting trees, taking cars off the road, etc

Public Health:

- CGB uses the EPA's CoBenefit Risk Assessment Tool that, based on AVERT outputs, estimates an economic value of avoided health impacts due to reduced emissions such as fewer heart attacks, fewer ER visits due to asthma, fewer missed days of work, etc.

Other Reporting:

- Social Cost of Carbon

Reviewed and endorsed by CT Department of Energy and Environmental Protection

Reviewed and endorsed by CT Department of Public Health

Evaluation Framework
Environmental and Public Health Impacts (cont'd)

- **<u>Environmental Protection Example</u>** – What emissions did the Residential Solar Incentive Program (RSIP) avoid?

	Emissions Avoided											
CY Closed	Annual CO2 (tons)	Lifetime CO2 (tons)	Green Bank Investment ($) / Lifetime CO2 (Tons)	Annual NOX (pounds)	Lifetime NOX (pounds)	Green Bank Investment ($) / Lifetime NOX (pounds)	Annual SO2 (pounds)	Lifetime SO2 (pounds)	Green Bank Investment ($) / Lifetime SO2 (pounds)	Annual PM2.5 (pounds)	Lifetime PM2.5 (pounds)	Green Bank Investment ($) / Lifetime PM2.5 (pounds)
2012	3,654	91,347	$98.96	4,987	124,680	$72.50	6,159	153,966	$58.71	307	7,674	$1,177.96
2013	6,972	174,300	$79.11	9,635	240,865	$57.24	11,487	287,170	$48.01	593	14,835	$929.43
2014	21,934	548,340	$59.10	25,997	649,934	$49.86	25,953	648,825	$49.94	1,897	47,428	$683.25
2015	35,458	886,448	$26.47	40,205	1,005,127	$23.35	37,614	940,339	$24.96	3,069	76,735	$305.83
2016	29,231	730,783	$20.44	27,291	682,272	$21.90	19,524	488,102	$30.61	2,419	60,477	$247.05
2017	23,769	594,219	$19.26	14,203	355,068	$32.24	11,173	279,319	$40.98	1,613	40,315	$283.91
2018	32,814	820,356	$16.86	16,221	405,531	$34.10	11,038	275,961	$50.11	2,055	51,363	$269.23
2019	37,938	948,440	$17.25	14,861	371,527	$44.04	6,773	169,326	$96.63	2,044	51,103	$320.19
2020	32,975	824,371	$16.14	11,598	289,942	$45.89	3,937	98,417	$135.19	1,809	45,223	$294.21
2021	20,417	510,426	$15.54	7,808	195,205	$40.62	4,449	111,216	$71.30	1,246	31,154	$254.53
Total	**245,161**	**6,129,031**	**$25.54**	**172,806**	**4,320,150**	**$36.23**	**138,106**	**3,452,642**	**$45.33**	**17,052**	**426,308**	**$367.14**

Evaluation Framework
Environmental and Public Health Impacts (cont'd)

- **Public Health Example** – What were the Public Health impacts from the emissions avoided by the Residential Solar Incentive Program (RSIP)?

Health Endpoint	Pollutant	Change in Incidence		Monetary Value	
		Low	High	Low	High
Mortality	$PM_{2.5}/O_3$	0.256	0.423	$3,741,251	$6,169,627
Nonfatal Heart Attacks	$PM_{2.5}$	0.099		$8,329	
Ingant Mortality	$PM_{2.5}$	0.001		$13,760	
Hospital Admissions - Respiratory	$PM_{2.5}/O_3$	0.026		$622	
Emergency Room Visits - Respiratory	$PM_{2.5}/O_3$	0.388		$630	
Asthma Onset	$PM_{2.5}/O_3$	0.964		$73,568	
Asthma Symptoms	$PM_{2.5}/O_3$	159.252		$36,698	
Emergency Room Visits - Asthma	O_3	0.002		$2	
Lung Cancer	$PM_{2.5}$	0.011		$511	
Hospital Admits - Cardio-Cerebro/Peripheral Vasular Disease	$PM_{2.5}$	0.020		$589	
Hospital Admits - Alzheimers	$PM_{2.5}$	0.099		$2,205	
Hospital Admits - Parkinsons Disease	$PM_{2.5}$	0.013		$306	
Stroke Incidence	$PM_{2.5}$	0.010		$602	
Hay Fever	$PM_{2.5}/O_3$	6.323		$7,045	
Cardiac Arrest	$PM_{2.5}$	0.002		$138	
ER Visits - Cardiac	$PM_{2.5}$	0.044		$95	
Minor Restricted Activity Days	$PM_{2.5}$	114.025		$14,335	
School Loss Days	O_3	61.125		$103,809	
Work Days	$PM_{2.5}$	19.210		$6,077	

Evaluation Framework
Environmental and Public Health Impacts (cont'd)

ENVIRONMENTAL PROTECTION

POLLUTION The Green Bank has helped reduce air emissions that cause climate change and worsen public health, including **7.4** million pounds of SOx and **9.3** million pounds of NOx lifetime.

11.8 MILLION tons of CO_2 : EQUALS

178 MILLION tree seedlings grown for 10 years

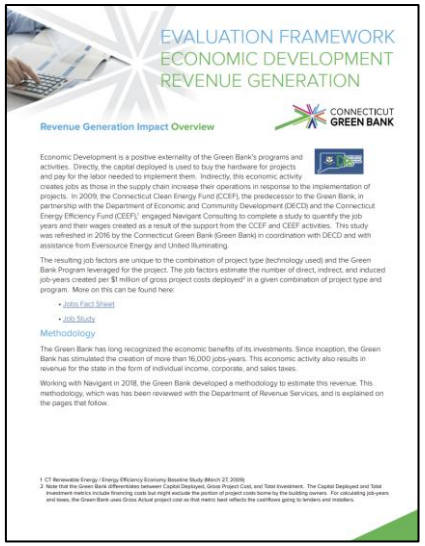
OR

2.3 MILLION passenger vehicles driven for one year

PUBLIC HEALTH The Green Bank has improved the lives of families, helping them avoid sick days, hospital visits, and even death.

$234.7 – $530.8 million of lifetime public health value created

Evaluation Framework
Economic Development Impacts



Job Creation:

- CGB uses a jobs model that is based off the amount of investment into projects based on technology. (i.e. $1 million of capital deployed into residential solar creates 2.7 direct job years)
- We use DECD factors to estimate indirect and induced job year creation

Connecticut
Department of Economic and Community Development

Reviewed and endorsed by CT Department of Economic and Community Development

Revenue Generation:

- Building on the above-mentioned jobs model, the Green Bank uses a revenue generation model to estimate revenue generation for the state
- Based on the amount of investment into projects based on technology and financing structure (i.e. $1 million of capital deployed into leased residential solar creates X direct job years)
- Estimates Personal Income Tax, Corporate Tax, Sales Tax

REVENUE SERVICES
STATE OF CONNECTICUT

Reviewed and endorsed by CT Department of Revenue Services

Evaluation Framework
Economic Development Impacts (cont'd)

- **Economic Development Example** – How many jobs have been created by the Smart-E loan?

Job Years Created

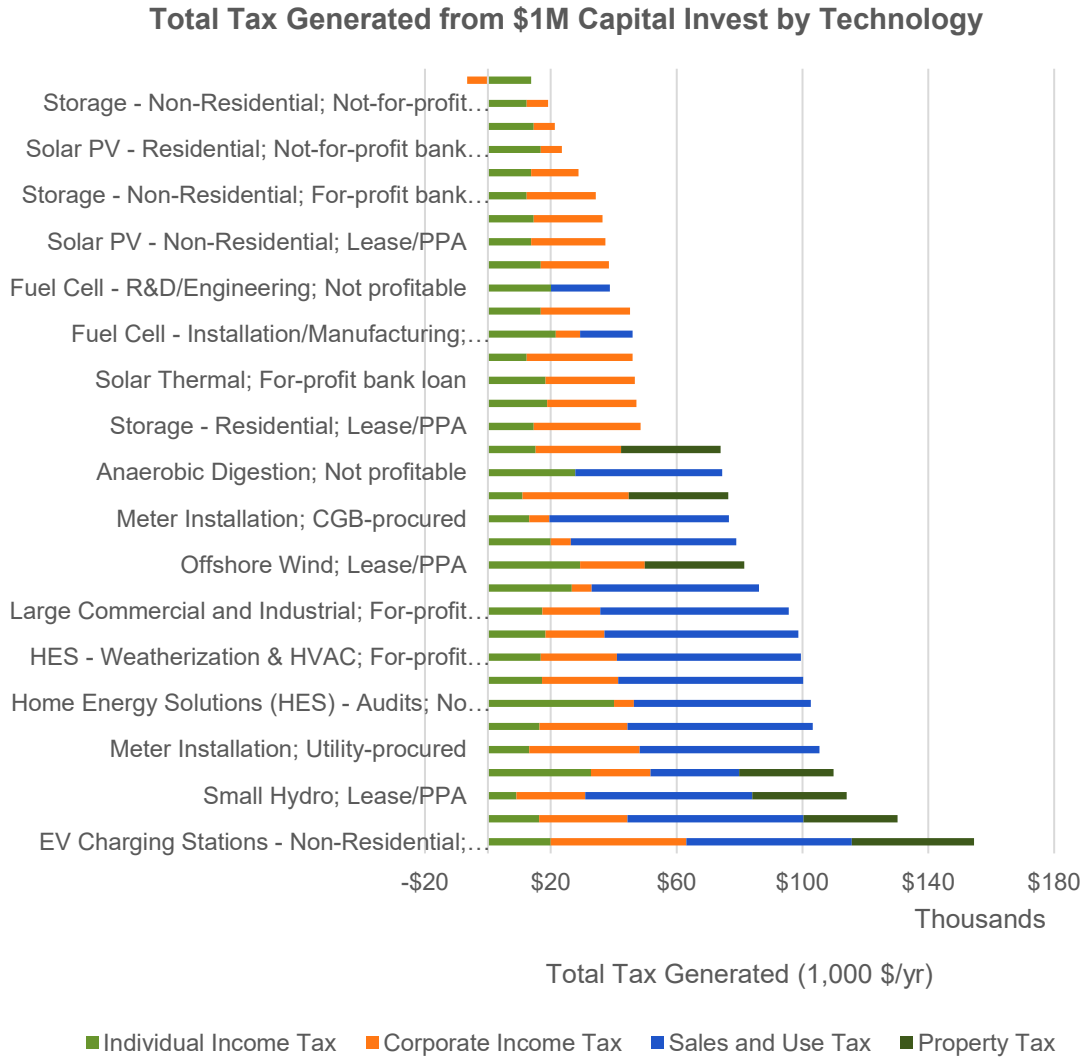
CY Closed	Direct	Indirect/Induced	Total
2013	9	14	23
2014	40	63	103
2015	50	80	130
2016	38	56	94
2017	140	183	323
2018	71	93	164
2019	61	80	141
2020	60	79	139
2021	97	126	222
2022	84	106	190
2023	89	108	197
2024	72	87	159
2025	63	77	140
2026	6	7	12
Total	**880**	**1,158**	**2,037**

- **Tax Revenue Generation Example** – What taxes have been generated by the Smart-E loan?

Tax Revenue Generated

CY Closed	Individual Income Tax	Corporate Tax	Sales Tax	Property Tax	Total Tax
2013	$25,829	$14,383	$14,045	$0	$54,256
2014	$110,379	$58,030	$56,614	$0	$225,023
2015	$148,935	$60,264	$33,565	$0	$242,764
2016	$143,782	$72,629	$61,455	$1,262	$279,129
2017	$724,685	$438,666	$499,582	$0	$1,662,933
2018	$376,898	$257,600	$303,354	$0	$937,852
2019	$327,896	$224,599	$255,325	$0	$807,821
2020	$321,674	$222,464	$244,743	$0	$788,882
2021	$504,269	$385,320	$460,799	$0	$1,350,388
2022	$455,629	$490,041	$890,007	$0	$1,835,677
2023	$573,913	$701,821	$1,456,664	$0	$2,732,398
2024	$471,840	$478,583	$839,312	$0	$1,789,735
2025	$413,608	$397,092	$713,401	$0	$1,524,102
2026	$35,653	$46,481	$104,465	$0	$186,599
Total	**$4,634,990**	**$3,847,972**	**$5,933,332**	**$1,262**	**$14,417,557**

Evaluation Framework
Economic Development Impacts (cont'd)



ECONOMIC DEVELOPMENT

JOBS The Green Bank has supported the creation of more than **30,539** direct, indirect, and induced job-years.

TAX REVENUES

The Green Bank's activities have helped generate an estimated **$157.9** million in state tax revenues.

$60.6 million individual income tax

$60.6 million corporate taxes

$35.4 million sales taxes

$1.2 million property taxes

Evaluation Framework
Community Impacts

- **Vulnerable Communities –** Public Act 20-5 – means populations that may be disproportionately impacted by the effects of climate change, including, but not limited to, **low and moderate income communities**, **environmental justice communities pursuant to section 22a-20a**, **communities eligible for community reinvestment pursuant to section 36a-30 and the Community Reinvestment Act of 1977, 12 USC 2901 et seq.,** as amended from time to time, populations with increased risk and limited means to adapt to the effects of climate change, or as further defined by the Department of Energy and Environmental Protection in consultation with community representatives.

- **Environmental Justice Communities –** means (A) a United States census block group, as determined in accordance with the most recent United States census, for which thirty per cent or more of the population consists of low income persons who are not institutionalized and have an income below two hundred per cent of the federal poverty level; or (B) a distressed municipality, as defined in subsection (b) of section 32-9p

- **Community Reinvestment Act Eligible Communities –** CRA passed in 1977 to encourage lending in LMI communities, projects qualify if they are in a community where the mean income is less than 80% of the Metropolitan Statistical Area (MSA)'s Adjusted Median Income (AMI).

- **Low Income and Disadvantaged Communities** – LIDACs those communities with the federal Climate and Economic Justice Screening Tool and Environmental Justice Screening Tool

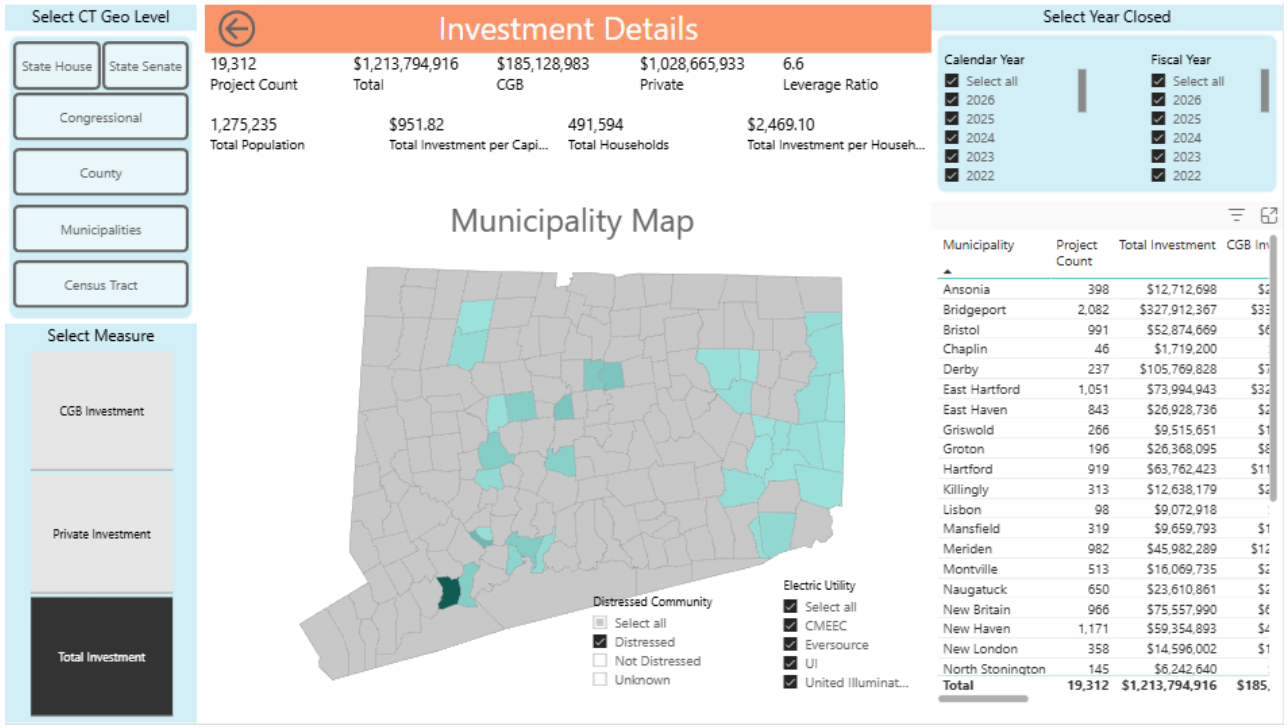
Other Reporting:

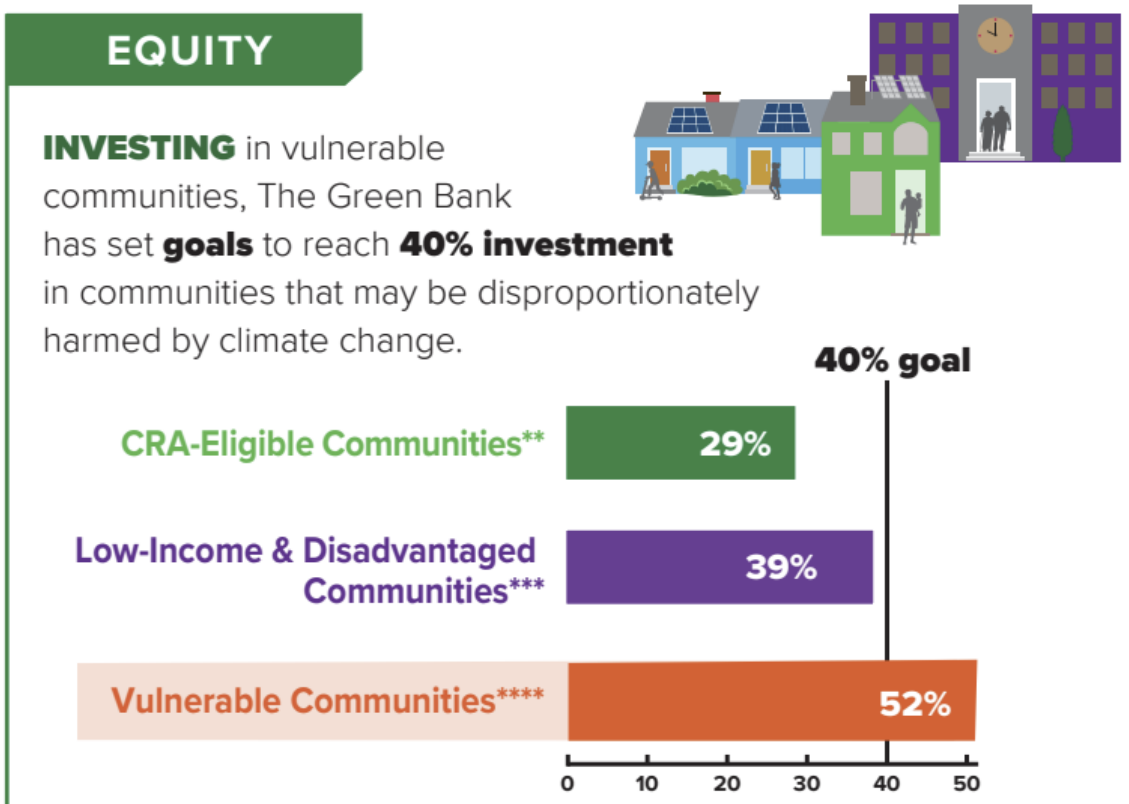
- Ethnicity, income bands, credit quality, customer types/market segments

Department of Economic and Community Development

Evaluation Framework
Community Impacts (cont'd)

- **Equity Example** – Since inception the Green Bank has supported 19,312 projects and deployed $1.2 Billion in Distressed Municipalities





** Community Reinvestment Act (CRA) Eligible Communities – households at or below 80% of Area Median Income (AMI)

*** Low-Income and Disadvantaged Communities – those within federal Climate and Economic Justice Screening Tool and Environmental Justice Screening Tool

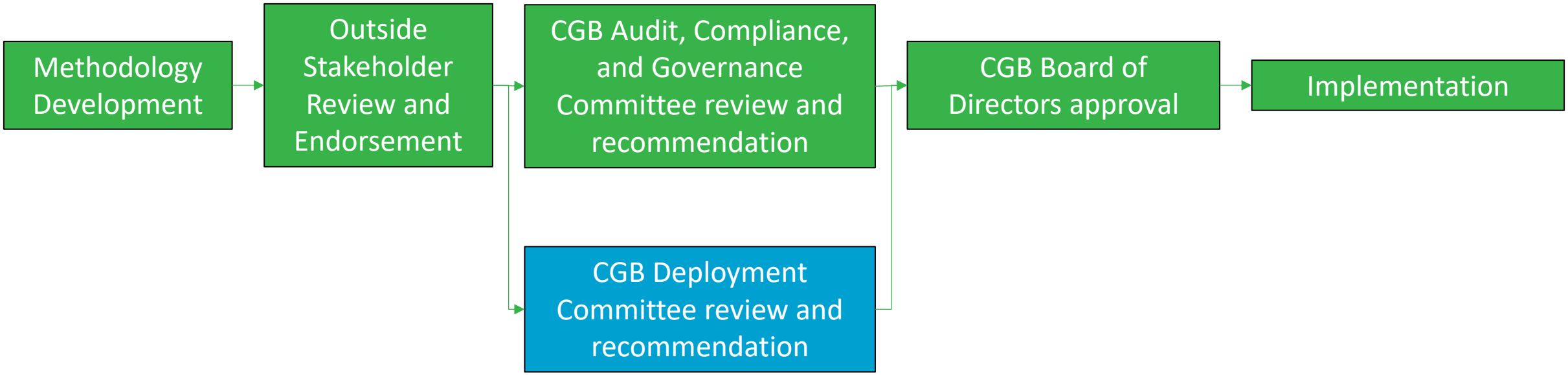
**** Vulnerable Communities – consistent with the definition of Public Act 20-05, including low- to moderate-income communities (i.e., less than 100% AMI), CRA-eligible communities, and environmental justice communities (e.g., including DECD distressed communities)

Evaluation Framework
What are we working on?

- **Ready for Review**
  - Expanded use of AVERT for EV's and Storage
- **Ongoing**
  - Update of CGB's Data Collection systems (NGEN and Salesforce) to streamline inputs and standardize definitions
- **In Progress**
  - Update to Program Logic Model and Evaluation Framework to include Environmental Infrastructure (2026)
  - Non-Generation related emissions reduction (2026)
  - Waste avoidance/food diversion (2026)
- **On the Horizon**
  - Other Environmental Infrastructure related impact methodologies
  - Update Social Cost of Carbon methodology
  - Transition from using estimated generation to actual generation for impact reporting
  - Ratepayer cost savings
  - New interactive Impact site (MAYA 2.0)

Evaluation Framework
Process

2015 – present **and Proposed**



Need to maintain governance and transparency around methodologies and balance with subject matter expertise

Board of Directors

CONNECTICUT GREEN BANK
INVESTMENT SOLUTIONS

Agenda Item #5
Other Business

Deployment Committee

Agenda Item #6
Adjourn

DEPLOYMENT COMMITTEE OF THE
CONNECTICUT GREEN BANK
Regular Meeting Minutes

Wednesday, November 12, 2025
2:00 p.m. – 3:00 p.m.

A regular meeting of the Deployment Committee of the **Connecticut Green Bank (the "Green Bank")** was held on November 12, 2025.

Committee Members Present: Joseph DeNicola, Dominick Grant, Matthew Ranelli, Lonnie Reed

Committee Members Absent: Kimberly Mooers

Staff Attending: Stephanie Attruia, David Beech, Priyank Bhakta, Larry Campana, Sergio Carrillo, Shawne Cartelli, Catherine Duncan, Mackey Dykes, Emma Ellis, Brian Farnen, Bryan Garcia, Bert Hunter, Stephanie Layman, Cheryl Lumpkin, Ariel Schneider, Eric Shrago, Dan Smith, Barbara Waters, Leigh Whelpton

Others present: Ethan Werstler, Nicholas Tan

1. Call to Order

- Joseph DeNicola called the meeting to order at 2:01 pm.

2. Public Comments

- No public comments.

3. Consent Agenda
a. Meeting Minutes from September 10, 2025

Resolution #1

Motion to approve the minutes of the Deployment Committee meeting for September 10, 2025.

Upon a motion made by Lonnie Reed and seconded by Matthew Ranelli, the Deployment Committee voted to approve Resolution 1. None opposed or abstained. Motion approved unanimously.

b. C-PACE Approval Extensions

- Mackey Dykes noted there are 3 transactions, 2 in Branford and 1 in Bridgeport and elaborated on the extension requests.

Resolution #2

WHEREAS, pursuant to Conn. Gen. Stat. 16a-40g (the "Act") the Connecticut Green Bank ("Green Bank") is directed to, amongst other things, establish a commercial sustainable energy program for Connecticut, known as Commercial Property Assessed Clean Energy ("C-PACE");

WHEREAS, pursuant to the C-PACE program, the Connecticut Green Bank Board of Directors (the "Board") or the Connecticut Green Bank Deployment Committee ("DC"), as may be applicable, approved and authorized the President of the Green Bank to execute financing agreements for the C-PACE projects described in the Memos submitted to the Board or DC on December 13, 2024 and July 25, 2025. (the "Finance Agreements");

WHEREAS, the Finance Agreements were authorized to be consistent with the terms, conditions, and memorandums submitted to the Board or DC, as may be applicable, and executed no later than 120 days from the date of such Board or DC approvals; and

WHEREAS, due to delays in fulfilling pre-closing requirements, the Green Bank will need more time to execute the Finance Agreements.

NOW, therefore be it:

RESOLVED, that the DC extends authorization of the Finance Agreements to no later than 120 days from November 12, 2025, and consistent in every other manner with the original Board or DC authorization for the Finance Agreement.

Upon a motion made by Dominick Grant and seconded by Lonnie Reed, the Deployment Committee voted to approve Resolution 2. None opposed or abstained. Motion approved unanimously.

4. Financing Programs Updates and Recommendations

a. C-PACE Transaction - Bolton

- Stephanie Attruia presented a 347.5 kW DC rooftop solar project, roof renovation, and EV chargers on a property requesting a $1,103,755 loan at 6.25% over a 20-year term with a loan-to-value and lien-to-value of 36.9%, and a DSCR of 1.46x. She reviewed the cash flows, both standard and sculpted, noted the SIR is 1.45, and stated she is waiting for confirmation from the customer as for which repayment schedule they will pick.

Resolution #3

WHEREAS, pursuant to Connecticut General Statute Section 16a-40g ("Statute"), the Connecticut Green Bank ("Green Bank") has established a commercial sustainable energy program for Connecticut, known as Commercial Property Assessed Clean Energy ("C-PACE");

WHEREAS, the Green Bank Board of Directors ("Board") has approved a $40,000,000 C-PACE construction and term loan program;

WHEREAS, the Green Bank seeks to provide a $1,103,755 of Proposed Assessment construction and term loan under the C-PACE program to The Carlyle Johnson, the building owner of 291 Boston Turnpike, Bolton, CT 06043, Tolland, Connecticut ("Loan"), to

[1] * - indicates project located in a "vulnerable community"

finance the construction of specified clean energy measures in line with the State's Comprehensive Energy Strategy and the Green Bank's Strategic Plan as more particularly described in the memorandum submitted to the Green Bank Deployment Committee dated November 7, 2025 ("Memo"); and

NOW, therefore be it:

RESOLVED, that the President of the Green Bank and any other duly authorized officer of the Green Bank is authorized to execute and deliver the Loan in an amount not to be greater than one hundred ten percent of the Loan amount with terms and conditions consistent with the Memo, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from the date of authorization by this resolution;

RESOLVED, that before executing the Loan, the President of the Green Bank and any other duly authorized officer of the Green Bank shall receive confirmation that the C-PACE transaction meets the statutory obligations of the Statute, including but not limited to the savings to investment ratio and lender consent requirements; and

RESOLVED, that the duly authorized Green Bank officers are authorized and empowered to do all other acts and execute and deliver all other documents and instruments as they shall deem necessary and desirable to affect the above-mentioned legal instruments.

Upon a motion made by Matthew Ranelli and seconded by Lonnie Reed, the Deployment Committee voted to approve Resolution 3. None opposed or abstained. Motion approved unanimously.

5. Other Business

- Matthew Ranelli asked if at a future meeting there could be a discussion on the sculpted repayment schedule in terms of having a standard of how many negative cash flow years are acceptable and why. Joseph DeNicola agreed.
- Bryan Garcia introduced the Smart-E Loan expansion and Barbara Waters presented the progress on the pilot period since covering the new measures. She presented the history of the coverage for asbestos and mold remediation and the classification that those measures were technically under a pilot program as well requiring a nexus to energy. She stated that only 52 projects were completed, all under $25,000, and across all the projects about $111,000 was spent on the asbestos remediations and about $111,000 on mold remediation. She mentioned that for about 17 jobs there is no documentation for it having a nexus to energy and when speaking with the vendor, there were certain assumptions made in conjunction with a lack of communication. She stated that as of right now, asbestos and mold are covered 100% with no mechanism in place to ensure a nexus to energy and so that is why the Board is being informed. Going forward for now, no asbestos or mold remediation projects will be approved without going through Barbara Waters first, but overall, these types of remediation measures make up only about 1% of all the Smart-E jobs since September 1, 2019. She asked for input from the Committee about next steps and stated that the team favors ending the pilot but continuing with asbestos and mold remediation as standalone measures with no required nexus to energy. She also suggested continuing with the pilot and requiring the nexus to energy but asked for feedback.
    - Matthew Ranelli responded that at the time, home energy audits couldn't be completed if there was a presence of asbestos or mold so he is in favor of continuing the program without the nexus to energy, but that if a home energy audit is completed at the

[1] * - indicates project located in a "vulnerable community"

end of the remediation, then that may be considered a nexus to energy. Barbara Waters responded with a case from Groton that faced a challenge in getting a HES audit due to timing. Additionally, getting documentation of the HES audit afterwards can be a challenge. Brian Farnen added that this conversation has come up previously with Kim Stevenson and at the end of the day, everything the Green Bank does has to come back to either clean energy or environmental infrastructure, though there is flexibility as to what that nexus could be. The group discussed the issue further.

- Matthew Ranelli suggested getting a confirmation of a scheduled home energy audit prior to the closing and the group discussed it further and agreed that that may be a viable solution.

- Barbara Waters asked if the asbestos and mold remediation should continue as a pilot or move to a standard program and Brian Farnen replied it would be a Committee decision. Bryan Garcia suggested to continue with the pilot as intended and enforce the current requirements but return to the Deployment Committee or Board of Directors with a recommendation for modification based on what was just discussed.
    - Joseph DeNicola asked how the programs would be marketed as an energy program or if it would be something separate. Barbara Waters responded that because of the increased scope around environmental infrastructure, Smart-E is currently marketed as supporting clean energy, energy efficiency, and environmental resilience in the home. In general, the discussion is about the larger scope. Matthew Ranelli added he would like to tie it to an energy nexus if possible but in a meaningful way.
    - Joseph DeNicola asked if there is a list of approved contractors for asbestos and mold remediation and Barbara Waters responded yes and then described the approval process.

6. Adjourn

Joseph DeNicola adjourned the Deployment Committee meeting at 2:34 pm.

[1] * - indicates project located in a “vulnerable community”

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CONNECTICUT
GREEN BANK

Memo

To: Board of Directors of the Connecticut Green Bank

From: Sergio Carrillo (Managing Director of Incentive Programs), Mackey Dykes (VP of Incentive Programs and Officer), Bryan Garcia (President and CEO), and Bert Hunter (EVP and CIO)

CC: Brian Farnen (General Counsel and CLO), Jane Murphy (EVP of Finance and Administration), and Eric Shrago (VP of Operations)

Date: February 11, 2026

Re: Approval of Financing Programs and Energy Storage Solutions Projects Funding Requests below $500,000 and No More in Aggregate than $2,000,000 – Update

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At its October 20, 2017 meeting, the Connecticut Green Bank ("Green Bank") Board of Directors authorized staff to evaluate and approve funding requests under $500,000, provided they follow the formal approval process, include a Green Bank officer's signature, align with the Comprehensive Plan and fiscal budget, and do not exceed an aggregate of $1,000,000 since the last Deployment Committee meeting. The Board later revised this process on January 19, 2024, establishing separate aggregate limits for the Financing and Energy Storage Solutions ("ESS") programs. At its October 24, 2025 meeting, the Board increased the aggregate limit from $1,000,000 to $2,000,000. This memo provides an update on Financing Programs and ESS project funding requests below $500,000 that were evaluated and approved.

During this current period no projects were evaluated and approved for funding for Financing Programs or for ESS.

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CONNECTICUT
GREEN BANK

Memo

To: Board of Directors of the Connecticut Green Bank

From: Bryan Garcia (President and CEO)

Date: February 11, 2026

Re: Approval of Restructure/Write-Offs Requests below $100,000 and No More in Aggregate than $500,000 – Update

---

At its June 13, 2018 meeting, the Board of Directors authorized Green Bank staff to evaluate and approve loan loss restructurings or write-offs under $100,000, pursuant to a formal process, with an aggregate limit of $500,000 between Deployment Committee meetings. At the April 24, 2020 meeting, the Board approved temporary repayment modification authority in response to the COVID-19 pandemic, followed by an expansion on June 26, 2020 to include Green Bank subsidiaries. Most recently, at the June 20, 2025 meeting, the Board approved revisions to the policy to improve clarity and consistency, eliminate redundancies, and broaden its scope to include capital assets and projects terminated before completion.

During this period, no projects were evaluated and approved for payment restructure/write-off.

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) emitted by the region's fossil fuel electric generation 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

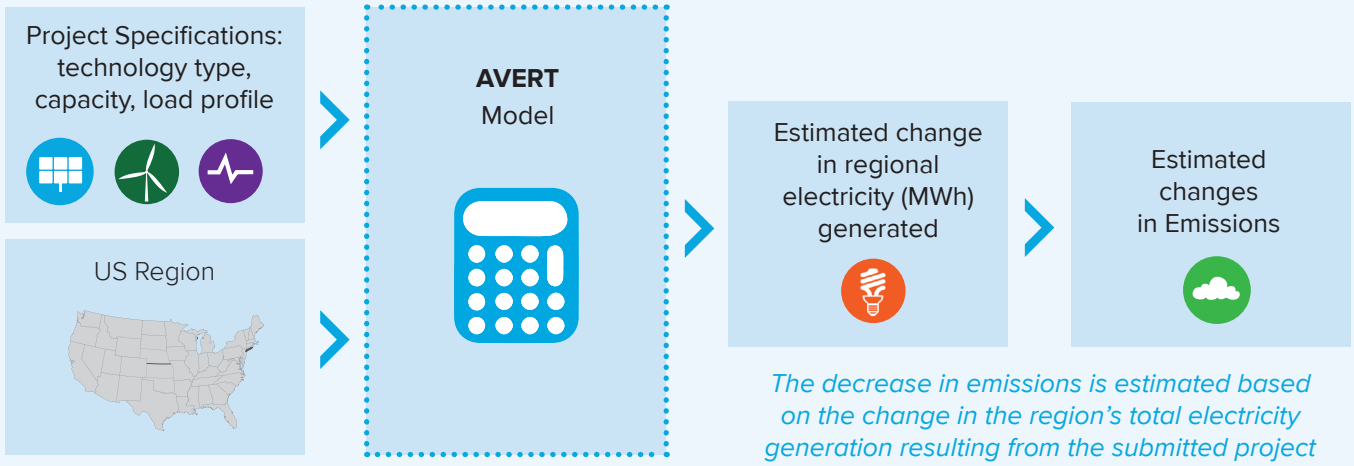
Using the type of calculation outlined above, the Green Bank will include Societal Perspective benefits as well as the environmental impact of its programs in its Comprehensive Annual Financial Report, green bonds issuances, and other communications. Further information about AVERT is available at: https://www.epa.gov/sites/production/files/2015-08/documents/ave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

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.

Figure 2: Green Bank AVERT Operationalized Flow

The Green Bank multiplies individual projects' generation and/or savings in kWh by the derived AVERT emissions factors to estimate changes in emissions.

Example of Environmental Equivalencies

The Green Bank uses the EPA's AVERT tool to translate the contributions made by Green Bank projects to the region's air quality. The decreases in CO_2 and NO_x in the example in **Table 2** above can also be demonstrated through common activities or environmental equivalencies as shown in **Table 3** below.

Table 3: Environmental Equivalencies

Capacity:	Equivalencies							
60 MW	Greenhouse gas emissions from:		CO_2 emissions from:				Carbon sequestered by:	
Technology	Miles driven by an average passenger vehicle	Tons of waste recycled instead of landfilled	Gallons of gasoline consumed	Pounds of coal burned	Homes' energy use for one year	Incandes-cent lamps switched to	Tree seedlings grown for 10 years	Acres of U.S. forests in one year
Solar PV	96,795,798	12,817	4,544,600	43,097,690	4,265	1,431,686	1,046,698	38,231
Energy Efficiency	74,488,411	9,863	3,497,260	33,165,473	3,282	1,101,742	805,478	29,421
Wind	122,560,178	16,229	5,754,248	54,569,111	5,400	1,812,761	1,325,300	48,407

Further information about the EPA equivalency Calculator is available at:
https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

In the examples above, the Connecticut Green Bank would apply the Societal Perspective to report the environmental impact results in its Comprehensive Annual Financial Report in the following manner: "In FY 2016 there was a total deployment of nearly 60 MW of Residential Solar PV in Connecticut. Through the Connecticut Green Bank's support, about 44,520 tons of CO_2, 45,580 pounds of NO_x, and 32,480 pounds of SO_2 emissions were saved, which is equivalent to 4,544,600 gallons of gasoline consumed, 1,431,686 incandescent lamps switched to LEDs, or carbon sequestered from 38,231 acres of U.S. forests in a year."

continued >

About the Connecticut Green Bank

The Connecticut Green Bank was established by the Connecticut General Assembly on July 1, 2011 as a part of Public Act 11-80. As the nation's first full-scale green bank, it is leading the clean energy finance movement by leveraging public and private funds to scale-up renewable energy deployment and energy efficiency projects across Connecticut. The Green Bank's success in accelerating private investment in clean energy is helping Connecticut create jobs, increase economic prosperity, promote energy security and address climate change. For more information about the Connecticut Green Bank, please visit www.ctgreenbank.com.

About the Department of Energy and Environmental Protection

The Connecticut Department of Energy and Environmental Protection (DEEP) was established on July 1, 2011 with the consolidation of the Department of Environmental Protection, the Department of Public Utility Control, and energy policy staff from other areas of state government. It is charged with conserving, improving and protecting the natural resources and the environment of the state of Connecticut as well as making cheaper, cleaner and more reliable energy available for the people and businesses of the state. The agency is also committed to playing a positive role in rebuilding Connecticut's economy and creating jobs – and to fostering a sustainable and prosperous economic future for the state. For more information about the Connecticut Department of Energy and Environmental Protection, please visit www.ct.gov/deep.

About the United States Environmental Protection Agency

The mission of the EPA is to protect human health and the environment. For more information about the United States Environmental Protection Agency, please visit www.epa.gov.

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CONNECTICUT GREEN BANK

Memo

To: Keri Enright-Kato, Director, Office of Climate Change, Technology, & Research, Connecticut Department of Energy and Environmental Protection and Robyn DeYoung, Environmental Specialist, US Environmental Protection Agency;

CC: Denise Mulholland, Senior Analyst - State Climate and Energy Program, US Environmental Protection Agency

From: Lucy Charpentier, Manager of Evaluation, Measurement and Verification; Eric Shrago, Director of Operations

Date: February 6, 2017

Re: Connecticut Green Bank use of AVERT for Air Pollution Avoidance Measurement for Individual Projects

---

BACKGROUND

The Connecticut Green Bank (Green Bank) would like to standardize its methodology on quantifying the air emission benefits (e.g., nitrogen oxides (NO_x), sulfur dioxide (SO_2) and carbon dioxide (CO_2)) from its energy efficiency and renewable energy investments.

The Green Bank currently calculates an expected annual and lifetime kWh savings of energy and production of clean energy[1] with associated CO_2, NO_X and SO_2 emissions per project using ISO-New England information. This methodology was followed by our predecessor, the Connecticut Clean Energy Fund, which used the results of the 2007 New England Marginal Emission Rate Analysis.

The U.S. EPA created the Avoided Emissions and Generation Tool (AVERT).[2] In an effort to update its methodology, which both DEEP and NREL recommended we review, the Green Bank explored the use of AVERT.

Once the methodology for the use of AVERT is standardized, the Green Bank will:

- Calculate and disclose the air emissions benefits anticipated from the issuance of "green" bonds that finance clean energy projects; and

[1] It should be noted that the Connecticut Green Bank collects actual clean energy production data from all renewable energy projects it has invested in.
[2] https://www.epa.gov/statelocalclimate/avoided-emissions-and-generation-tool-avert

- Publicly report the air emissions benefits resulting from its investment activity in clean energy through its Comprehensive Annual Financial Report.

OVERVIEW

AVERT uses regional Air Market Program Data (AMPD) from the EPA Clean Air Markets Division (CAMD) for nearly all operating fossil-fuel energy generating units with generating capacities great then 25 MW[3]. Data collected in AMPD include reported gross generation (MWh), steam output (tons from CHP facilities), heat input (in MMBtu), emissions of sulfur dioxide, oxides of nitrogen (NO_x), and carbon dioxide (CO_2).

The current structure of AVERT requires the submission of a single project or aggregate of multiple projects into the Microsoft Excel model at a time. This takes significant time by Green Bank staff to input each project to retrieve air emission benefits. To operationalize these calculations, the Green Bank is proposing using factors derived by average projects through AVERT and then taking an average based on technology. The factors using ISO-New England 2015 emissions data are the following (see Table 1):

Table 1. Factors

Technology	CO_2 tons factor	NO_X lbs factor	SO_2 lbs factor
Solar PV	0.5446	0.6630	0.6535
Energy Efficiency	0.5409	0.6167	0.6208
Wind	0.5456	0.6123	0.6787

To confirm these factors, the Green Bank has run indicative projects (based on average size) through the models and replicated these results and compared to results obtained from AVERT. The average of the differences is as follows (see Table 2):

Table 2. Average differences from AVERT

Technology	CO2 tons Difference	CO2 % Difference	NOX lbs Difference	NOX % Difference	SO2 lbs Difference	SO2 % Difference
Solar PV	-16.67	0.00	-33.33	0.00	-166.67	0.00
Energy Efficiency	0.00	0.00	0.00	0.00	0.00	0.00
Wind	0.00	0.00	-16.67	0.00	-66.67	0.00

RECOMMENDATION

[3] The AVERT 2015 Northeast Regional Data File contains 328 fossil units. Generation is fully represented for CT, MA, ME, NH, NY, RI and VT and NJ is partially represented (23%). See the Disclaimers tab for additional details.

The Green Bank proposes to automate the calculation of these avoided emissions (multiplying the expected generation by the factors) initially manually and eventually through our data warehouse. The Green Bank will implement a process to update the factors annually, using the same methodology used to derive the above factors, once the EPA updates the model with new emissions factors based on the ISO-New England generation mix. The Green Bank will evaluate building an API to query the AVERT model once it is available online.

Factors will be used to determine actual emissions avoided for the year's factor used and for projected future avoidances. Future avoidances will be projected using the newest factor. The Green Bank will continue to use EGRID to estimate actual emissions avoided for projects completed prior to January 1, 2015.

Connecticut Department of
ENERGY & ENVIRONMENTAL PROTECTION

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Memo

To: Bryan Garcia, President and CEO, Connecticut Green Bank

CC: Lucy Charpentier, Manager of Evaluation, Measurement and Verification, Connecticut Green Bank; Eric Shrago, Director of Operations, Connecticut Green Bank

From: Keri Enright-Kato, Director, Office of Climate Change, Technology, & Research, Connecticut Department of Energy and Environmental Protection

Date: March 15, 2017

Re: Request by the Connecticut Green Bank on February 6, 2017 for Review and Approval of the use of AVERT to Calculate Air Pollution Avoidance Measurement and Societal Perspective/ Evaluation Framework Draft Fact Sheet

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Background

At the Department of Energy and Environmental Protection's (DEEP) suggestion, the Connecticut Green Bank ("Green Bank") reviewed available tools for estimating the organization's contribution to support emissions reductions and is now seeking to adopt the Environmental Protection Agency's model AVoided Emissions and geneRation Tool (AVERT) as their official tool for measuring these impacts. The Green Bank assembled the following materials for DEEP's review and approval:

- Memo (February 6, 2017);
- AVERT Overview and Step-by-Step Instructions (July 2016);
- AVERT User Manual (March 2017);
- Evaluation Framework: Societal Perspective (Environment) – Draft Fact Sheet by the Green Bank;
- Letter from EPA (March 15, 2017).

Review

The Connecticut Green Bank wants to estimate the extent to which investments in clean energy create value from a societal perspective as it relates to the mitigation of greenhouse gas emissions and other air pollutants. For Green Bank programs this will be measured as the amount of clean energy deployed and the resulting renewable energy produced and energy saved. At DEEP's suggestion, the Green Bank examined the AVERT model from the EPA. The tool considers regional generation fleets and profiles to quantify the amounts of Carbon Dioxide (CO_2), Nitrous Oxide (NOx), and Sulfur Dioxide (SO_2) that will not be emitted due to generation from existing sources being offset due to, for example, Green Bank supported projects. The outputs are in tons of CO_2 and pounds of NOx and SO_2.

The Green Bank, working with DEEP and the EPA, has developed a process to operationalize running the AVERT model and will create and update estimates for all their projects on an annual basis.

Findings

DEEP reviewed The Green Bank's Memos, AVERT Manual, AVERT Overview, and Draft Fact Sheet. Our view is that the AVERT is a well-developed tool that accurately describes the impacts of Green Bank projects to support the reduction of regional emissions. DEEP approves the use of AVERT for emissions benefit calculations and the summary fact sheet.

EVALUATION FRAMEWORK
SOCIETAL PERFORMANCE

CONNECTICUT GREEN BANK

Public Health 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 are measured by the decrease in the amount of nitrogen oxides (NO_x), sulfur dioxide (SO_2), and particulate matter ($PM_{2.5}$) emitted by the region's fossil fuel electric generation due to Green Bank projects

The changes in quantities of these emissions impacts the quality of health of those that breathe this air. Air pollution influences the prevalence and severity of asthma, bronchitis, coronary disease, and even death.

The Green Bank uses the US Environmental Protection Agency's (EPA) Co-Benefit Risk Assessment (CoBRA) model to calculate and report on the public health benefits of the Green Bank's clean energy investment activity in Connecticut.

The Green Bank will include public health impacts of its programs as part of the Societal Benefits in its Comprehensive Annual Financial Report, green bonds issuances, and other communications.

Methodology

The Green Bank has long recognized the environmental benefits of its investments. After working with the Connecticut Department of Energy and Environmental Protection (DEEP), Connecticut Department of Public Health (DPH) and the US Environmental Protection Agency (EPA), the Green Bank adopted the EPA's CoBRA to model the public health impacts of the air quality benefits associated with Green Bank projects.

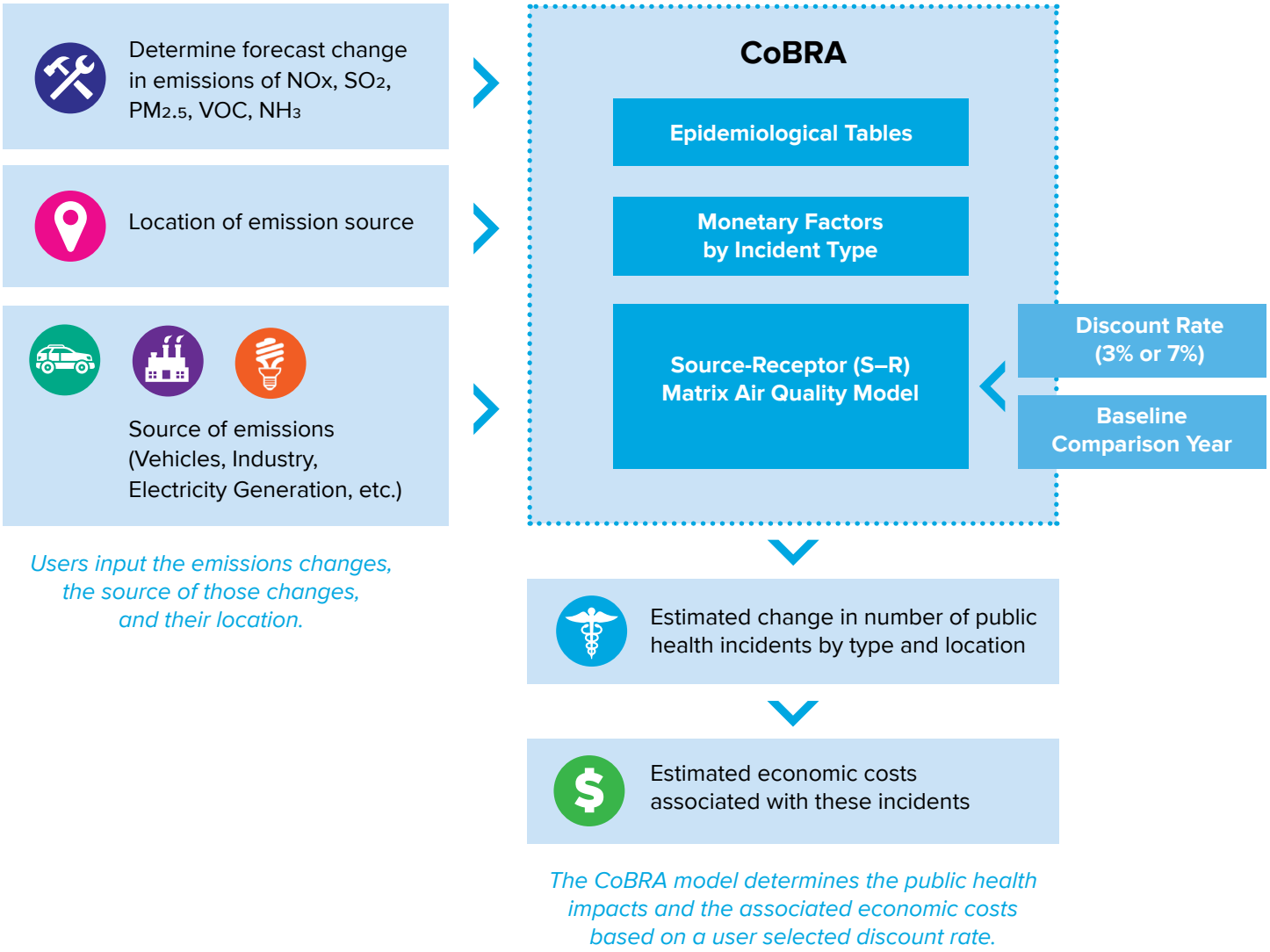
CoBRA is a complex model that uses a baseline of emissions and models the increase or decrease in public health incidents and their costs based on the change in emissions of nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter ($PM_{2.5}$), volatile organic compounds (VOC) and ammonia (NH_3). The tool takes into account the method through which these are emitted (vehicles, energy production, type of industry, etc) and their location. It uses an air dispersion model (Source-Receptor (S-R) Matrix) and standard EPA epidemiological estimation methods to gauge the change in number of incidents, and then applies monetary factors to give an economic impact of these emissions changes.

DPH Keeping Connecticut Healthy

EPA United States Environmental Protection Agency

The graphic below presents a simplified representation of the model.

Figure 1: CoBRA Flow



Users input the emissions changes, the source of those changes, and their location.

The CoBRA model determines the public health impacts and the associated economic costs based on a user selected discount rate.

Further information about the CoBRA is available at:
https://www.epa.gov/sites/production/files/2017-10/documents/cobra_user_manual_september2017_508_v2.pdf

The Green Bank will directly run a project or projects' environmental impacts through the CoBRA model to obtain the associated public health benefits that its projects support. CoBRA will report back the low and high estimates of avoided incidents, locations, and associated costs of the following health outcomes:

Acute Bronchitis	Lower Respiratory Symptoms
Asthma Exacerbation	Minor Restricted Activity Days
Emergency Room Visits, Asthma	Mortality
Hospital Admits, All Respiratory	Nonfatal Heart Attacks
Hospital Admits, Cardiovascular (except heart attacks)	Upper Respiratory Symptoms
Infant Mortality	Work Loss Days

Example of Health Impacts

The following shows an example of public health impacts associated with the decrease of 155 tons of $PM_{2.5}$, 1,169 ton decrease in SO_2, and a 2,331 ton decrease in NO_x (the equivalent of what the Green Bank's projects avoid emitting in one year).

Table 1

CT Emissions Decrease (in tons)			Location of impact	Value of Total Health Benefits	
$PM_{2.5}$	SO_2	NO_x		low estimate	high estimate
7	98	116	Connecticut	$1,223,571	$2,765,763
			Rest of US	$2,746,739	$6,208,563
			Nationwide	$3,970,310	$8,974,326

continued >

About the Connecticut Green Bank

The Connecticut Green Bank was established by the Connecticut General Assembly on July 1, 2011 as a part of Public Act 1º1-80. As the nation's first full-scale green bank, it is leading the clean energy finance movement by leveraging public and private funds to scale-up renewable energy deployment and energy efficiency projects across Connecticut. The Green Bank's success in accelerating private investment in clean energy is helping Connecticut create jobs, increase economic prosperity, promote energy security and address climate change. For more information about the Connecticut Green Bank, please visit www.ctgreenbank.com.

About the Department of Energy and Environmental Protection

The Connecticut Department of Energy and Environmental Protection (DEEP) was established on July 1, 2011 with the consolidation of the Department of Environmental Protection, the Department of Public Utility Control, and energy policy staff from other areas of state government. It is charged with conserving, improving and protecting the natural resources and the environment of the state of Connecticut as well as making cheaper, cleaner and more reliable energy available for the people and businesses of the state. The agency is also committed to playing a positive role in rebuilding Connecticut's economy and creating jobs – and to fostering a sustainable and prosperous economic future for the state. For more information about the Connecticut Department of Energy and Environmental Protection, please visit www.ct.gov/deep.

About the Department of Public Health

Established in 1878, the Department of Public Health (DPH) is the lead agency in protection of the public's health, and in providing health information, policy and advocacy. DPH is a central part of a comprehensive network of public health services, and is a partner to local health departments for which it provides advocacy, training and certification, technical assistance and consultation, and specialty services that are not available at the local level. The agency is responsible for providing accurate health information to the Governor, the Legislature, the federal government and local communities. This information is used to monitor the health status of Connecticut's residents, set health priorities and evaluate the effectiveness of health initiatives. The agency is also a regulator focused on health outcomes, maintaining a balance between assuring quality and administrative burden on the personnel, facilities and programs regulated. DPH is currently staffed by approximately 800 employees organized into fourteen branches, sections, and offices; each tasked with ensuring and/or providing services to help the agency achieve its mission. For more information about the Connecticut Department of Public Health, please visit www.ct.gov/dPh/site/default.asp.

About the United States Environmental Protection Agency

The mission of the EPA is to protect human health and the environment. For more information about the United States Environmental Protection Agency, please visit www.epa.gov.

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CONNECTICUT GREEN BANK

Memo

To: Keri Enright-Kato, Director, Office of Climate Change, Technology, & Research, Connecticut Department of Energy Environmental Protection, Ric Piroli, Bureau of Air Management, Connecticut Department of Energy Environmental Protection, Bryan Toal, Environmental Health, Connecticut Department of Public Health, and Denise Mulholland, Senior Analyst - State Climate and Energy Program, US Environmental Protection Agency;

CC: Robyn DeYoung, Environmental Specialist, US Environmental Protection Agency

From: Lucy Charpentier, Manager of Evaluation, Measurement and Verification; Eric Shrago, Director of Operations

Date: August 25, 2017

Re: Connecticut Green Bank use of EPA CoBRA for Public Health Impact Measurement for Projects

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BACKGROUND

Earlier this year, the Connecticut Green Bank (Green Bank) operationalized the Environmental Protection Agency (EPA)'s Avoided Emissions and Generation Tool (AvERT) model as the basis for measuring the environmental impacts of its investments. AvERT models the pollutants emitted by energy producers based on what would have been used to generate electricity had these projects not existed. AvERT measures these results in terms of CO_2, NO_X, SO_2, and $PM_{2.5}$.

The Green Bank, recognizing these pollutants effect a person's wellbeing, would like to gage the impact of improved air quality supported by its investments with regards to public health in the state.

The U.S. EPA created the Co-Benefit Risk Assessment (CoBRA) model as a tool for policy makers to assess public health impacts that are supported by changes in emissions.). The model allows users to estimate and map the air quality, human health, and related financial benefits of clean energy policies or programs.[1]

COBRA is built upon emission 2017 estimates of PM2.5, S02, NOX, NH3, and VOCs and a reduced form air quality model (Source-Receptor (S–R) Matrix). Users create their own

[1] https://19january2017snapshot.epa.gov/statelocalclimate/co-benefits-risk-assessment-cobra-screening-model_.html

scenario by inputting increases or decreases to emissions. The model then converts the air quality changes into human health effects (e.g. number of cases of asthma, fatal heart attacks, hospitalizations, etc.) using standard EPA methods and applies monetary factors so that the user can see the health improvements in financial terms as well.

Once the methodology for the use of CoBRA is implemented, the Green Bank will:

- Calculate and disclose the public health benefits anticipated from the issuance of "green" bonds that finance clean energy projects; and
- Publicly report the public health benefits resulting from its investment activity in clean energy through its Comprehensive Annual Financial Report.

OVERVIEW OF OPERATIONALIZATION

The Green Bank will use outputs from AvERT as the inputs for CoBRA. The organization envisions running the model on a portfolio of projects at a time rather than calculating impacts on a per project level due to the complexity of the model and the small effects of a single project. The Green Bank will use the built in monetary factors in CoBRA unless otherwise approved by Connecticut Department of Public Health (DPH).

RECOMMENDATION

The Green Bank proposes to use CoBRA as its official tool for measuring health impacts and will automate its use where and when possible in our Data Warehouse.

Connecticut Department of
ENERGY &
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Memo

To: Bryan Garcia, President and CEO, Connecticut Green Bank

CC: Lucy Charpentier, Manager of Evaluation, Measurement and Verification, Connecticut Green Bank; Eric Shrago, Director of Operations, Connecticut Green Bank

From: Keri Enright-Kato /S/, Director of the Office of Climate Change, Technology, & Research

Date: Oct. 12, 2017

Re: Request by the Connecticut Green Bank on August 25, 2017 for Review and Approval of the use of CoBRA to Calculate Health Impacts of Air Quality Changes Measurement and Societal Perspective/ Evaluation Framework Draft Fact Sheet

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Background

At the Environmental Protection Agency (EPA)'s suggestion, the Connecticut Green Bank ("Green Bank") reviewed available tools for estimating public health benefits associated with the organization's contribution to support emissions reductions and is now seeking to adopt the Environmental Protection Agency's model Co-Benefits Risk Assessment (CoBRA) as their official tool for measuring these impacts. The Green Bank assembled the following materials for DEEP's review and approval:

- Memo (August 25, 2017);
- Quick Start Tutorial: How to Use CoBRA (June 2015);
- CoBRA User Manual (June 2015);
- Evaluation Framework: Societal Perspective (Public Health) – Draft Fact Sheet by the Green Bank.

Review

The Connecticut Green Bank wants to estimate the extent to which investments in clean energy create value from a societal perspective as it relates to the public health benefits associated with the mitigation of greenhouse gas emissions and other air pollutants. For Green Bank programs the resulting renewable energy produced and energy saved from its projects, will be examined using the previously approved EPA AvERT based methodology to quantify the amounts of Carbon Dioxide (CO_2), Nitrous Oxide (NOx), Sulfur Dioxide (SO_2) and particulate matter ($PM_{2.5}$) that will not be emitted due to generation from existing sources being offset due to, for example, Green Bank supported projects. The outputs are in tons of CO_2 and pounds of NOx, SO_2, and $PM_{2.5}$. These offset emissions will be used as inputs into the CoBRA model resulting in numbers of health-related incidents avoided and their associated cost savings.

Findings

DEEP reviewed The Green Bank's Memos, CoBRA Manual, Quick Start Tutorial: How to Use CoBRA, and Draft Fact Sheet. Our view is that the CoBRA is a well-developed tool that accurately describes the impacts of Green Bank projects to support the reduction of regional emissions. DEEP approves the use of CoBRA for emissions benefit calculations and the summary fact sheet.

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

Raul Pino, M.D., M.P.H.
Commissioner

Dannel P. Malloy
Governor
Nancy Wyman
Lt. Governor

MEMO

To: Bryan Garcia, President and CEO, Connecticut Green Bank

cc: Lucy Charpentier, Manager of Evaluation, Measurement and Verification, Connecticut Green Bank
Eric Shrago, Director of Operations, Connecticut Green Bank

Subject: CoBRA Review

I have reviewed some of the background materials available from the U.S. Environmental Protection Agency (EPA) on their "Co-Benefits Risk Assessment" (CoBRA) screening model for estimating health and economic benefits of policies that affect air pollution. I also listened to a webinar presentation by Denise Mulholland of EPA about the uses and limitations of the Co-BRA Screening Model.

The CoBRA model turns estimated air pollution reductions into estimated health impacts in nine areas: mortality, non-fatal heart attacks, hospitalizations, bronchitis, respiration symptoms, asthma emergency room visits, asthma exacerbations, days of limited physical activity and work days lost. The estimated health impacts are then converted into estimated cost savings. In EPA's "User Manual for the Co-Benefits Risk Assessment Screening Model" there is a lengthy description of how they used numerous epidemiology studies to estimate health improvements from decreased air pollution and specifically from decreased levels of small particulate matter (PM 2.5). This section of the manual has an extensive review of the epidemiology literature used in the model.

The Connecticut Department of Public Health (DPH) does not have the expertise to evaluate the air pollution modeling or health impacts modeling that went into CoBRA. However the health effects section is well researched and referenced. The model was also submitted for technical peer review by external experts.

The CoBRA model appears to be a well reviewed screening tool to estimate the air pollution related health impacts at the policy level. DPH supports the effects by the Green Bank to find ways to evaluate the effectiveness of its programs.

Sincerely,

Brian Toal

Brian Toal, Epidemiologist 4
Environmental and Occupational Health Program

Keeping Connecticut Healthy
DPH
Connecticut Department of Public Health

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EVALUATION FRAMEWORK
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CONNECTICUT GREEN BANK

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Economic Development Overview

One of the indicators that the Connecticut Green Bank will be tracking in its programs and overall portfolio is the extent to which investments in clean energy create value from a societal perspective as it relates to the economic development of the state[1]. For the Green Bank programs this will be measured as the relationship between investments and associated direct and indirect jobs created. In 2009, and updated in 2010, Navigant Consulting prepared a Connecticut Renewable Energy and Energy Efficiency Economy Baseline Study[2], which included a focus on the investments in those energy sectors and the resulting job creation. Since that report was prepared, the availability of new clean energy technologies that have emerged (e.g., DER resources, EVs, electric charging stations, etc.), and a variety of related economic factors (e.g., costs of labor, cost of resource acquisition, etc.) have changed. In coordination with the Connecticut Department of Economic and Community Development (DECD) and with assistance from Eversource Energy and United Illuminating, The Connecticut Green Bank contracted Navigant Consulting to refresh the investment-jobs portion of its earlier study by providing an updated calculator tool to estimate the economic development benefits from clean energy investments in Connecticut, as reflected in job-years created. The updated study focused on jobs associated with the investment area of the Connecticut Green Bank: renewable energy (RE) and energy efficiency (EE) project development and deployment, and product development and manufacturing. The final value output in the jobs calculator is *job-years created per $1 million invested in clean energy projects in Connecticut*.

The Connecticut Green Bank, through its Evaluation Framework, and specifically its Societal Perspective metrics, will use the findings of this study to estimate, analyze, and report on the economic development benefits of the investment activity in clean energy deployment in Connecticut that it is an integral part of.

Results of RE/EE job-years created to investment analysis

Below is a summary of the results of the analysis of direct, indirect, and induced job-years created by each million-dollar investment in clean energy deployment in Connecticut:

~5 job-years for storage tech installers	**~9 job-years** for residential solar installers	**~14 job-years** for commercial EE installers
~7 job-years for EV charging installers	**~11 job-years** for fuel cell manufacturers	**~15 job-years** for RTT installers
~7 job-years for commercial solar installers	**~14 job-years** for wind project installers	**~18 job-years** for residential EE installers

About the Connecticut Green Bank

The Connecticut Green Bank was established by the Connecticut General Assembly on July 1, 2011 as a part of Public Act 11-80. As the nation's first full-scale green bank, it is leading the clean energy finance movement by leveraging public and private funds to scale-up renewable energy deployment and energy efficiency projects across Connecticut. The Green Bank's success in accelerating private investment in clean energy is helping Connecticut create jobs, increase economic prosperity, promote energy security and address climate change. For more information about the Connecticut Green Bank, please visit www.ctgreenbank.com

About the Department of Economic and Community Development

The Department of Economic and Community Development is the state's lead agency responsible for strengthening Connecticut's competitive position in the rapidly changing knowledge-based global economy. The department administers the Manufacturing Innovation Fund that was created to support and strengthen Connecticut's manufacturing sector. For more information about the Department of Economic and Community Development, please visit www.decd.org

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Methodology

1 Calculation of total jobs at top companies:
Interviewed top companies, 22 total (40 researched)

- 12 RE companies interviewed, 17 researched, 60% of market
- 10 EE companies interviewed, 17 researched, 30% of market
- Asked each company for current total number of RE/EE jobs in relevant job classifications and sections of the RE/EE value chain

2 Extrapolation to represent the total industry of CT:
Determined market share for companies in Connecticut RE/EE industry

- Calculated for non-interviewed companies
- If interviewed companies had **X** jobs, representing **Y%** of the market share, then all jobs = **X / Y%**

3 Estimated jobs created per $1 Million invested using jobs calculator

This analysis mainly considers direct jobs[3] in private companies that employ people who are based in Connecticut. A multiplier for calculating indirect jobs[4] and induced jobs[5] from the number of direct jobs was provided by DECD for the study.

Key Findings

Renewable Energy: Employment in the solar industry has grown by approximately 30% since 2010 to become the largest RE industry for jobs in Connecticut.

- The majority of RE jobs are split between the solar and fuel cell industries, with other RE technologies making up the remaining 6% of RE industry jobs
- Installation and engineering jobs account for the largest job type at solar companies
- Manufacturing and engineering jobs account for the largest job types at fuel cell companies
- The majority of solar employees in Connecticut focus on the residential market

Energy Efficiency: Overall employment has remained relatively constant, experiencing most job growth in the residential customer market.

- EE technologies mainly include lighting, HVAC, and building envelope, with the majority of companies participating in multiple technologies
- Installation jobs account for the majority of roles
- Most jobs are focused on residential and C&I customer markets, with the remaining focused on retail and utility
- The average number of employees at C&I companies is 90-120, while it is 10-40 at residential companies

Example of Jobs Calculator: Residential Solar

In the example below, the Connecticut Green Bank would apply the Societal Perspective to report the economic development results in its Comprehensive Annual Financial Report in the following manner: **"In FY 2016 there was a total investment of $240 million in Residential Solar PV in Connecticut. Through the Connecticut Green Bank's support, about 940 direct and 1,220 indirect and induced job-years were created in the state from installing nearly 60 MW of Residential Solar PV."**

Occupation *Solar PV Installation – Residential*	Capital Invested	Company Overhead and Margin	Project Cost after Overhead and Margin	Labor (% of project cost)	Non-labor Costs (% of project costs)
	A	B	C=Ax(1-B)	D	E=100%-D
	$1,000,000	20%	$800,000	35%	65%
Weighted Average Wage	**Fully Burdened Employee Cost**	**Job-years Created per Million Dollars Invested**	**Indirect and Induced Job Multiplier**	**Indirect and Induced Jobs Created from Capital Invested**	**Total Job Years Created from Capital Invested**
F	G=Fx1.3	H=Cx(D/G)	I	J=HxI	K=H+J
$55,000	$71,500	3.9	1.3	5.1	9.0

[1] See Section 7 of Connecticut Green Bank's Evaluation Framework: Assessing, Monitoring, and Reporting of Program Impacts and Process (July 2016)
[2] Connecticut Renewable Energy and Energy Efficiency Economy Baseline study, Navigant Consulting, Inc. [Completed in March 2009 and subsequently updated in 2010]
[3] These are existing jobs in the specified Connecticut industries.
[4] Represents the response as supplying industries increase output in order to accommodate the initial change in final demand.
[5] Generated by the spending of households who benefit from the additional wages and business income they earn through direct and indirect activity.

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CONNECTICUT GREEN BANK

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CONNECTICUT GREEN BANK

Memo

To: Nandika Prakash

From: Bryan Garcia

CC: Commissioner Catherine Smith, Chairwoman; Eric Shrago, Director of Operations; Lucy Charpentier, Manager of Evaluation, Measurement, and Verification

Date: September 13, 2016

Re: Request for Review and Approval – Clean Energy Jobs in Connecticut Study and Calculator and Evaluation Framework for Societal Perspective for Economic Development Draft Fact Sheet

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As you are aware, the Connecticut Green Bank ("Green Bank"), in conjunction with the Department of Economic and Community Development ("DECD"), engaged Navigant Consulting to conduct a study with regard to the economic impact (i.e., estimate of direct, indirect and induced job-years created) from the investment in clean energy deployment in Connecticut. We appreciate your guidance and assistance throughout that process.

Through its evaluation efforts in general, and specially its "Evaluation Framework: Assessing, Monitoring, and Reporting of Program Impacts and Processes," the Green Bank has assembled the following materials for your review and approval:

- Clean Energy Jobs in Connecticut – Final Report by Navigant Consulting (August 10, 2016);
- Clean Energy Jobs in Connecticut – Final Calculator by Navigant Consulting (August 10, 2016); and
- Evaluation Framework: Societal Perspective (Economic Development) – Draft Fact Sheet by the Green Bank

If you could review the attached materials and provide an official DECD approval response of these materials by Friday, October 7, 2016, we would appreciate it. We have provided a link to a similar response from Michael Lettieri from the DECD of December 16, 2013 as an example.

We will then provide all of these jointly produced materials to the Board of Directors of the Green Bank for their review and approval at the October 21, 2016 meeting.

Thank you Nandika for your continuous support.

Department of Economic and Community Development

Connecticut
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MEMO

To: Bryan Garcia, President and CEO, Connecticut Green Bank

Cc: Bart Kollen, Deputy Commissioner, DECD

From: Nandika Prakash, Ph.D., Senior Economist, DECD

Re: Request by the Connecticut Green Bank on September 13, 2016 for Review and Approval of the 2016 Clean Energy Jobs in Connecticut Study, Calculator, and Societal Perspective/Evaluation Framework Draft Fact Sheet

Date: October 14, 2016

Background

The Connecticut Green Bank ("Green Bank"), in conjunction with the Department of Economic and Community Development ("DECD"), engaged Navigant Consulting to conduct a study with regard to the economic impact (i.e., estimate of direct, indirect and induced job-years created) from the investment in clean energy deployment in Connecticut. The Green Bank assembled the following materials for DECD's review and approval:

- Memo (September 13, 2016);
- Clean Energy Jobs in Connecticut – Final Report by Navigant Consulting (August 10, 2016);
- Clean Energy Jobs in Connecticut – Final Calculator by Navigant Consulting (August 10, 2016); and
- Evaluation Framework: Societal Perspective (Economic Development) – Draft Fact Sheet by the Green Bank.

Review

The Connecticut Green Bank wants to estimate the extent to which investments in clean energy create value from a societal perspective as it relates to the economic development of the state. For Green Bank programs this will be measured as the relationship between investments and associated direct, indirect and induced jobs created. In coordination with DECD, the Green Bank contracted Navigant Consulting to refresh the investment-jobs portion of its Connecticut Renewable Energy and Energy Efficiency Economy Baseline Study (2009, 2010) by providing an updated calculator tool to estimate the economic development benefits from clean energy investments in Connecticut, as reflected in job-years created. The updated study focused on jobs associated with the investment area of the Connecticut Green Bank: renewable energy (RE) and energy efficiency (EE) project development and deployment, and product development and manufacturing. The final value output in the jobs calculator is job-years created per $1 million invested in clean

energy projects in Connecticut. DECD provided the indirect and induced jobs multiplier, obtained from simulations run using DECD's Connecticut REMI model, to use in the updated calculator.

Findings

DECD reviewed The Green Bank's Final Report, Final Calculator and the Fact Sheet. Our view is that the study is focused and illustrative and the estimates provided by the calculator are reasonable. DECD approves the report, the jobs calculator and the summary fact sheet.

EVALUATION FRAMEWORK ECONOMIC DEVELOPMENT REVENUE GENERATION

CONNECTICUT GREEN BANK

Revenue Generation Impact Overview

Economic Development is a positive externality of the Green Bank's programs and activities. Directly, the capital deployed is used to buy the hardware for projects and pay for the labor needed to implement them. Indirectly, this economic activity creates jobs as those in the supply chain increase their operations in response to the implementation of projects. In 2009, the Connecticut Clean Energy Fund (CCEF), the predecessor to the Green Bank, in partnership with the Department of Economic and Community Development (DECD) and the Connecticut Energy Efficiency Fund (CEEF),[1] engaged Navigant Consulting to complete a study to quantify the job years and their wages created as a result of the support from the CCEF and CEEF activities. This study was refreshed in 2016 by the Connecticut Green Bank (Green Bank) in coordination with DECD and with assistance from Eversource Energy and United Illuminating.

The resulting job factors are unique to the combination of project type (technology used) and the Green Bank Program leveraged for the project. The job factors estimate the number of direct, indirect, and induced job-years created per $1 million of gross project costs deployed[2] in a given combination of project type and program. More on this can be found here:

- Jobs Fact Sheet
- Job Study

Methodology

The Green Bank has long recognized the economic benefits of its investments. Since inception, the Green Bank has stimulated the creation of more than 16,000 jobs-years. This economic activity also results in revenue for the state in the form of individual income, corporate, and sales taxes.

Working with Navigant in 2018, the Green Bank developed a methodology to estimate this revenue. This methodology, which was has been reviewed with the Department of Revenue Services, and is explained on the pages that follow.

1 CT Renewable Energy / Energy Efficiency Economy Baseline Study (March 27, 2009)

2 Note that the Green Bank differentiates between Capital Deployed, Gross Project Cost, and Total Investment. The Capital Deployed and Total Investment metrics include financing costs but might exclude the portion of project costs borne by the building owners. For calculating job-years and taxes, the Green Bank uses Gross Actual project cost as that metric best reflects the cashflows going to lenders and installers.

Methodology

Individual Income Taxes

Personal Income Tax Generated = [Number of job-years created]* x [weighted average wage]** x [income tax rate]***

* Source: 2009 and 2016 Jobs Studies	** Source: 2009 and 2016 Jobs Studies, and NREL JEDI Model	*** Source: Department of Revenue Services Tax Calculator

The Green Bank uses the methodology developed by Navigant to estimate individual income taxes. This method relies on the factors for job creation and estimated wages[3] produced by both the 2009 and 2016 Job studies.[4] Then the appropriate effective tax rate is applied based on the tax calculator that can be found on the Department of Revenue Services' website.[5]

To operationalize this, the Green Bank has created individual income tax factors that too are a result of the combination of project type (technology used) and the Green Bank Program leveraged for the project, and estimate the taxes paid per $1 million invested.

By applying this methodology[6], for example, to the $1.2 billion of costs of projects sparked by the Green Bank since its inception, the Green Bank estimates its activities have generated $30.1 million in individual income tax revenues for the General Fund.

Corporate Income Taxes

Corporate Income Tax Generated = [Sum of taxable income]* x [corporate income tax rate]**

* Source: 2018 Tax Calculator models of corporate profitability	** Source: CT Department of Revenue Services

The Green Bank uses the Navigant-developed method for estimating corporate income taxes. The method reviews all parties (installer, lender, investor, etc.) involved in a project, estimates their taxable income from their involvement with the project over its lifetime, and then applies the appropriate standard corporate tax rate. The estimations used for profitability come from an in-depth analysis prepared by Navigant based on a review of publicly traded companies and qualified CT Green Bank contractors (installers).

To operationalize this, the Green Bank has created corporate income tax factors that too are a result of the combination of project type (technology used) and the Green Bank Program leveraged for the project and estimate the taxes paid per $1 million invested.

By applying this methodology[7], for example, to the $1.2 billion of costs of projects sparked by the Green Bank since its inception, the Green Bank estimates its activities have generated $13.9 million in corporate income tax revenues for the General Fund.

3 Only the 2016 study included wages for indirect and induced job-years. Navigant identified a wage based off of NREL models for 2009 that is consistent with what was done for the 2016 study.

4 The Green Bank applies the wages and factors from the 2009 study to all projects closed prior to July 1, 2017. The Factors resulting from the 2016 study are applied to all projects closed after June 30, 2017.

5 For the purposes of this, it is assumed that all job-years created are located in Connecticut and everyone is filing taxes as a single filer.

6 This methodology has been presented to the CT Department of Revenue Services in January 2018. We expect to further review it with them in March 2018 and for it to be approved by the Green Bank Board of Directors subsequently.

7 This methodology has been presented to the CT Department of Revenue Services in January 2018. We expect to further review it with them in March 2018 and for it to be approved by the Green Bank Board of Directors subsequently

Sales Tax

The Green Bank's programs also generate revenue for the state through sales and use tax. While solar thermal, solar photovoltaic, and geothermal generation equipment and activities (home installation work) are exempt from sales tax, the rest of the activities to sell and install the Green Bank's projects contribute to the general fund.

Sales Tax Generated = [Gross Project Cost]* x [% of Project that is a taxable Service or Hardware]** x [6.35%]***

* Source: CT Green Bank Data Warehouse	** Source: 2018 Navigant Tax Calculator	*** Source: CT Department of Revenue Services

As part of their 2018 analysis, Navigant identified what portion of a project's costs are from labor and what are from hardware. They also broke down the labor portion into what is engineering or design work and what is pure installation work as this distinction impacts whether or not the contracted labor is taxable. Applying the state's 6.35% sales tax rate to the taxable projects (i.e. excluding solar PV, solar thermal, and geothermal projects which are exempt from sales taxes) or portions of projects, the Green Bank estimates that projects stimulated by its programs have generated $13.6 million in sales taxes for the state since inception.[8]

Overall

Across all of its projects, for FY 2012 through FY 2017, the Green Bank's activities have generated an estimated $57.6 million for the state.

Table 1.

Sum of ActualGrossCost	FYClosed						
Market	2012	2013	2014	2015	2016	2017	Grand Total
Capital Deployed	$38,822,491	$118,871,396	$105,012,856	$317,404,490	$301,155,574	$194,278,615	$1,075,545,420
Capital Deployed - Labor	$17,287,081	$46,004,645	$37,643,116	$115,720,947	$107,259,752	$72,831,750	$396,747,291
Capital Deployed - Hardware	$21,535,410	$72,866,751	$67,369,740	$201,683,542	$193,895,822	$121,446,864	$678,798,129
Direct Jobs Created	259	636	635	1,859	1,880	806	6,075
Indirect and Induced Jobs Created	416	1,021	1,020	2,890	3,013	413	8,773
Total Jobs Created	675	1,656	1,656	4,749	4,892	1,219	14,848
Individual Income Taxes Generated	$1,293,428	$3,186,490	$3,012,139	$9,378,468	$8,891,072	$4,308,682	$30,070,278
Corporate Taxes Generated	$729,841	$1,146,201	$1,654,528	$4,359,442	$3,579,538	$2,479,796	$13,949,345
Sales Taxes Generated	$182,457	$4,165,296	$856,421	$4,016,435	$2,291,750	$2,079,636	$13,591,996
Total Taxes Generated	$2,205,725	$8,497,987	$5,523,088	$17,754,345	$14,762,360	$8,868,114	$57,611,618

8 Methodology was reviewed by the CT Department of Revenue Services in March 2018 and approved by the Green Bank Board of Directors subsequently..

continued >

About the Connecticut Green Bank

The Connecticut Green Bank was established by the Connecticut General Assembly on July 1, 2011 as a part of Public Act 11-80. As the nation's first full-scale green bank, it is leading the clean energy finance movement by leveraging public and private funds to scale-up renewable energy deployment and energy efficiency projects across Connecticut. The Green Bank's success in accelerating private investment in clean energy is helping Connecticut create jobs, increase economic prosperity, promote energy security and address climate change. In 2017, the Connecticut Green Bank received the Innovations in American Government Award from the Harvard Kennedy School Ash Center for Democratic Governance and innovation for their "Sparking the Green Bank Movement" entry. For more information about the Connecticut Green Bank, please visit www.ctgreenbank.com.

About the Department of Revenue Services

The Connecticut Department of Revenue Services is responsible for instilling public trust in the collection of and increasing the voluntary compliance with taxes in the state. To learn more about DRS, please visit http://www.ct.gov/drs/site/default.asp.

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CONNECTICUT GREEN BANK

Memo

To: Susan Sherman, Legislative Program Manager. Department of Revenue Services

From: Lucy Charpentier, Manager of Evaluation, Measurement and Verification; Eric Shrago, Director of Operations

Date: March 8, 2018

Re: Connecticut Green Bank/Navigant Consulting Development and use of a Tax Revenue Calculator for Income, Sales and Use Taxes

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BACKGROUND

Founded in 2011, the Connecticut Green Bank is a quasi-public institution that has leveraged its own capital and financing partners to close over 26,000 projects and deploy over $1 Billion dollars into the Connecticut economy in support of cleaner, more efficient energy projects for homes, businesses, and institutions across the state. The benefits from these projects are not just energy related. They have led to the creation of over 14,000 jobs and improved the air quality in state by reducing greenhouse gasses by over 9 million tons that have saved millions of dollars on public health expenditures.

The economic activity sparked by the Green Bank's activities also generates tax revenue for the general fund through personal income taxes paid by those employed in jobs created by these projects, corporate taxes paid on profits earned from these projects and through sales and use taxes generated when these projects are sold. The Green Bank is proposing a methodology for quantifying this tax revenue generation.

ECONOMIC DEVELOPMENT

Economic Development is a positive externality of the Green Bank's programs and activities. Directly, the capital deployed is used to buy the hardware for projects and pay for the labor needed to implement them. Indirectly, this economic activity creates jobs as those in the supply chain increase their operations in response to the implementation of projects. In 2009, the Connecticut Clean Energy Fund (CCEF), the predecessor to the Green Bank, in partnership with the Department of Economic and Community Development (DECD) and the Connecticut Energy Efficiency Fund (CEEF),[1] engaged Navigant Consulting to complete a study to quantify the job years and their wages created because of the support from the CCEF and CEEF activities. This study was refreshed in 2016 by the Connecticut Green

[1] CT Renewable Energy / Energy Efficiency Economy Baseline Study (March 27, 2009)

Bank (Green Bank) in coordination with DECD and with assistance from Eversource Energy and United Illuminating.

The resulting job factors are unique to the combination of project type (technology used) and the Green Bank Program leveraged for the project. The job factors estimate the number of direct and indirect and induced job-years created per $1 million of gross project costs deployed[2] in a given combination of project type and program. More on this can be found here:

- Jobs Fact Sheet
- Job Study

Since inception, the Green Bank has stimulated the creation of more than 16,000 jobs-years[3].

This economic activity also results in revenue for the state in the form of individual income, corporate, and sales taxes. The Green Bank engaged Navigant in 2017 to develop a methodology for estimating this revenue. At present, the Green Bank is reviewing the methodology with the Department of Revenue Services.

INCOME TAX ESTIMATION METHODOLOGY

Building on the Green Bank's Jobs Calculator, the Income Tax Calculator uses the technology specific number of jobs and estimated wages[4] produced by both the 2009 and 2016 Job studies[5]. Then the appropriate effective tax rate is applied based on the tax calculator that can be found on the Department of Revenue Services' website[6] to determine the taxes generated created per $1 million in project costs.

For Corporate Income Taxes, the Green Bank uses the Navigant-developed. This method reviews all parties (installer, lender, investor, etc.) involved in a project, estimates their taxable income from their involvement with the project over its lifetime, and then applies the appropriate standard corporate tax rate. The estimations used for profitability come from an

[2] Note that the Green Bank differentiates between Capital Deployed, Gross Project Cost, and Total Investment. The Capital Deployed and Total Investment metrics include financing costs but might exclude the portion of project costs borne by the building owners. For calculating job-years and taxes, the Green Bank uses Gross Actual project cost as that metric best reflects the cashflows going to lenders and installers.

[3] This number includes job-years created by the Green Bank's requirement of the Energy Efficiency Board's Home Energy Solutions audit for all RSIP program participants which has not previously be included.

[4] Only the 2016 study included wages for indirect and induced job-years. Navigant identified a wage based off of NREL models for 2009 that is consistent with what was done for the 2016 study.

[5] The Green Bank applies the wages and factors from the 2009 study to all projects closed prior to July 1, 2017. The Factors resulting from the 2016 study are applied to all projects closed after June 30, 2017.

[6] For the purposes of this, it is assumed that all job-years created are located in Connecticut and everyone is filing taxes as a single filer.

in-depth analysis prepared by Navigant based on a review of publicly traded companies and qualified CT Green Bank contractors (installers).

SALES AND USE TAX ESTIMATION METHODOLOGY

The Green Bankand Navigant reviewed each technology type to determine the taxable labor and non-labor portions of projects to determine and applied the state sales tax rate of 6.25% to determine the sales and use taxes generated per $1 million of project costs. Both the Green Bank and Navigant have reviewed relevant statutes to determine and apply existing tax exemptions.

RECOMMENDATION

The Green Bank proposes to use above mentioned methodologies as its official tool for measuring Tax Revenues generated and will automate its use where and when possible in our Data Warehouse.

Enc: Tax Calculator

INTEROFFICE MEMORANDUM

TO: BRYAN GARCIA, PRESIDENT AND CEO, CONNECTICUT GREEN BANK

FROM: SCOTT JACKSON, COMMISSIONER, DEPARTMENT OF REVENUE SERVICES

SUBJECT: TAX REVENUE CALCULATOR

DATE: 8/3/2018

CC: SUSAN SHERMAN

Thank you for offering the Department of Revenue Services the opportunity to review and comment upon the Tax Revenue Calculator developed by Navigant Consulting as the official method to assess tax revenue for the State of Connecticut by investments and co-investments mobilized by the Green Bank.

My team and I have carefully reviewed the documents you provided, including your memo of January 24, 2018 and the Tax Revenue Calculator Final Report issued March 28, 2018. It is the analysis of this Agency that the methodology employed by Navigant Consulting represents a fair and reasonable approach to capturing the financial benefits of Green Bank investments derived by the State. The analysis of DRS is confined to the arena of tax revenue; additional accrued community and societal benefits have not been incorporated into our analysis.

The Tax Revenue Calculator accurately reflects contemporary tax types, rates, and exemptions although it is my recommendation that, as long as the calculator is employed, the Green Bank confirm such tax types, rates, and exemptions at the conclusion of any legislative session. Additionally, you may wish to validate with the Connecticut Department of Labor's Office of Research on an annual basis the "Average Direct Wage" identified for the various projects and installations.

In summary, DRS believes that the material provided is focused and illustrative and the estimates provided by the Tax Revenue Calculator are reasonable.

EVALUATION FRAMEWORK
ENERGY BURDEN REDUCTION FOR SOLAR CUSTOMERS

Savings in Dollars from Commercial & Residential Solar Installations

CONNECTICUT GREEN BANK

Overview

The Connecticut Green Bank measures its positive societal impacts across a number of categories, including economic development, environmental impact, and public health. Another area of impact the Green Bank seeks to track is the financial savings achieved by residents and businesses that install solar photovoltiac (PV) systems at their homes or commercial properties. While these systems are helping to create jobs and tax revenues, and decreasing greenhouse gas emissions, there is also often a direct financial benefit in the form of a reduced energy burden to the participating family or business. To those considering going solar, the financial savings can be a key motivator.

Solar Deployment Structures

The Green Bank has used both property-owner (loans) and third-party ownership structures (leases and power purchase agreements) to deploy distributed solar generation in Connecticut in the residential and commercial sectors. Regardless of the structure, these products have a common aim of providing the building owner with clean energy at a price (inclusive of financing) that is less than what they would have paid for electricity from the utilities.

A drone photo of the solar PV system at the SoNo Ice House, a state-of-the-art facility featuring two ice skating rinks, in South Norwalk.

Report Usage

The Connecticut Green Bank proposes to use the Energy Burden Reduction Methodology shown in formula 1 to calculate estimated Savings in Dollars for their residential and commercial solar PV customers. The difference between the cost of electricity for a customer using a Green Bank supported solar PV system and a customer not using such a system is equal to the dollars a customer has saved (i.e., energy burden reduction). Our goal is to make this Energy Burden Reduction for Solar Customers report into the official methodology for calculating actual savings in our Solar Lease and Solar Loan portfolios.

Methodology

This report calculates the Energy Burden Reduction for residential and commercial customers participating in Green Bank Programs in Dollars. Generally, Savings in Dollars is calculated by subtracting the Hypothetical Avoided Utility Expense by Solar Lease or Loan Expense, shown below in Formula 1. The Solar Expense is calculated differently for customers depending on the program in which they participate. For Residential customers, savings is only positive if the hypothetical avoided utility cost of the solar PV generation is greater than the customer's Solar Lease or Loan Payment, shown in Formula 2. For commercial customers, savings is strictly the difference between the utility rate and a customer's contractual PPA rate all multiplied by the Solar PV Generation, shown in Formula 3.

(Formula 1) Savings = Hypothetical Avoided Utility Expense – Solar Expense

*(Formula 2) Posigen/SL1/SL2 Savings = (Utility Rate*Solar PV Generation)-Solar Expense*

*(Formula 3) Commercial Savings = (Utility Rate-PPA Rate)*Solar PV Generation*

(Formula 4) Utility Rate = (Generation Charge + Policy and Other Delivery Charges + Transmission Charge + Distribution Charge + Demand Charge + Combined Public Benefits Charges)

Hypothetical Avoided Utility Expense: Hypothetical avoided utility expense calculations are the same for UI and Eversource customers, shown in Formula 4. However, various charges differ by rate class and date.

We only consider kWh charges for solar PV because residential electric rates don't have demand charges.

The utility rates used are standard offer rates. The actual rates were recorded off Public Utility Regulatory Authority's (PURA) docket website since January 1, 2011 for UI's GS, GST, LPT and residential R rate classes, and Eversource's rate classes 1, 5, 30, 35, 37, 40, 55, 56 and 57. Hypothetical Avoided Utility Expense is the Solar PV generation times the kWh Utility Rate for each month, for their respective rate class.

Solar Expense

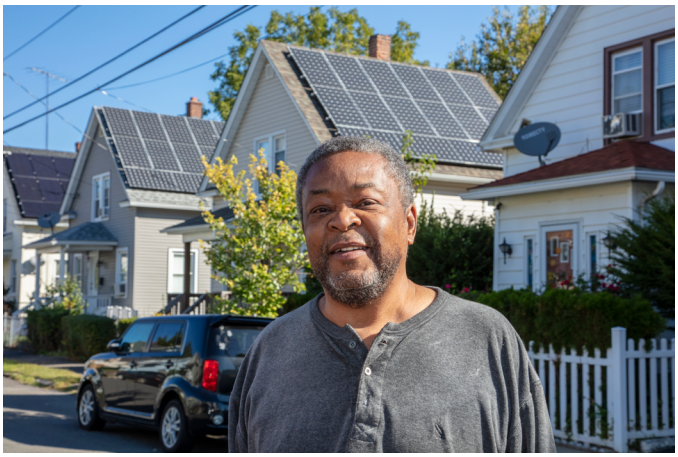
PosiGen/Solar Lease 2/Solar Loan 1

Escalating Lease Price: Residential customers with escalating lease prices have a predetermined lease price/kWh that increases at a compounding escalator rate every year on the anniversary of the energize date. The report calculates the number of anniversaries since the energize date (in the Factor column) then calculates the Adjusted Lease price shown in Formula 5.

(Formula 5) Adjusted Lease Price=Lease Price($1+Escalator/100)^Factor*

Fixed Lease Price: Residential customers with fixed lease prices will be charged the same amount each month, depending on their respective predetermined lease price, shown in Formula 6.

Repayment is complete: Solar Lease Expenses are structured to be fully repaid before the end of the system's life cycle. If the Solar Lease Expense is fully repaid, naturally there will be no Solar Lease Expense. Savings will be equal to the equation in Formula 7.



"Everyone said it was crazy to go solar, now they all want it. People don't realize there are savings. Our bill during the winter was $460 and now it is $15." — Melvin, who went solar in June 2015 and convinced three neighbors to also go solar with PosiGen

Escalating PPA Rate: Customers with an escalating PPA rate see their PPA rates increase by a compounding escalator rate every year on the anniversary of the commercial operation date. The report calculates the number of anniversaries since the commercial operation date (in the Factor column) then calculates the Adjusted PPA price shown in Formula 8. Solar Expense is then calculated by multiplying the adjusted PPA price/kWh by the Solar PV kWh generation shown in Formula 9.

(Formula 6) Solar Expense = Fixed Lease Price

*(Formula 7) Savings = (Utility Rate*Solar PV Generation)*

(Formula 8) Adjusted PPA Price = Original PPA Rate(1+Escalator/100)^Factor*

*(Formula 9) Solar Expense = Locus kWh Generation*adjusted PPA Rate $/kWh*

Locus Energy: Our Solar PhotoVoltaic systems continuously upload production data to Locus Energy's web platform on a fifteen minute basis.

*(Formula 10) Solar Expense=Locus kWh Generation*Original PPA Price $/kWh*

Fixed PPA Rate: Customers with fixed PPA rates pay the original PPA rate throughout the term of their agreement. Their Solar Expense is shown in Formula 10.

continued >

Controls: The Green Bank has sought feedback from PURA and DEEP. The Green Bank has implemented the following as controls around this and other associated processes:

a. Estimate to Actual Production – Regular review of the estimated production (PowerClerk) vs. the actual production;
b. Staff Performance Review –regular review of fleet performance by senior staff responsible for the programs; and
c. Annual Audit Requirement – independent third party auditor to undertake the following as part of the regular review of Green Bank Impact:

* Review methodology for reasonableness
* Assess process for data collection, analysis, and reporting.

With a roof covered with solar panels, the Glenbrook Industrial Park in Stamford is home to a number of artisans, makers and light manufacturers.

Other Considerations

Net Metering Income: The Green Bank has a practice of building our solar PV systems up to 85% of commercial customer's demand. Due to our sizing practice, our solar PV systems were built in such a way where Solar PV generation is not expected to exceed yearly customer kWh demand.

Off peak usage only in Time-of-Day Utility Estimate Calculation: Utility providers differentiate their prices depending on what time-of-day the energy is consumed. Research shows that peak hour prices are always more expensive than, or equal to, off peak hour prices. Therefore, in an effort to be conservative in the estimate of savings, only use off peak charges in the Hypothetical Avoided Utility Expense calculation. In the future, consideration will be given to adjusting the Hypothetical Avoided Utility Expense calculation to include peak prices.

The only rates that differentiate prices between peak and off peak usage are Eversource's rates 37, 41, 55, 56, 57 and UI's GST and LPT rate; there is no time-of-day calculation for Eversource rate 1, 5, 30, 35, 40 and UI's R and GS rate.

Automation: This report is almost entirely automated. The Green Bank uses PowerBI for its data analysis. We obtain and record PURA rates quarterly.

Additional Improvements: Incorporate a Peak vs Off-peak kWh model to estimate peak charges for our sites with Time-of-Day rates.

Additional Notes:

1. Commercial customers have the option to purchase supplied energy from third party providers, not just Eversource and UI. However, we are not considering third party utility providers. It is important to note that third-party providers are almost always cheaper for C&I customers than Last Resort.

2. We assume the customer billing month starts on the first day and ends on the last day each month. We assume standard offer rates.

About the Connecticut Green Bank

The Connecticut Green Bank was established by the Connecticut General Assembly in 2011 as a part of Public Act 11-80. As the nation's first full-scale green bank, its mission is to confront climate change and provide all of society a healthier, more prosperous future by increasing and accelerating the flow of private capital into markets that energize the green economy.

This is accomplished by leveraging limited public resources to scale-up and mobilize private capital investment into Connecticut. For more information, visit www.ctgreenbank.com.

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