



Informational Stakeholder Webinar

Quarterly Progress

May 22, 2018



Agenda



- **Update** – Sweeps and Restructuring
- **Sector Updates** – Progress to Targets for FY 2018
 - ❑ Infrastructure
 - ❑ Residential
 - ❑ Commercial, Industrial, and Institutional Sector
- **Evaluation Framework** – Societal Impacts and Financial Markets
 - ❑ Economic Development – Jobs and Tax Revenues
 - ❑ Environmental Protection – Air Emissions and Public Health
 - ❑ “Green” and “Social” Bonds – Impact Investing
- **Other News**
 - ❑ 2018 Legislative Session – Climate Change and Clean Energy

Update

Sweeps and Restructuring

Connecticut State Budget

Halloween Sweeps (October 31, 2017)



■ Biennial Budget

Bipartisan support from the CGA and signed into law on October 31, 2017 a \$41.3 billion biennial budget addressing reductions of **\$3.5+ billion** in deficits.

■ Energy Sweeps

\$32.6 million in sweeps to CT Green Bank, including:

- **\$14.0 million (of \$27 million or 52%)** a year for two years from the **Clean Energy Fund** administered by the **Connecticut Green Bank**
- \$10 million a year for two years from the **Regional Greenhouse Gas Initiative** administered by the **Department of Energy and Environmental Protection** – Connecticut Green Bank receives 23% of proceeds (i.e., **transfer \$2.3 million a year or \$4.6 million to the General Fund over two years**), EDCs receive 70% of proceeds, and DEEP receives 7% of proceeds.

\$117.0 million in sweeps to the Conservation and Load Management Fund, administered by Eversource Energy and Avangrid – **\$63.5 million in FY 2018 and \$53.5 million in FY 2019**

Sustainability Plan



Holiday Restructuring (December 15, 2017)

■ Incentive Business

Administer an incentive program to **deploy 300 MW of new residential solar PV** by the end of 2022 while achieving **sustained orderly development of local solar industry**. **Costs are recovered** through the sale of **SHRECs sold to EDCs for RPS compliance through MPA at price set by Green Bank**.

■ Investment Business

Manage a business that **provides capital** for projects, products, and programs that **finance clean energy**. Focus is to now **generate a rate of return** (e.g., cash flow from 5% return over 10-years) by investing remaining ratepayer resources to **generate revenues that will cover operating expenses** to achieve a **breakeven in 4 to 7 years**.

■ Nonprofit

Working with various partners (i.e., foundations and CRA-interested banks) to **create a 501(c)3 non-profit** to house staff that would **manage a line of products for underserved market segments** (e.g., LMI households and underserved credits) to maintain impact and continue “inclusive prosperity” mission. Recently received an **Advisory Opinion from the Office of State Ethics** offering guidance on staff transition.

Connecticut Green Bank Structure



Connecticut Green Bank

Incentives

- RSIP
- SHREC
- Securitization

Investment

- C-PACE
- LBE-RE
- Project Finance
- LMI (existing PosiGen)
- Solar Lease Funds (existing)

Nonprofit

- Smart-E
- LMI Solar (future PosiGen et al)
- Multifamily
- Commercial Solar Funds (future)



Cost Recovered



Self sustaining



Operating Leverage

Sector Updates – Progress to Targets for FY 2018

Infrastructure

Progress to Targets for FY 2018

Infrastructure Program Sector



Key Metrics	Program Performance Targets	Program Progress (through Q3)	% of Goal Achieved
Capital Deployed	\$136,300,000	\$121,299,122	89%
Investment at Risk		\$9,780,073	
Private Capital		\$111,519,049	
Deployed (MW)	37.0	34.9	94%
# of Loans/Projects	4,431	4,273	96%
Leverage Ratio		12.4	

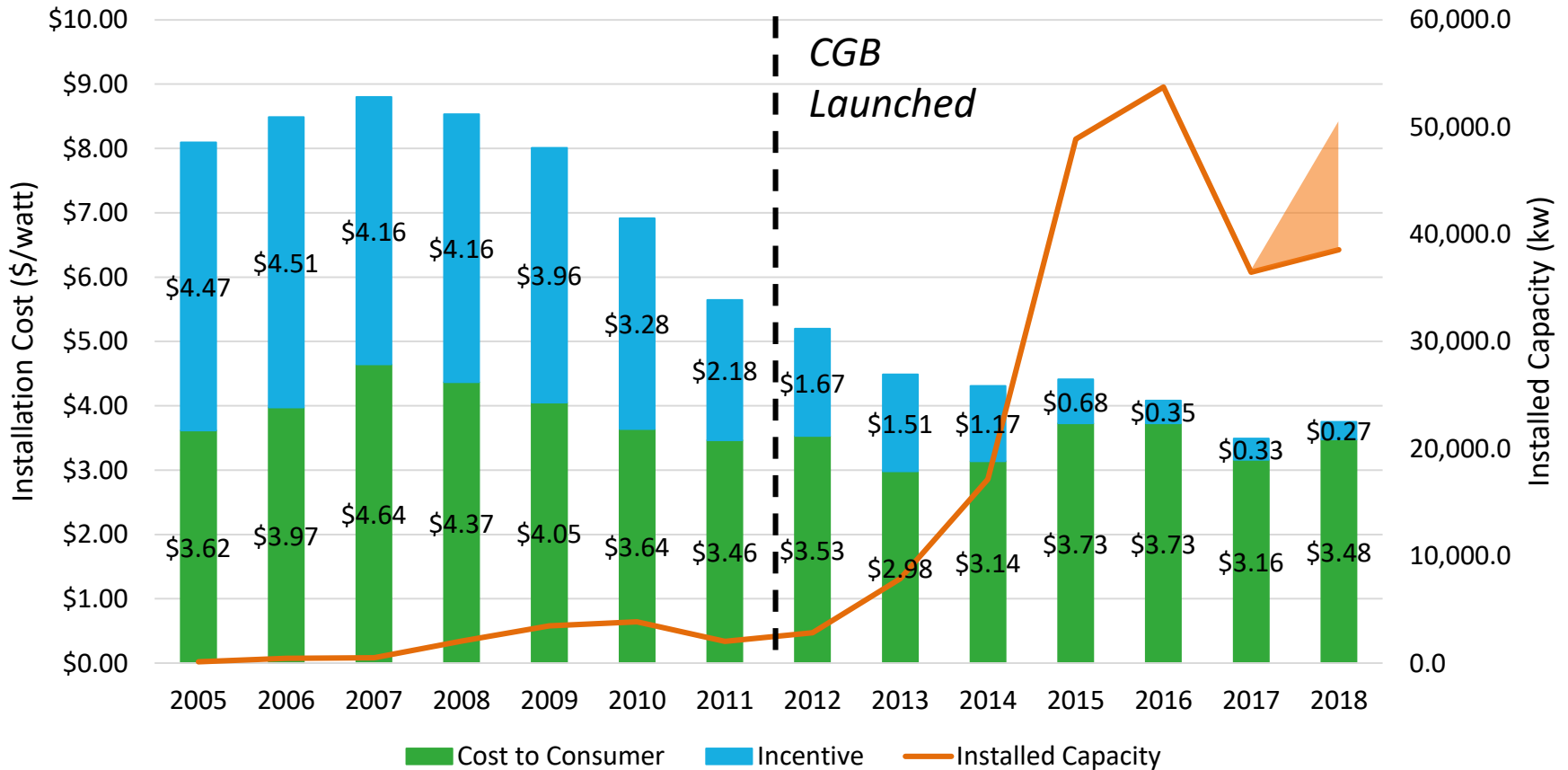
Take-Away Message – as a result of sweeps we no longer provide credit enhancements for AD and CHP, at 210 MW of 300 MW policy target for RSIP, preparing for [securitization of SHRECs](#) through “green” and potential “social” bond, significant progress on LMI market segment (CT is a parity state), and focused on transitioning market to post-RSIP structure

REFERENCES

As a result of the CGA sweeps of \$16.3 million from the CT Green Bank in FY 2018, a 1.6 MW food-waste to energy anaerobic digester (AD) project scheduled for investment in FY 2018 was cancelled. In total, 8.2 MW of AD and CHP projects were cancelled for future investment by the CTGB as a result of the sweeps requiring nearly \$70 million in investment (of which \$12.8 million was to be from the CTGB) and losing over 1,100 direct, indirect, and induced job-years.

Residential Solar PV in CT

Deployment ↑ and Subsidies ↓



REFERENCES

Residential Solar Investment Program (RSIP) Market Watch Report of April 27, 2018 by fiscal year (July 1 through June 30)



SPARKED BY CONNECTICUT GREEN BANK

Sector Updates – Progress to Targets for FY 2018

Residential

Progress to Targets for FY 2018

Residential Program Sector



Key Metrics	Program Performance Targets	Program Progress (through Q3)	% of Goal Achieved
Capital Deployed	\$47,567,394	\$46,458,125	98%
Investment at Risk		\$8,695,202	
Private Capital		\$40,884,928	
Deployed (MW)	6.2	6.1	99%
# of Loans/Projects	1,926	1,929	100%
Leverage Ratio		5.7	

Take-Away Message – won CESA SLICE award for “Solar for All”, Smart-E Loan IRB (using ARRA-SEP) catalyst to increased contractor usage and new contractor partnerships with local lenders, steady progress on multifamily and affordable housing, and focused on transitioning programs and products to the nonprofit to ensure delivery of “inclusive prosperity” in the growing green economy.

REFERENCES

Please note that capital deployed does not include all credit enhancements and uses amount financed rather than cost of the measures. Investment at Risk includes loss reserves and interest rate buydowns as well as capital.

Sector Updates – Progress to Targets for FY 2018

Commercial, Industrial, and Institutional

Progress to Targets for FY 2017

CI&I Program Sector



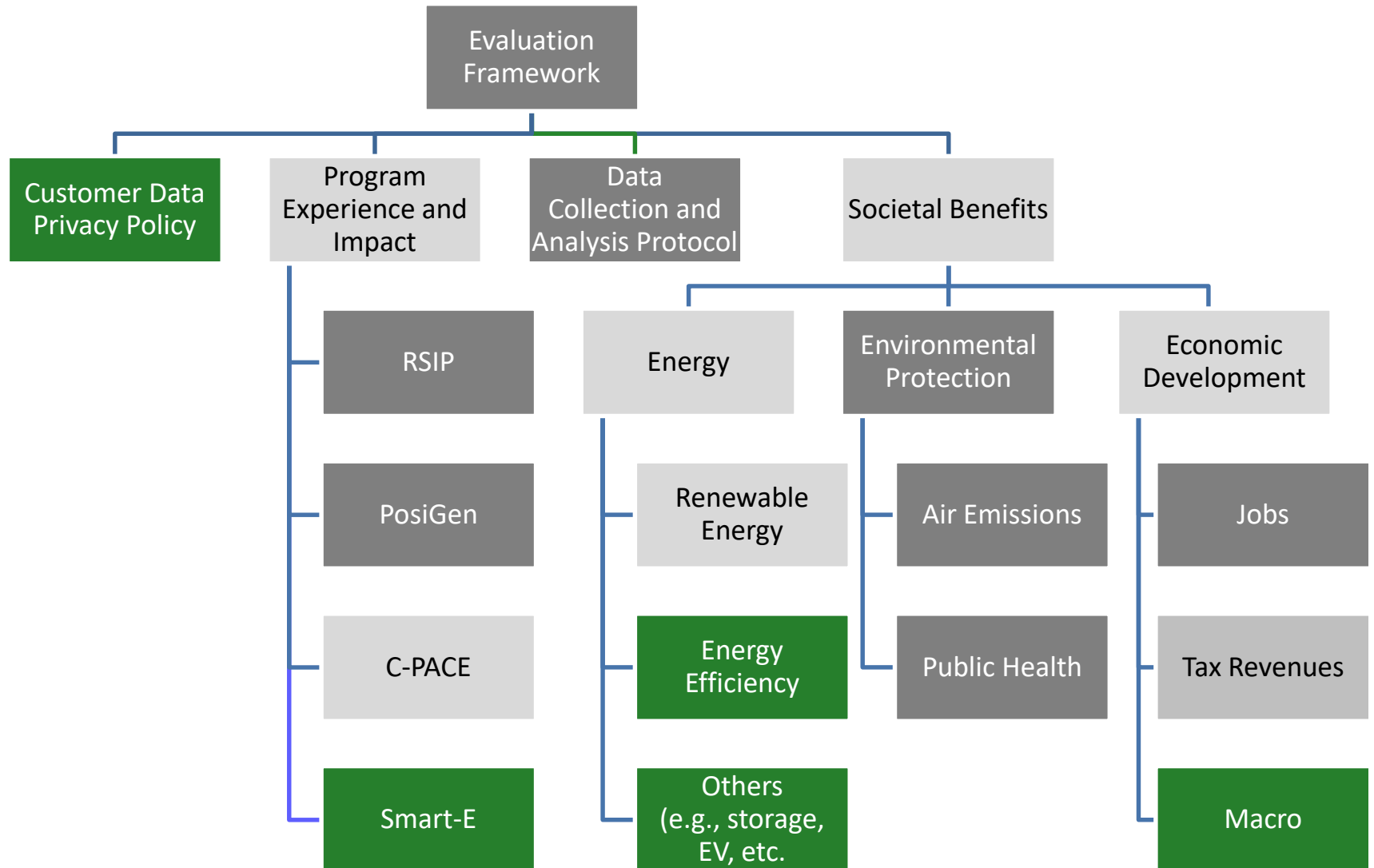
Key Metrics	Program Performance Targets	Program Progress (through Q3)	% of Goal Achieved
Capital Deployed	\$34,000,000	\$23,851,316	70%
Investment at Risk		\$3,836,881	
Private Capital		\$20,014,435	
Deployed (MW)	10.4	6.7	64%
# of Loans/Projects	67	56	84%
Leverage Ratio		6.2	

Take-Away Message – on target to have one of the best C-PACE years yet in terms of projects financed, successful Energy On the Line partnership with DECD through the Manufacturing Innovation Fund, executed one of the last CREBs in support of solar PV deployment at CSCU, and continued partnership with Onyx on commercial solar PPA's.

Evaluation Framework

Societal Impact and Financial Markets

Evaluation Framework Overview



Evaluation Framework

Economic Development – Jobs





EVALUATION FRAMEWORK SOCIETAL PERSPECTIVE



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 state¹. 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 Study², 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	~13 job-years for RTI 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

continued >

Partners – DECD with consulting assistance from Navigant and advice by Eversource and Avangrid

Jobs – takes project investment (i.e., \$1 million) and estimates direct, indirect, and induced job-years by technology (e.g., solar PV, energy efficiency, fuel cell, etc.) and market segment (e.g., residential, commercial, etc.)

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, over 936 direct and 312 indirect and induced job-years were created in the state from installing nearly 60 MW of Residential Solar PV."

Occupation	Capital Invested	Company Overhead and Margin	Project Cost after Overhead and Margin	Labor (% of project cost)	Non-labor Costs (% of project costs)
<i>Solar PV Installation – Residential</i>	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

Evaluation Framework



Economic Development – Tax Revenues (Draft)

Partners – DRS with consulting assistance from Navigant

Tax Revenues – takes project investment (i.e., \$1 million) and estimates tax revenues from labor, corporate, and sales tax based on technology and investment structure

Sum of ActualGrossCost Market	2012	2013	2014	FYClosed 2015	2016	2017	2018	Grand Total
Capital Deployed	\$38,822,491	\$118,871,396	\$105,012,856	\$317,404,490	\$301,155,574	\$194,278,615	\$114,130,276	\$1,189,675,697
Capital Deployed - Labor	\$17,287,081	\$46,004,645	\$37,643,116	\$115,720,947	\$107,259,752	\$72,831,750	\$43,003,719	\$439,751,010
Capital Deployed - Hardware	\$21,535,410	\$72,866,751	\$67,369,740	\$201,683,542	\$193,895,822	\$121,446,864	\$71,126,558	\$749,924,687
Direct Jobs Created	259	636	635	1,859	1,880	806	478	6,553
Indirect and Induced Jobs Created	416	1,021	1,020	2,890	3,013	413	246	9,019
Total Jobs Created	675	1,656	1,656	4,749	4,892	1,219	724	15,572
Individual Income Taxes Generated	\$1,293,428	\$3,186,490	\$3,012,139	\$9,378,468	\$8,891,072	\$4,211,358	\$2,489,545	\$32,462,498
Corporate Taxes Generated	\$672,846	\$1,036,632	\$1,195,229	\$3,743,657	\$2,740,774	\$2,262,085	\$1,275,038	\$12,926,260
Sales Taxes Generated	\$770,735	\$5,563,717	\$3,720,374	\$12,413,975	\$11,162,178	\$6,741,162	\$3,935,544	\$44,307,685
Total Taxes Generated	\$2,737,009	\$9,786,838	\$7,927,741	\$25,536,099	\$22,794,025	\$13,214,605	\$7,700,127	\$89,696,443

Evaluation Framework

Environmental Protection – Air Emissions

EVALUATION FRAMEWORK
SOCIETAL PERFORMANCE



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 (SO₂) and carbon dioxide (CO₂) and particulate matter emitted by the region's fossil fuel electric generation or transportation due to Green Bank projects.

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

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

Table 1: AVERT Factors

Technology	CO ₂ tons / MWh	NO _x lbs / MWh	SO ₂ lbs / MWh
Solar PV	0.5621	0.5754	0.4107
Energy Efficiency	0.5432	0.4803	0.3397
Energy Efficiency/PV	0.5528	0.5285	0.3754
Wind	0.5372	0.4284	0.3333

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

Table 2: AVERT Examples

Capacity:	60 MW			
Technology	Annual expected generation change (MWh)	CO ₂ savings (tons)	NO _x savings (lbs)	SO ₂ savings (lbs)
Solar PV	79,220	44,520	45,580	32,480
Energy Efficiency	63,090	34,260	30,300	21,430
Wind	104,930	56,370	44,920	34,980

Using the type of calculation outlined above, the Green Bank will include Societal Perspective benefits as well as the environmental impact of its programs in its Comprehensive Annual Financial Report, green bonds issuances, and other communications. Further information about AVERT is available at: https://www.epa.gov/sites/production/files/2016-08/documents/avert_decision_makers_fact_sheet_2-13-14_final_508.pdf

Partners – DEEP with guidance from EPA on use of AVERT

Air Emissions – takes renewable energy production and energy efficiency savings to estimate air emissions (e.g., PM, CO₂, etc.) reductions using an energy dispatch and displacement model

Table 2: AVERT Examples

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Evaluation Framework

Environmental Protection – Public Health



EVALUATION FRAMEWORK SOCIETAL PERFORMANCE

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 is measured by the decrease in the amount of nitrogen oxides (NO_x), sulfur dioxide (SO₂), 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 (SO₂), particulate matter (PM_{2.5}), volatile organic compounds (VOC) and ammonia (NH₃). 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.

Partners – DEEP and DPH with guidance from EPA on use of AVERT and COBRA

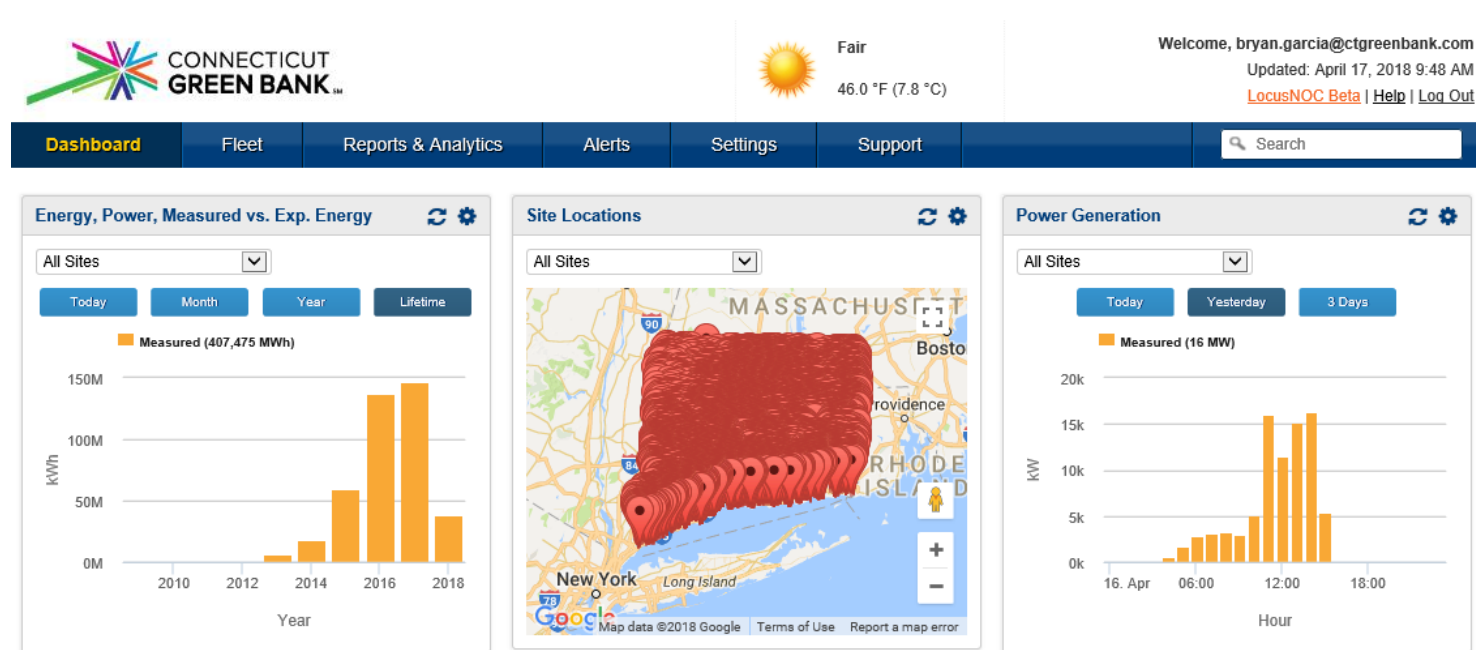
Public Health –takes air emission reductions to estimate public health benefits (e.g., reduced sick days, hospitalizations, deaths, etc.) and values those benefits in dollars

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

Evaluation Framework

Energy – Energy Generation (Draft)



Clean Energy – Use metered actual data wherever possible. The Green Bank has direct access to the meter data for all projects it owns as well as those receiving its solar incentives. The Green Bank is building processes to work with developers to obtain actual generation figures for non-programmatic investments (e.g. Wind, CHP, Fuel Cells, etc.).

SHREC Securitization



“Green” and “Social” Bonds – Impact Investing

■ Climate Bonds

- Certified in using Climate Bonds Principles
- Impact of Air Quality Improvements and Public Health to be quantified by a third-party

■ Social Bonds

- Exploring the certification of the SHREC or another securitization as a Social or Sustainability Bond
- Designation would be based on Jobs, Serving an underserved market (LMI, CRA census tracts, and distressed communities) and on Public Health

Other News

2018 Legislative Session

Climate Change and Clean Energy



- **Senate Bill 7** – “An Act Concerning Climate Change Planning and Resiliency,” included:
 - Midterm GHG emissions reduction target of 45% less than 2001 levels by 2030; and
 - Number of measures to address resiliency planning

- **Senate Bill 9** – “An Act Concerning Connecticut’s Energy Future,” included:
 - Class I RPS expansion to 40% by 2030 with ACP reduction to \$40 (from \$55)
 - Transition net metering to a tariff policy to support increased in-state deployment of behind-the-meter renewable energy – 10 MW fuel cells, 25 MW shared clean energy facilities, 50 MW solar PV CI&I, and no cap for residential solar PV
 - Support for Energy Efficiency – protections through the CAM, fuel neutral treatment of home heating for households, and 1.6 million MMBtu annual target
 - Support for CT Green Bank – clarifying non-impairment provisions to protect private capital investment partners from future sweeps

Net Metering to Tariff

“Big Picture”



■ Commercial and Industrial

- ZREC-LREC facilities grandfathered for 20 years – through 2039 then tariff structures
- Continuation of the ZREC (through Year 8 – 2019), which are eligible for net metering, and then transition to the new tariff structure with the PURA approval of the competitive procurement plan
- 85 MW a year – 50 MW solar PV, 25 MW SCEF, and 10 MW fuel cells

■ Residential

- RSIP facilities grandfathered for 20 years – through 2039 then tariff structures
- Continuation of the RSIP until 300 MW public policy goal achieved – potential for pilot tariff option side-by-side with RSIP incentive for customer decision to help transition market
- No cap – currently deploying 45-50 MW a year

Thank You!

Bryan Garcia

President and CEO

845 Brook Street

Rocky Hill, CT 06067

bryan.garcia@ctgreenbank.com

Eric Shrago

Director of Operations

300 Main Street, 4th Floor

Stamford, CT 06901

eric.shrago@ctgreenbank.com