April 15, 2016

Dear Members of the EEB and Green Bank Board of Directors Joint Committee:

I'm looking forward to our next regularly scheduled meeting on Wednesday, April 20, 2016 from 1:30-3:30 p.m. at the Department of Energy and Environmental Protection in Hartford (Holcombe Room – 5th Floor).

On the agenda we have the following items:

1. **Report Outs** – brief report outs for the government, single family, and multifamily working groups, and in-depth report-outs from the small and medium/large business working groups.

2. **Issues to Address** – we will discuss the role and authority of the Joint Committee.

3. **Other Business** –the Connecticut Green Bank will provide an overview of its Comprehensive Plan process and draft Evaluation Framework.

If any members of the Joint Committee have additional topics they would like to discuss, then they can do it under "Other Business".

Attached to this e-mail you will find the following documents:

- Cover Letter
- Agenda
- Draft Resolutions
- Draft Meeting Minutes of January 20, 2016
- Brief Progress Reports for Government, Small Business, Med-Large Business, Single-Family and Multifamily Working Groups
- Connecticut Green Bank Comprehensive Annual Financial Report for FY 2015
- Connecticut Green Bank Evaluation Framework (Draft)

If you have any questions, comments or concerns, please feel free to contact me at any time.

I look forward to seeing you next week at the Department of Energy and Environmental Protection in Hartford.

Sincerely,

Eric Brown
Chair
Joint Committee

AGENDA

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board of Directors

CT Dept. of Energy and Environmental Protection (Holcombe Room, 5th Floor)
79 Elm Street, Hartford, CT

Wednesday, April 20, 2016
1:30-3:30 p.m.

1. Call to Order
2. Public Comments
3. Review and approval of Meeting Minutes for January 20, 2016 meeting (5 min)
4. Brief Report-Outs from Sector Working Groups (20 min)
    a. Government
    b. Residential – Single Family
    c. Multifamily
5. In-Depth Report Out from Small Business and Med/Large Business Working Groups (45 min)
6. Issues to Address and Resolve (20 min)
    a. Role/Authority of Joint Committee
7. Other Business (25 min)
    a. CT Green Bank Comprehensive Plan
    b. Draft Evaluation Framework – CT Green Bank
8. Planning for Next Meeting (5 min)
9. Adjourn

Join the meeting online at: https://global.gotomeeting.com/join/834446381

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Access Code: 834-446-381

RESOLUTIONS

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board of Directors

CT Dept. of Energy and Environmental Protection (Holcombe Room, 5th Floor) 79 Elm Street, Hartford, CT

Wednesday, April 20, 2016 1:30-3:30 p.m.

1. Call to Order

2. Public Comments

3. Review and approval of Meeting Minutes for January 20, 2016 meeting (5 min)

   Resolution #1

   Motion to approve the meeting minutes for January 20, 2016

4. Brief Report-Outs from Sector Working Groups (20 min)

   a. Government
   b. Residential – Single Family
   c. Multifamily

5. In-Depth Report Out from Small Business and Med/Large Business Working Groups (45 min)

6. Issues to Address and Resolve (20 min)

   a. Role/Authority of Joint Committee

7. Other Business (25 min)

   a. CT Green Bank Comprehensive Plan
   b. Draft Evaluation Framework – CT Green Bank

8. Planning for Next Meeting (5 min)

9. Adjourn

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Joint Committee

Connecticut Energy Efficiency Board and the Connecticut Green Bank Board of Directors

Connecticut Green Bank
April 20, 2016

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Agenda Item #1

Call to Order

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Agenda Item #2

Public Comments

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Agenda Item #3

Approval of Meeting Minutes for January 20, 2016

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Agenda Item #4

Brief Report Outs from Each Sector Working Group (Government, Residential – Single and Multifamily)

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Agenda Item #5

In-Depth Report Out from Sector Working Group (Small and Medium/Large Business)

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Agenda Item #6

Issues to Address and Resolve

X

- X

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Agenda Item #7a

Other Business

CT Green Bank Comprehensive Plan

CT Green Bank – Comp Plan and Budget

- Timeline
  - Budget & Operations Committee (May 25 and June 7)
  - Board of Directors (June 17)
- Contents – covers FY 2017 and FY 2018
  - Executive Summary
  - Organizational Overview
  - Public Policy Overview
  - Evaluation Framework
  - Financing Programs
  - Marketing Programs
  - S&I Sector
  - Residential Sector
  - CI&I Sector
  - Strategic Initiatives
  - Budgets
  - Key Definitions

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Comp Plan – Relative to Joint Committee

- Acknowledges Joint Committee principle statement to guide activity

> "The Energy Efficiency Board and the Connecticut Green Bank have a shared goal to implement state energy policy throughout all sectors and populations of Connecticut with continuous innovation towards greater leveraging of ratepayer funds and a uniformly positive customer experience."

- Sector Overviews – review CES, IRP and C&LM Plan to support state policies, and include goals of the Joint Committee in each sector
- Strategic Initiatives – identifies renewable thermal technologies (RTT) as an area of joint interest

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Agenda Item #7b

Other Business

Draft Evaluation Framework of CT Green Bank

CT Green Bank – Evaluation Framework

- Contributors and Acknowledgements
- Introduction – independent audit and reporting (CAFR)
- Program Logic Model – green bank model of market transformation
- Program Impact Indicators – capital supply, consumer demand, loan performance/risk, and impacts/benefits
- Evaluation Plan Development – 5-part process that builds evaluation into the operations of the organization
- Net Impact Analysis
- Appendices
  - Program Performance Indicators
  - Example Data Release Form (C-PACE)
  - Example Data Release Form (Smart-E Loan)

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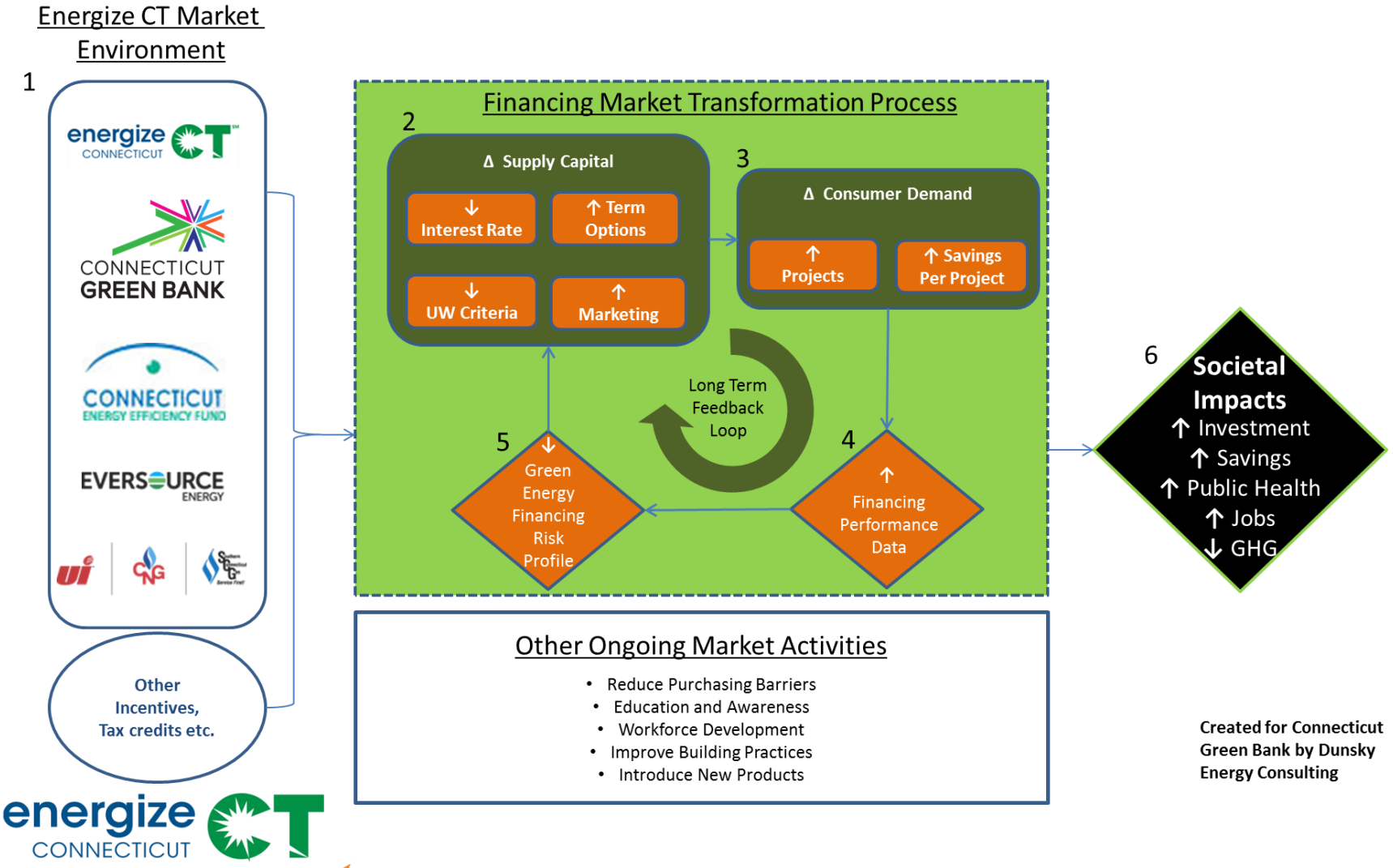
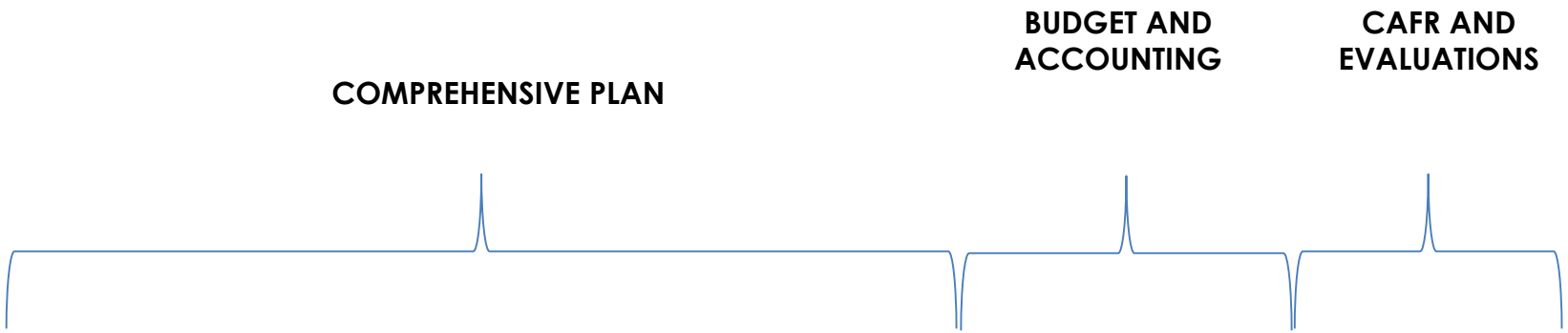
Program Logic Model



Evaluation Plan Development



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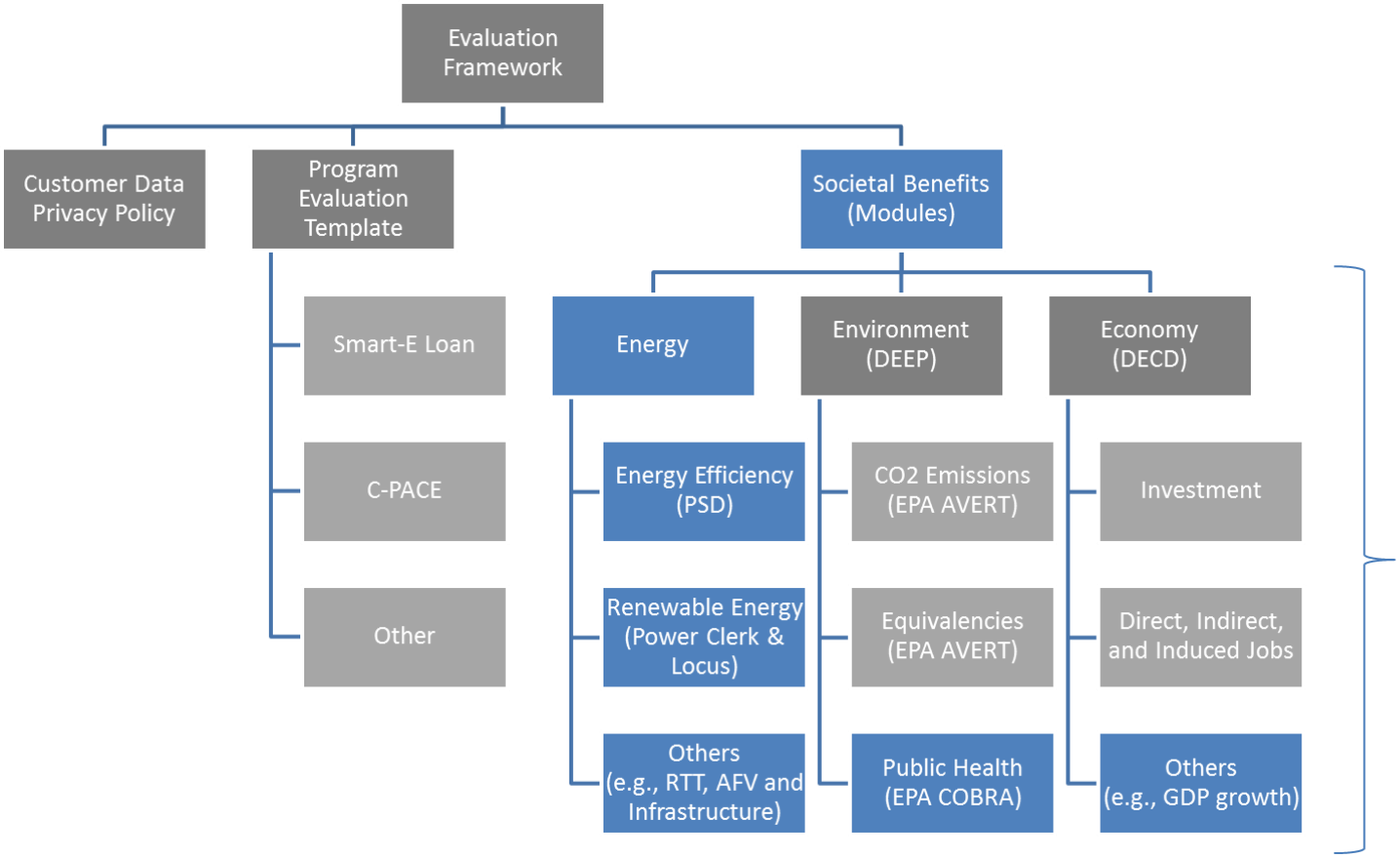
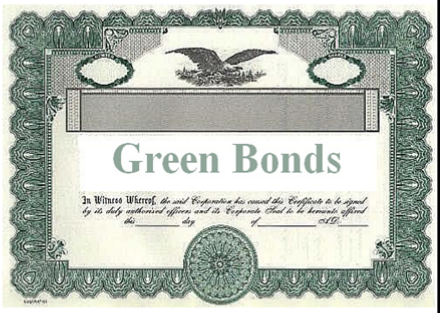
The “Big Picture”





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Agenda Item #9

Adjourn

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board of Directors

Connecticut Green Bank, 845 Brook Street, Rocky Hill

Wednesday, January 20, 2016
1:30-3:30 p.m.

MINUTES (Draft)

In Attendance

Voting Members: Norma Glover, John Harrity, Eric Brown, Amanda Fargo-Johnson (phone), Diane Duva

Non-Voting Members: Bryan Garcia, Pat McDonnell, Matt Gibbs, Ron Araujo

Others: Brian Farnen, Steve Bruno, Donna Wells, Evan Seretan, Kim Stevenson, Chris Kramer (phone), Jeff Schlegel (phone), Andy Brydges, Genevieve Sherman (phone), Kerry O'Neill, Marcus Smith, *Collette _____ (CT Department of Housing)*

1. **Call to Order**

   Eric Brown called the meeting to order at 1:30 pm.

2. **Public Comments**

   None.

3. **Review and approval of Meeting Minutes for October 28, 2015 meeting**

   Ms. Glover suggested that the Joint Committee invite a few small businesses to attend a Joint Committee meeting (comment not related to the minutes). Mr. Harrity moved to approve, and Ms. Glover 2nd. All voted in favor to approve the 10/28/15 meeting minutes.

4. **Brief Report-Outs from Sector Working Groups**

   a. Government. Mr. Brydges provided an update. He said that an important challenge was getting the first big project into contract; doing that would set a precedent for additional projects. He said the University of Connecticut Phase I project was moving along and could end up being the first project going into contract. Mr. Garcia said that the Green Bank would be recommending approval of revenue Bonds on April 22.

b. Small Business. Mr. Bruno provided an update. He said that the Green Bank and the Companies had held several meetings to discuss a path forward for small business. Ms. Sherman discussed potential additions to the SBEA program, perhaps for larger customers. She also noted the possibility of combining different loan types.
c. Med-Large Business. Ms. Wells provided an update. Ms. Glover asked how customer experience has been this customer segment. Mr. Bruno said that this programs had not run as smoothly as the SBEA program, and said that they are working to remove impediments in the process. He said that the medium-size customer segment (above 200KW) is the most challenging segment. Ms. Glover said that we need to continue focusing on improving financing offerings for that market. Mr. McDonnell suggested that the program managers speak at the next Joint Committee meeting to discuss the challenges with the program.

5. In-Depth Report Out from the Residential Single Family and Multifamily Working Groups

Mr. Araujo discussed the format of the update developed by the Residential working groups. Ms. O'Neill provided an overview of the single family update. Ms. O'Neill and Mr. Farnen noted that there was a good chance that the Green Loan Guarantee Fund would be make it on to the agenda of the Bond Commission by the end of the 2nd quarter. Regarding the multi-family update, Mr. Araujo and Ms. Stevenson noted the good progress in working with the Department of Housing on integrating energy efficiency into public housing renovations. Ms. Stevenson said that their process could be looked at by other states as a model. Mr. Araujo provided an overview of the multi-family update. He and Ms. Stevenson said that they had identified key multi-family financing needs and would be developing an action plan by the end of the 2nd quarter. Ms. _____ (Collette) from the CT Department of Housing (DOH) said that it is important for the DOH to leverage other resources for energy efficiency. She said that she is working on standardizing the application process with Eversource, UI, and contractors. She said that a new application likely will be completed by the end of March. Ms. _____ also noted that she is working on enhancing coordination between the DOH and contractors earlier in the process. Mr. Araujo noted that the Green Bank has pre-development financing available. Ms. Stevenson said that the coordination with the DOH grew out of the process in May 2015 on multi-family housing financing. Mr. Harrity commented that it was very encouraging to see the DOH, Green Bank, utilities working together very effectively.

6. Issues to Address and Resolve. Review meeting preparation process.

It was noted that the Joint Committee had identified liaisons/coordinators for each of the five working groups. Joint Committee members said that they supported the proposed process, and it that Mr. Diamond and Mr. Garcia would follow the process from this point forward. Mr. Harrity moved to approve the proposed process, and Ms. Fargo-Johnson 2nd. All voted in favor to approve the process. Mr. Brown said that he likes the matrix format proposed by Mr. Araujo for the Residential updates. Mr. Brown suggested that the matrix include a column called "Satisfies" to indicate which Joint Committee goals are addressed by the working group's actions. It was agreed that all working groups would follow the proposed format for the updates.

7. Planning for Next Meeting

For the April Joint Committee meeting, it was agreed that the Committee would do a "deep dive" on the Small Business and Med/Large Business working groups. It was also agreed that the location for April meeting would be DEEP in Hartford. The Committee also agreed that the deep dive for the July meeting would be Government, and that the location of the

July meeting would be the Energize CT Center in North Haven. It was proposed that the October Joint Committee meeting be held at Eversource in Berlin.

8. Other Business

Green Bank Model–Program Logic Input Model, other financing evaluation. Mr. Garcia and Mr. Brydges provided a presentation on the Program Logic Model (PLM). Mr. Gibbs commented that PLM can be applied to energy efficiency market transformation, not only financing market transformation. He asked if the Committee should flesh out the left side of the PLM graphic (CGB and Utility/Government) - not only incentives/rebates. Mr. Kramer said the model was a good way to understand financing, but agreed that it could be applied to market transformation for energy efficiency. Mr. Garcia noted that the PLM will be incorporated into the CGB's next two-year Plan. Mr. Garcia commented that the PLM can show how green banks and energy efficiency programs can work together in market transformation. Mr. Kramer said that there are two key metrics: 1) the level of savings; 2) how much can savings be increased by using financing?

9. Meeting adjourned at 3:30 pm

Commercial Metrics for Small Business, Government and Medium/Large C&I

April 15, 2016

Commercial Sector

C&I Sector: Government

1. Improve the Customer Experience. Ensure seamless service delivery that is responsive to State and local governmental and institutional needs, including
    a. Integration of appropriate Connecticut Green Bank and other related services, especially for those that aren't currently served by Lead By Example (LBE)-Energy Savings Performance Contracts (ESPC); and
    b. Providing technical support and incentives from the Connecticut Energy Efficiency Fund and the Connecticut Green Bank's capability to finance ESPC projects at scale. Establish and communicate a process for customers undertaking ESPCs to receive technical support through internal utility resources and contracted "owner's representative" services.

2. Establish sustainable and cost-effective financing mechanisms – Develop sustainable and cost-effective funding mechanisms for both the preparatory and permanent project financing needs of government sector energy savings projects.

3. Develop new products to fill market gaps – For example, develop a financing vehicle for aggregation of small-scale comprehensive energy saving projects at municipal or other institutional facilities that are, individually, too big for the Small Business Energy Advantage (SBEA) financing program but too small to be standalone ESPC projects.

C&I Sector: Small Business

1. Improve the Customer Experience – Ensure seamless service delivery between services of the Connecticut Energy Efficiency Fund and the Connecticut Green Bank that is responsive to customers' needs, including integration of appropriate Connecticut Green Bank and other allied small business services, especially for those that aren't currently served by Small Business Energy Advantage (SBEA) financing program.

2. Identify and engage alternative capital sources to lower the cost of and increase opportunities for project financing.

3. Examine ways to couple SBEA and C-PACE (or other financing offerings) - Promote more comprehensive projects (especially among higher energy usage customers) and longer-term payback measures.

Commercial Metrics for Small Business, Government and Medium/Large C&I

April 15, 2016

C&I Sector: Medium/Large Business

1. Improve understanding of opportunities within this market for deep energy efficiency improvements - Build on available knowledge and analysis to develop effective and sustainable incentive and financing strategies for stimulating deeper energy investments and that meet all cost-effective energy efficiency goals.

2. Increase customer savings and benefits from the C&I Programs - Drive more projects with deeper energy savings, supported with increased financing options (including C-PACE) to help ensure comprehensive investment and closure of financing gaps

3. Cross-leverage Connecticut Energy Efficiency Fund and Connecticut Green Bank programs – Develop and implement communication and marketing strategies to insure maximum cross-leveraging of these opportunities to help achieve the state goals of acquiring all cost-effective energy efficiency and expanded renewable deployment through highly effective leveraging of ratepayer funds.

Commercial Metrics for Small Business, Government and Medium/Large C&I

April 15, 2016

Action Item	Measurement of Success	Challenges	Target Completion Date	Status	Satisfies Items
C&I Government					
Companies allocate spending for technical support and incentives to develop ESPC projects. Ensure CEEF support for ESPC owner's representative via internal or contracted support.	Sufficient Funding available		Q3	Complete - Companies refiled budget 3/1/16	1, 2
Identify low cost capital sources (non-utility capital) for municipal loans. Similar Goal for SBEA.	Pool of low cost funds available for Municipal Loans. The cost of funds is lower than the utility cost of capital.	Unsecured Loans based on utility bill credit history; Process is consistent with SBEA Loan Process.	Q3	UI and ES have me met with CT Green Bank and reviewed the SBEA/Muni Loan process. The Companies are piloting 3rd Party capital (M-CORE Capital) to finance Municipal Loans. (Approximately 5% Muni Market rate is being brought down to 0% which costs less than the utility cost of capital). The Companies have also utilized a PURA distributed generation loan product with Bank Of America on projects larger than $1M and reduce kW demand. The subsidized rate is 1% below prime or customers lowest interest rate and subsidized through Federally Mandated Congestion Charges.	2,3

Commercial Metrics for Small Business, Government and Medium/Large C&I

April 15, 2016

Update the Master Agreement between CEEF and state for state agencies to provide improved flexibility.	Master Agreement in place for both Eversource and UI	Financing cap imposed; resolution tied to item above	Q1	Complete; though cap imposed, highlighting need for items above and below.	2,3
Develop new products to fill market gaps: Example 1: develop financing for projects too large for SBEA and too small for ESPC Example 2: Develop a financing vehicle for aggregating smaller, long-term, comprehensive energy saving projects for multiple municipalities that don't fit the Small Business Energy Advantage (SBEA) financing mechanism that ensures that energy savings from one town do not offset financing measures for another town.	Products in place for pre-development financing, for mid-sized projects, and for aggregated projects.	Resources focused on SBEA at moment	Q4	Resources focused on SBEA at moment	2,3
Issue Green Bond [revenue bonds] for LBE ESPC project.	Indenture document drafted	Financing constraint; Pending completed project technical studies/scope	Q3/4	Jan-April Meetings with OPM and OTG re financing constraints; outcome pending broader statewide decision-making milestones.	2
Liberate and execute on the Bank of America interest rate buy-down.	Execution	Execution dependent on projects completing technical studies/scope	Q3	CT GB assessing viability	2

Commercial Metrics for Small Business, Government and Medium/Large C&I

April 15, 2016

Action Item	Measurement of Success	Challenges	Target Completion Date	Status	Satisfies Items
Small Business					
Joint Projects with C-PACE to finance projects with longer term (i.e., greater than 4 year paybacks). CEEF funds would be provided for EE rebates on qualifying measures plus interest rate buy-downs on the EE customer portion of projects up to 4 years and less than $100K.	Joint C-Pace Projects with CT Green Bank and the Utilities that include measures that have greater than 4 year paybacks.	Identification of Projects	Q2	Continued communication and dialogue on the process.	1, 2
Identify low cost capital sources (non-utility capital) for SBEA loans. Similar Goal for Muni.	Pool of low cost funds available for SBEA Loans. The cost of funds is lower than the utility cost of capital.	Unsecured Loans based on utility bill credit history; Process is simple and sold by contractors	Q3	ES increased SBEA self-funding in 2016 (3/1/16 filing) with 2015 Carryover funds which reduces interest costs. ES and UI provided statistics to the CT Green Bank on current SBEA lending portfolio. Green Bank has initiated discussions on alternative funding sources for SBEA. UI met with CT Green Bank and reviewed their SBEA/Muni Loan process	2,3

Commercial Metrics for Small Business, Government and Medium/Large C&I

April 15, 2016

Action Item	Measurement of Success	Challenges	Target Completion Date	Status	Satisfies Items
Medium / Large Business					
Target Segments (i.e., Nursing Homes) to identify and develop a comprehensive project with financing options.	Completion of a joint Nursing Home Project which combines utility incentives plus C-PACE project financing.		Q3	Joint collaborative projects are being evaluated to maximize the potential for deep energy retrofits (i.e., Stamford Town Center, Bridgeport Diocese, etc.). Had a successful workshop with CT Green Bank, Utilities and Nursing Homes.	1, 2
Develop a tool / cut-sheet for a comprehensive project offering with financing options.	Simple and unified comprehensive / financing offer		Q3	Utilities have begun pulling together existing tools / cut-sheets to share to develop a comprehensive project offering that includes financing options.	2,3
Develop an enhanced process flow model	Simple and unified process flow model		Q2	CT Green Bank has developed a model which will be shared with the Utilities. Utilities will share their current process models also.	1,2,3
Identify other cost effective segment and other project opportunities.	Identify segment, projects and complete a joint project in alignment with the findings from above. Create a summary report on Joint Projects.		Q3	Utilities and CT Green Bank are pulling together their studies, segment efforts and will share with the intent of identifying other cost effective segment and project opportunities.	2,3

Residential Metrics for Single Family and Multi-Family

April 15, 2016

Residential Sector: Single-Family

1. Identify coordinated strategies for expanding comprehensive loans for the 2016-2018 period. Calibrate incentive and buy-down levels to achieve more comprehensive projects while reducing program costs.
2. Pursue all cost-effective energy efficiency in the residential sector, using financing and increasing the amount of private sector capital where effective (and a simplified approval process where possible and appropriate), to leverage up ratepayer funds and achieve more and deeper savings.
3. Increase financing in the HES/HPwES channel to meet needs and drive deeper energy savings and more projects.
    a. Increase HES projects with completed follow-ons per the C&LM plan, using financing as one of the tools to increase completed follow-ons.
    b. Increase the adoption of the Smart E-bundle and CHIF comprehensive loans

Residential Sector: Multi-family

1. Reduce energy consumption and costs in multifamily properties consistent with goals in the Connecticut Green Bank's plan and the Conservation and Load Management plan. (MMBTU's per unit).
2. Establish, align and fund financing programs to fill current unmet needs and gaps including projects driven by energy efficiency improvements where capital improvements are a subcomponent. Complete the tasks from the work plan from the May 2015 Lean event.
3. Fund and complete a market analysis of certain sectors to quantify and qualify this segment and identify gaps, opportunities and best ways to serve by the end of 2016. Hard to reach sectors include certain rural areas and non-subsidized, non-rent restricted multifamily housing that is privately owned and serving low-income tenants (also referred to as naturally occurring affordable properties).

Residential Metrics for Single Family and Multi-Family

April 15, 2016

Residential - Joint Committee Metrics

Reporting Format

Action Item	Measurement of Success	Challenges	Target Completion Date	Status	Satisfies Item
Single Family					
Fully Integrate CHIF into the Smart-E lending program.	CHIF is a Smart-E approved lender. CHIF will have been trained/integrated by the CGB. CHIF will be providing loans for both non- credit and credit challenged customers statewide and will be offering the Bundle. CHIF will be included in the dashboard, website and all marketing materials.	Additional Requirements of Webster Bank to provide $6M line of credit (i.e., CT Green Bank Loan Guarantee, ES Utility Inter creditor Agreement required DEEP/PURA approval)	Original Target Q1-2016; Estimated May 2, 2016	In Progress	1, 2
Track loan activity vs. goals monthly (all loans, comprehensive loans, measures, etc.)	Utilizing the monthly financing cost comparison report data and the energy efficiency dashboard – graphically show an increase in Smart-E loan activity (quantity) for single measure and comprehensive loans.		Ongoing monthly	Draft created	2,3
Track component costs on a monthly basis (average incentives, buy-down costs, financing costs, program costs, etc.)	Utilizing the monthly financing cost comparison report data – graphically show a decrease in overall financing costs for single measure and comprehensive loans.		Ongoing Monthly spreadsheet	Draft Created	1,2,3

Residential Metrics for Single Family and Multi-Family

April 15, 2016

Action Item	Measurement of Success	Challenges	Target Completion Date	Status	Satisfies Item
Track ad-on measures monthly, including which ones receive financing	Utilizing the energy efficiency dashboard data, graphically show an increase in add-on measures and comprehensive jobs.		Ongoing monthly	Draft created	2, 3
Secure GLGF bond proceeds for Smart-E	CGB has successfully secured GLGF bond proceeds to provide further support for Bundle/comprehensive loan buy-downs		Q2-2016	On the list to get on the Bond Commission Agenda	3
Multi-Family					
Develop a Tracking Matrix for multi-family (similar to residential) to include all methods being utilized to finance energy improvements to multifamily housing. This includes HES and HES-IE incentives for multi-family and CGB, CHFA, DOH financing, etc.	Develop a matrix depicting multi-family financing from CEEF, CGB sources, others as available (i.e., LIME, C-PACE, CHFA, DOH, HUD, others). Track activity ongoing once developed.		Q1-2016 for development, ongoing for tracking and reporting	Template created and circulated for review	1

Residential Metrics for Single Family and Multi-Family

April 15, 2016

Action Item	Measurement of Success	Challenges	Target Completion Date	Status	Satisfies Item
Track savings per property financed on a monthly basis (energy savings per unit)	Utilizing company tracking system data – graphically show an increase in the savings per unit (ie., MMBTU/unit, MMBTU/Square Foot-where possible) for financed multi-family projects.		Ongoing, beginning Q2-2016		1
Create a matrix that aligns funding programs and gaps and develop solutions to fill in the gaps (for example; earlier involvement in CHFA projects, SBEA vendors perform some multi-family services, financing alternatives to CPACE, which doesn't work well below $100K or for FHA financed or HUD insured properties, a large portion of the MFH market)	Completed matrix of gaps and solutions, and action plan to close the gaps.		End of Q1, 2016 for the Matrix of gaps End of Q2, 2016 for the action plan to close the gaps	Draft in progress	2
Fund and complete a market analysis of certain sectors to quantify and qualify the multifamily segment in a meaningful way. For example (small	RFP is issued by Q1, 2016; vendor selected Q2, 2016 and study completed Q3, 2016. Use the analysis to update the solutions to the gaps identified above.		Develop and issue an RFP by the end of Q2, 2016 Complete study by the		2,3

multi-family, condo's, other building structures and property types, etc., tenant paid vs. owner paid, affordable vs. market rate.			Q3, 2016		

Evaluation Framework

Assessing, Monitoring, and Reporting of Program Impacts and Processes

April 1, 2016

Table of Contents

1. Contributors and Acknowledgements

In a Request for Qualifications (RFQ) issued on August 28, 2013, the Connecticut Green Bank sought to identify qualified firms and individuals with expertise in program evaluation, measurement, and verification (EM&V) that could be engaged on an as needed basis to complete certain EM&V projects ranging from researching and developing strategies for EM&V to conducting in-depth market, process, or impact evaluations.

The Connecticut Green Bank selected the Opinion Dynamics and Dunsky Energy Consulting team, including:

- Philippe Dunsky, President of Dunsky Energy Consulting
- Antje Flanders, Vice President of Opinion Dynamics
- Alex Hill, Senior Consultant of Dunsky Energy Consulting
- Jake Millette, Project Manager of Opinion Dynamics

The EM&V consulting team was selected to assist us in developing a strategy for an evaluation framework to assess, monitor and report program impacts and processes. Given their industry leading expertise in the area of financing programs, they were engaged in an effort to assist us in first defining and testing key indicators and associated metrics for impact evaluation with a focus on market transformation, and second assessing the relative value of key performance indicators against two (2) test case programs – Commercial Property Assessed Clean Energy (C-PACE) and the Energize CT Smart-E Loan. This document is the output of the first engagement.

The Connecticut Green Bank would like to acknowledge the Opinion Dynamics and Dunsky Energy Consulting for contributing to this important work for our organization.

The Connecticut Green Bank, Opinion Dynamics, and Dunsky Energy Consulting are also grateful for the guidance and feedback from the Board of Directors of the Connecticut Green Bank and the Joint Committee of the Energy Efficiency Board and the Connecticut Green Bank.

We also appreciate the feedback and guidance from several individuals and specifically would like to acknowledge:

- Matt Gibbs, Director of Energy Efficiency at Eversource Energy
- Paul Horowitz, President at PAH Associates
- Chris Kramer, Senior Consultant at Energy Futures Group (and Financing Consultant to the Connecticut Energy Efficiency Board)
- Pat McDonnell, Director of Conservation and Load Management at the United Illuminating Company

This “Evaluation Framework: Assessing, Monitoring and Reporting on Program Impacts and Processes” document represents an effort by the Connecticut Green Bank to formalize how it evaluates the societal impacts it is helping create as a result of its investments. We thank and acknowledge all of the contributors who have helped us produce this guidance document.

2. Introduction

Connecticut Green Bank (Green Bank), a quasi-public agency created by state legislation and governed by a Board of Directors, is the first state-level green bank in the United States. The Green Bank uses limited public dollars to attract and deploy private capital to accelerate the deployment of clean energy[1] in Connecticut. Note, the definition of "clean energy" includes "financing energy efficiency projects" and "alternative fuel vehicles and associated infrastructure" – and thus the term "clean energy," when used throughout this document, also includes renewable energy, energy efficiency, and clean fuels for transportation.

The Green Bank's goal is to create a thriving marketplace with low-cost and long-term private capital to accelerate the adoption of efficient use of energy and of clean energy technologies in Connecticut by making clean energy more accessible and affordable for homeowners, businesses and institutions. By attracting and deploying private capital at ratios of 5, 10, or 20 to 1 of public funds, through public-private partnerships the Green Bank can support the successful implementation of Connecticut's ambitious clean energy policy goals. For example, through statute (i.e. Public Act 15-194), regulation (i.e. Conservation and Load Management Plan), and planning (i.e. Comprehensive Energy Strategy and Integrated Resources Plan), the Comprehensive Plan of the Green Bank seeks to support the clean energy policies of the state.[2]

Beyond the contributions that Green Bank projects and programs can deliver within its near term Comprehensive Plan, to a large extent through the use of private sector capital, we are mindful that significant deployment of clean energy resources and strategies will be required over the coming decades as the state continues to encourage the successful attainment of its long term greenhouse gas emissions reduction target, of 80 percent below 2001 levels by 2050. The Green Bank's ability to continue to attract and deploy increasing amounts of low-cost and long-term private capital will be an essential element toward attaining this target while helping to mitigate the associated costs that would potentially be recovered from residents, businesses, and industry through electric or gas rates.

In this document, the Green Bank presents a framework through which to evaluate the impacts of its programs. These impacts can broadly be viewed within two categories:

1) Energy savings and clean energy production supported by Green Bank programs and the resulting societal impacts or benefits arising from clean energy investments; and

[1] Clean energy means solar photovoltaic energy, solar thermal, geothermal energy, wind, ocean thermal energy, wave or tidal energy, fuel cells, landfill gas, hydropower that meets the low-impact standards of the Low-Impact Hydropower Institute, hydrogen production and hydrogen conversion technologies, low emission advanced biomass conversion technologies, alternative fuels, used for electricity generation including ethanol, biodiesel or other fuel produced in Connecticut and derived from agricultural produce, food waste or waste vegetable oil, provided the Commissioner of Energy and Environmental Protection determines that such fuels provide net reductions in greenhouse gas emissions and fossil fuel consumption, usable electricity from combined heat and power systems with waste heat recovery systems, thermal storage systems, other energy resources and emerging technologies which have significant potential for commercialization and which do not involve the combustion of coal, petroleum or petroleum products, municipal solid waste or nuclear fission, financing of energy efficiency projects, projects that seek to deploy electric, electric hybrid, natural gas or alternative fuel vehicles and associated infrastructure, any related storage, distribution, manufacturing technologies or facilities and any Class I renewable energy source, as defined in section 16-1.

[2] FY 2015 and 2016 Comprehensive Plan of the Connecticut Green Bank

2) Market transformation impacts from Green Bank programs that lead to new opportunities to support clean energy projects, ultimately through the increase in private capital investment in clean energy.

The Green Bank currently derives a majority of its capital sources from electric ratepayers,[3] although increasingly it is accessing more and more private capital through various for-profit,[4] non-profit,[5] and public finance[6] sources and transactions. Unlike the State's energy utilities, the Green Bank is not required by statute to evaluate its programs' impacts and thus Green Bank programs are not subject to the evaluation requirements to which the electric and gas utilities who are incentivized to deliver energy efficiency programs to customers are subject. However, many of the Green Bank's programs co-exist in the market alongside ratepayer supported clean energy incentive and other programs; in many cases, they are in a mutually supporting relationship with the utility sponsored programs.

While the Green Bank is not obliged to evaluate its programs in the same manner as are the utilities' energy efficiency programs, the Green Bank is committed to evaluating its programs in order to ensure that the Clean Energy Fund, cap-and-trade allowance proceeds, and other investments are yielding value to the Green Bank's objectives and that the Green Bank's programs effectively and efficiently operate and deliver their services to customers. The Green Bank sees assessing, monitoring and reporting of program impacts and processes as a normal function of operating an organization focused on delivering societal impact. In addition, there are varying degrees of statutorily required auditing and reporting requirements for the Connecticut Green Bank and its programs, including:

- **Independent Audit** – Public Act 11-80 requires that the Clean Energy Fund,[7] which is administered by the Connecticut Green Bank be audited annually by independent certified public accountants; and

- **Reporting** – Public Act 15-194 requires the Connecticut Green Bank to report to the Energy and Technology Committee of the General Assembly on progress toward the goals of the Residential Solar Investment Program (RSIP).

This evaluation framework was developed to assist the Green Bank to present appropriate evaluation approaches to estimate the impacts and benefits of its programs and to help it communicate them to key stakeholders.

[3] Through the Clean Energy Fund, a 1 mil surcharge (i.e., $0.001/kWh) is charged to electric ratepayers in Eversource Energy and United Illuminating service territories. This surcharge aggregates to approximately $27 million a year in capital for the Connecticut Green Bank. The Connecticut Green Bank also receives cap-and-trade allowance proceeds of about $5 million a year through the Regional Greenhouse Gas Initiative to support clean energy projects.

[4] Through a public-private partnership with Hannon Armstrong, the Connecticut Green Bank through contract has access to $100 million of private capital to support its C-PACE program.

[5] Through a public-private partnership with the MacArthur Foundation, the Connecticut Green Bank and its partner the Housing Development Fund have access through contract to $5 million of program related investment capital to support their low income and multifamily programs.

[6] Through Sections 159-166 of SB 501 (i.e., 2012 Special Session of the Connecticut General Assembly), the Connecticut Green Bank will begin to issue revenue bonds – or green bonds – to raise private capital to support its programs in 2016.

[7] On and after July 1, 2004, the Public Utility Regulatory Authority requires the electric IOU utilities to assess a charge of not less than one mill per kilowatt hour to each end use customer of electric services in Connecticut and that those funds be deposited into the Clean Energy Fund. The Clean Energy Fund is within the Connecticut Green Bank.

2.1 Program Evaluation Objectives

Several objectives guided the development of this evaluation framework, including:

- Identify and estimate quantitative and market impacts resulting from Green Bank financing and Green Bank supported clean energy programs;
- Provide insights into program efficiency and effectiveness that can support program design and process improvements;
- Track progress toward Green Bank's market transformation objectives;
- Where appropriate to the program being evaluated, estimate the extent to which the program produced savings or clean energy generation that would not have happened in its absence;
- Provide an assessment, monitoring and reporting mechanism to support the issuance of green bonds that provide increased capitalization to the Green Bank for clean energy investment; and
- Report progress toward objectives and impacts to internal and external stakeholders through the Comprehensive Annual Financial Report (CAFR) of the Green Bank.

2.2 Framework Elements

The evaluation framework presented in this document was developed based on a review of the Green Bank's overall program goals as outlined in the Comprehensive Plan, through discussion with program administrators and Green Bank leadership, and through a review of Green Bank reporting and program documentation, including its audited and unaudited statements.[8] This evaluation framework can be incorporated into the operations of the organization and used as a template for Green Bank programs.[9] The remainder of this document presents the following framework elements:

- Program Logic Model (PLM)
- Program Impact Indicators
- Evaluation Plan Development
- Net Impact Analysis

[8] Comprehensive Annual Financial Report for FY 2015

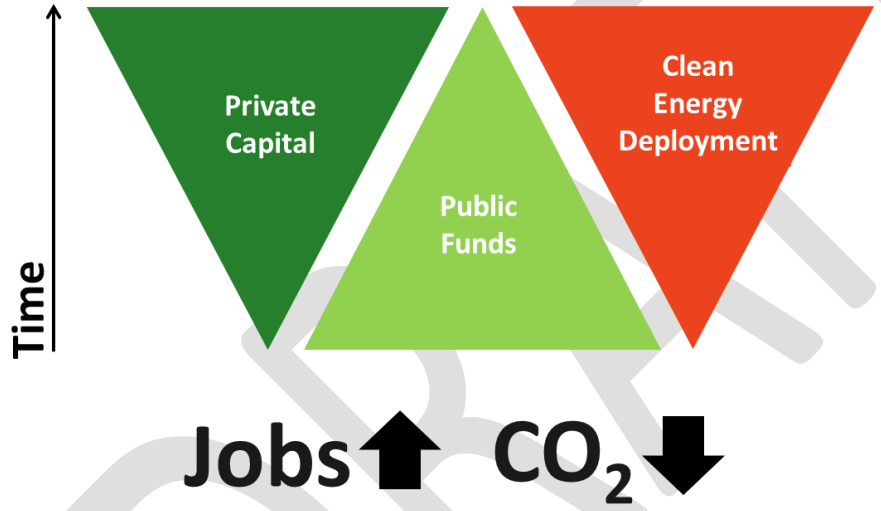
[9] As part of the Evaluation Framework, the Evaluation Team developed sample evaluation plans for the C-PACE and Smart-E Loan programs.

3. Program Logic Model

A Program Logic Model (PLM) is a "graphical representation of the causal links between program activities, short-term responses to those activities among market actors and longer-term market effects. Logic models flow from decision-maker's hypotheses of how a program intervention strategy addresses barriers or market failures. A logic model can provide the basis for establishing metrics that indicate progress toward program goals and help program administrators, policymakers, and stakeholders assess the likely timeframe within which the theorized transformation might be realized."[10]

The high level, long term Green Bank market transformation objective – to increasingly rely on private capital over time to deploy increasing amounts of clean energy resources, increase jobs and reduce greenhouse gas emissions – can be graphically represented by the following (see Figure 1).

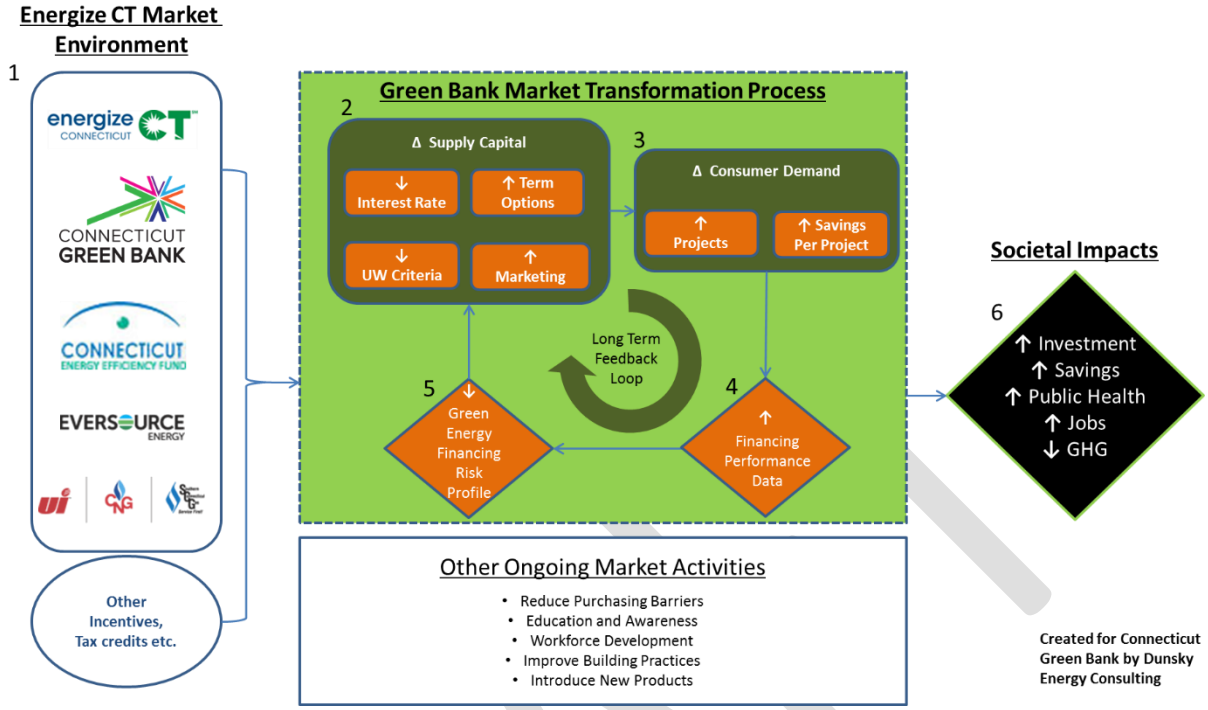
Figure 1. Green Bank Model of Public-Private Partnerships for Clean Energy Deployment



This organizational objective can serve as the general framework within which the PLM for the Green Bank's overall strategy to increase the use of private capital financing to accelerate the deployment of clean energy can be developed and presented. The focus of the Connecticut Green Bank's PLM is on its role in effecting this transformation (see Figure 2). However, as noted above, the Green Bank's programs and associated financing elements are for the most part marketed and deployed in the same environment as the utilities' energy efficiency and renewable energy (i.e., zero emission renewable energy credit and low emission renewable energy credit) programs, and often intersect and interact at the Green Bank's individual project level.

[10] State and Local Energy Efficiency Action Network (2015). *Making it Count: Understanding the Value of Regulated Energy Efficiency Financing Programs*. Prepared by: Chris Kramer, Emily Martin Fadrhonc, Charles Goldman, Steve Schiller, and Lisa Schwartz of Lawrence Berkeley National Laboratory (pp 53).

Figure 2. Green Bank Program Logic Model



This figure is a generalized market transformation and impact logic model that can be adapted to apply to a specific financing program of a green bank, as its market transformation strategies and associated evaluation frameworks are developed. An example of the green bank model and the market transformation process at work with one of its products was the CT Solar Loan.[11]

As the Green Bank's capital availability expands to support further clean energy deployment, one can anticipate that there will be increased coordination between the Green Bank's programs and those administered by the utilities. It is thus important to include the various other key participants in this overall logic model, in order to be able to identify the variety of interactions that can occur between them, that over the short, medium, and long term can lead to the transformation of the funding of clean energy projects. In addition, it is important to identify known interventions in the clean energy environment which can influence the ways in which the Green Bank's financing efforts might play out over time.

The PLM includes three (3) components – Energize CT Market Environment, Green Bank Market Transformation Process, and Societal Impacts.

3.1 Energize CT Market Environment

Energize CT is an initiative of the Connecticut Green Bank, the Connecticut Energy Efficiency Fund, the State, and the local electric and gas utilities. It provides Connecticut consumers, businesses and communities the resources and information they need to make it easy to save energy and build a clean

[11] Comprehensive Annual Financial Report for FY 2015 – Market Transformation: Financial Warehouse and Credit Enhancement Structures Case of the CT Solar Loan (pp. 133-136)

energy future for everyone in the state. Under this umbrella, the electric and gas investor owned utilities (IOUs) provide information, marketing, and deliver the energy efficiency programs that have been approved by the State and supported by the Connecticut Energy Efficiency Fund. Operating under a statutory mandate that all cost-effective energy efficiency be acquired, with guidance from the Connecticut Energy Efficiency Board and its consultants, the utilities offer a variety of programs and encouragements for residential, commercial, and industrial customers to make decisions to participate in these cost-reducing opportunities. A range of methods is used to incent customers to participate in the programs, among them targeted information, low cost/no cost measures, financial incentives, discounted retail products, and product and project financing. The Connecticut Green Bank, with a statutorily established residential solar PV target of 300MW by 2022, also markets and delivers its clean energy programs to residential customers. It too relies on information, marketing, direct incentives, and financing opportunities.

Of the Green Bank programs, currently only participants in the Residential Solar Incentive Program (RSIP) are required to receive a home energy assessment (i.e., supported by the utility efficiency programs), BPI audit, or equivalent. The program participants in the RSIP, with their individual energy saving projects, may thus receive rebates or incentives from the utilities (which are intended to overcome barriers to customer participation and to encourage increased selection of energy efficient measures), the Green Bank[12], or other levels of government (e.g., state incentives and Federal tax credits for solar PV and other technologies) as well as opportunities to finance some or all of the remaining portion of their clean energy project. In the context of a PLM, one can anticipate similar links between the Green Bank programs and those of the investor owned utilities (IOU's).

An impetus for coordination between the utility administered energy efficiency programs and the Green Bank programs is threefold: 1) more energy savings, and resulting emissions reductions, could potentially be acquired more economically both to the programs and to the project participants, 2) delivery efficiencies and greater savings could be found in coordinating financing that each entity offers to common customer segments within the sphere of program activities that they offer, and 3) coordination through a Joint Committee of the Energy Efficiency Board and the Connecticut Green Bank is required by statute.[13] It is important to note that there are a number of other ongoing market activities that are occurring through Energize CT or outside of the Green Bank's market transformation process. From introducing new products, reducing purchasing barriers, education and awareness programs to workforce development, and improving building practices – there are a variety of activities that help move the market towards more clean energy deployment.

3.2 Market Transformation Process

The efforts of the Connecticut Green Bank are exemplified through the market transformation process, which focuses on accelerating the deployment of clean energy – more customers and "deeper" more comprehensive measures being undertaken. The Green Bank can enter the process at a number of

[12] Per Public Act 15-194 "An Act Concerning the Encouragement of Local Economic Development and Access to Residential Renewable Energy," the Connecticut Green Bank administers a rebate and performance-based incentive program to support solar PV.

[13] Pursuant to Section 15-245m(d)(2) of Connecticut General Statutes, the Joint Committee shall examine opportunities to coordinate the programs and activities contained in the plan developed under Section 16-245n(c) of the General Statutes [Comprehensive Plan of the Connecticut Green Bank] with the programs and activities contained in the plan developed under section 16-245m(d)(1) of the General Statutes [Energy Conservation and Load Management Plan] and to provide financing to increase the benefits of programs funded by the plan developed under section 16-245m(d)(1) of the General Statutes so as to reduce the long-term cost, environmental impacts, and security risks of energy in the state.

points (i.e., from numbers 2 through 4 in the above PLM figure), such as supplying capital through financing offers, marketing clean energy financing, or offsetting clean energy financing risk by backstopping loans, or sharing loan performance data.

Here is a breakdown of each component of the financing market transformation process of the Green Bank:

- **Supply of Capital –** financing programs aim to increase the supply of capital available to support energy savings in the market place. This is done at the Green Bank by:

    a. Providing financing (loans or leases) to customers using Green Bank capital; and/or
    b. Establishing structures, programs, and public-private partnerships that connect third-party capital to support energy savings projects.

    Beyond ensuring that financing is available for clean energy projects, the benefits of the Green Bank's Supply of Capital interventions can lead to, but are not limited to:

    a. Reduced interest rates, which lower the cost of capital for clean energy projects;
    b. More loan term options to better match savings cash flows (e.g., longer terms for longer payback projects, early repayment, or deferred first year payments);
    c. Less restrictive underwriting criteria to increase eligibility for and expand access to financing; and
    d. Increased marketing by lenders to leverage clean energy investment opportunities.

- **Consumer Demand –** in combination with a comprehensive set of clean energy programs under the Energize CT initiative, the Green Bank drives demand for financing by marketing financing programs and increasing awareness of the potential benefits stemming from clean energy projects. Green Bank programs that deliver rebates and incentives – or connect with customers to support energy savings projects that are eligible for rebates and incentives – can further help to drive demand for natural gas conversions (e.g., Energize Norwich in partnership with Norwich Public Utilities)[14] as well as reduce the installed costs of and drive demand for solar PV projects (e.g., Solarize Connecticut). The results of the increased demand are expected to, but are not limited to:

    a. Increase the number of clean energy projects; and
    b. Increase the average savings and/or clean energy production per project.

- **Financing Performance Data –** Green Bank gathers and communicates the performance of clean energy financing either through its own programs or for other financing options in the market place. This increases access to valuable information that can help lenders and customers identify promising clean energy investments. Enabling access to this information (i.e., data transparency) is important to encouraging market competition.

[14] Section 52 of Public Act 13-298

- **Financing Risk Profile –** Green Bank can help reduce clean energy financing risk profiles in a number of ways. First, it can absorb a portion or all of the credit risk by providing loan loss reserve (LLR) funds and guarantees or taking the first-loss position on investments (i.e., subordinated debt). Second, it can channel or attract rebates and incentives to finance energy saving projects thus improving their economic performance and lowering the associated performance risk. Finally, by making clean energy financing performance data available to the market, Green Bank programs increase lenders' and borrowers' understanding of clean energy investment risk profiles, which may allow them to (1) design better financing products and (2) select projects for financing to reduce risks.

  This element of the PLM plays the key linking role in the Market Transformation feedback loop, leading to longer term impacts, as the market (1) recognizes the potentially advantageous risk/return profile associated with clean energy investments and (2) takes further steps to increase the supply and demand of capital to support clean energy investments.

  Ensuring that financing performance and risk profile data are available to the market is important from various perspectives. For a deeper examination and presentation, please see the report by the State Energy Efficiency Action Network.[15]

3.3 Societal Impacts

The efforts to accelerate and scale-up investment in clean energy deployment by the Connecticut Green Bank, lead to a myriad of societal impacts and benefits.

All of the PLM elements ultimately aim to contribute to Green Bank program impacts and benefits. These include the direct impacts resulting from more clean energy investments supported by Green Bank financing that result in an increase in energy savings and improvement of public health (e.g., asbestos remediation, lead abatement, etc.) to the customer, increase in the creation of local in-state jobs, and the reduction of greenhouse gas emissions for society. The impacts may also include consideration of secondary or indirect benefits such as GDP growth and energy savings supported by investment from other lenders who have leveraged Green Bank data or marketing efforts.

As the Green Bank continues to attract more private investment in Connecticut's clean energy economy through the issuance of green bonds, the deployment of clean energy will be accelerated. The more clean energy that is being deployed, the greater the societal benefits will be.

[15] State and Local Energy Efficiency Action Network. (2014). *Energy Efficiency Finance Programs: Use Case Analysis to Define Data Needs and Guidelines.* Prepared by: Peter Thompson, Peter Larsen, Chris Kramer, and Charles Goldman of Lawrence Berkeley National Laboratory.

4. Program Impact Indicators

For an extensive list of potential program performance indicators that will be used to assess the pace and extent of the movement toward the market transformation objectives, see Appendix I. Each indicator is a numerical value that, in relation both to a stated value for that indicator that would represent success and to previous values that would indicate the extent of progress over time, provides the Green Bank with quantitative feedback on its progress toward transforming the clean energy markets with respect to more customers and deeper energy savings with the use of greater proportions of private financing.

These program impact indicators are organized to correspond to four key impact areas of the PLM (see Figure 3:

- Capital Supply
- Consumer Demand
- Loan Performance / Risk
- Impacts / Benefits

Figure 3. Key Program Impact Indicators

Capital Supply	**Consumer Demand**
○ Available private loan pool ○ Green Bank funds available for credit enhancements ○ Ratio of public to private capital deployed ○ Weighted average interest rate ○ Weighted average loan term	○ Awareness of financing options ○ Total capital deployed (total amount of the loan) ○ Number of customer applications ○ Application approval rate ○ Green Bank customer acquisition costs ○ Number of active enrolled contractors
Loan Performance / Risk	**Impacts / Benefits**
○ Annual default rate ○ Average delinquency rate ○ Early repayment rates ○ Average and minimum FICO ○ Average and maximum DTI ratio	○ Clean energy capacity installed ○ Energy savings from clean energy ○ Jobs created ○ Improvement in public health ○ Greenhouse gas emission reductions ○ Savings-to-investment ratio (SIR)

The first three categories in blue, present the key market transformation performance impacts of Green Bank programs. The fourth category in red, captures the program's direct clean energy impacts as well as economic impacts. An important step in developing an evaluation plan for any Green Bank program will be to review the lists of indicators and select those that are most relevant to that program and measurable in order to formulate the program's key performance indicators (KPIs).

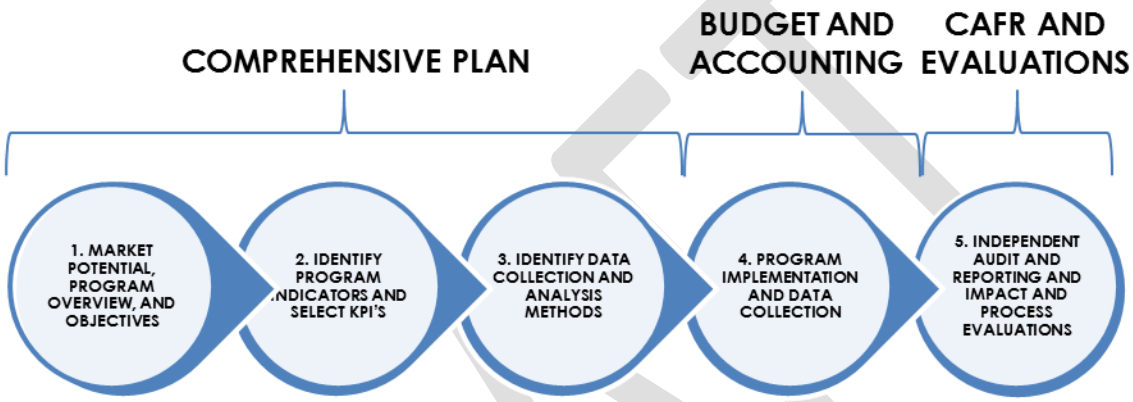
While this framework focuses on the evaluation of Green Bank program impacts, assessing market transformation effects may best be accomplished by also including some process evaluation. The direct program impacts represent the specific energy savings or economic benefits stemming from the program financing or supported financing (i.e. third-party financing that benefits from program credit

enhancements). Aside from measuring the impacts that are supported by the program, it will be important to make some assessment of the portion of the supported clean energy projects and measures that would likely not have happened in the absence of the Green Bank program. Methods for assessing this are addressed in more detail below in the Net Impact Analysis section to follow.

5. Evaluation Plan Development

An important element of applying the evaluation framework is incorporating it within the operations of the organization. This section outlines five steps in the plan development and implementation process. The first three steps can be incorporated into the Green Bank's multi-year Comprehensive Plan, the fourth step is within the annual Budget and ongoing Accounting processes for the organization, and the fifth and final step is through either the independently audited Comprehensive Annual Financial Report (CAFR) or program evaluation, initiated through a statutory requirement, Board of Director requests, or at the discretion of the Green Bank management– see Figure 4.

Figure 4. Evaluation Plan Development and Implementation Process



5.1 Step 1 – Market Potential, Program Overview, and Objectives

Within the Comprehensive Plan of the Green Bank, for each sector programs and products, it is important to clearly state the market in which the program operates – that is, its market potential or Total Available Market (TAM) and Serviceable Available Market (SAM). From there, providing an overview of the programs and products as well as the specific targets or objectives will provide a foundation for evaluation. Understanding how the programs and products address market barriers should be part of this first step, in order to then select program KPIs and subsequent evaluation methods. A program logic model for each program, typically an implementation tool used by program managers to observe and track performance, should also be prepared. It can also serve as an input into the development of individual program evaluation plans.

5.2 Step 2 – Identify Program Indicators and Select KPI's

The evaluation framework draws from a table of indicators (see Appendix I) which captures various program impacts and market transformation metrics. For each program outlined within the Comprehensive Plan, these indicators are of varying relevance and may be more or less measurable depending on the nature of the financing program's features and available data. The program logic models can serve as a guide on which indicators and KPIs to select for each program.

- **Indicator** – A measurable metric of program performance (e.g., the number of loans issued, total estimated energy savings).

- **Key Performance Indicator** – a measure of the program's progress toward its core objectives. KPIs may simply be a single indicator (e.g., annual loan volume) or they may combine multiple indicators to develop a metric that captures a relationship among indicators. For example, the leverage ratio of private to public capital is comprised of the ratio of the total private capital employed to the total public capital invested through the program. In this case, an increasing leverage ratio indicates that the program is making progress toward its core objective of leveraging private capital.

For a given program, the framework can be applied to develop a list of KPIs, as follows:

1) Identify the relevant indicators from the provided list and remove indicators that do not apply to the program;
2) Assess the relevance and measurability of each indicator to the program;
3) Select the indicators to be measured in the evaluation; and
4) Identify the indicators that best represent progress toward the program's objectives and formulate measurable KPIs.

5.3 Step 3 – Identify Data Collection and Analysis Methods

Once the program indicators and KPIs have been established, the Comprehensive Plan should outline the data collection and analytical methods that will be used. Selected methods will depend on a number of factors, including the selected KPIs, the type of program, the status of projects within the program (i.e., approved, in construction, closed, or completed transactions), the installed measures, the expected magnitude of savings, the level of program participation, and the evaluation timeline. Within the Comprehensive Annual Financial Report process an independent auditor will assess the data collection systems, project status, and project reporting to provide a formal opinion as to whether these data are fair and accurate.

In addition to program materials, evaluations will typically require additional data. Data collection can be broadly grouped into primary and secondary data collection methods. Primary data collection might include in-depth interviews, surveys, real-time metered data, access to utility bill data, and/or on-site measurement and verification. Every effort will be taken to collect customer, contractor, and capital provider data (e.g., through surveys and other means) during the project implementation phase so as to ensure that the information is captured on time as opposed to a future point in time. Examples of secondary data include evaluation plans or reports from other programs/jurisdictions, market reports, or publicly available data (e.g., Census data, EIA data).

5.4 Step 4 – Program Implementation and Data Collection

As programs are being implemented, continuous data collection, analysis, and reporting are being done. With the approval of the Comprehensive Plan and Budget, the accounting department and data collection efforts are constantly tracking and monitoring program performance towards objectives. Lean process improvements are constantly being conducted, and performance is being regularly

communicated to staff and the Board of Directors. Having ongoing data collection, analysis, and reporting alongside quarterly communications to stakeholders will lead to continuous improvement of programs and processes.

It should be noted that the Green Bank does require customers that utilize its financing programs (e.g., C-PACE and the Smart-E Loan) to sign data release forms (see examples provided in Appendix II and Appendix III). The Green Bank anticipates that the use of actual energy consumption data pre (i.e., 1 to 3 years before) and post project completion (i.e., through the life of the financing) will help the Green Bank communicate the value of financing clean energy improvements to existing and prospective customers. The Green Bank is also in the process of establishing an official customer privacy policy that balances the need to protect customer privacy while at the same time providing information that can be used for public disclosure including, but not limited to auditing, reporting, and evaluation. Collecting data through surveys during the financing process should also be pursued. In an effort to support national data standardization and collection efforts, consideration should also be given to the Connecticut Green Bank being a pilot participant in the State Energy Efficiency Action Network (SEEAction Network) Financing Solution Working Group's residential loan data standardization efforts.[16]

5.5 Step 5 – Independent Audit and Reporting, and Impact and Process Evaluation

Once select indicators and KPIs, and data collection and analysis methods have been established, and various programs and products have been implemented, the independently audited Comprehensive Annual Financial Report (CAFR) will be the mechanism to publicly report on results, and as appropriate independent evaluation of programs will be conducted.

5.5.1 Independent Audit and Reporting

A CAFR is a set of government financing statements comprising the financial report of a state, municipal or other government entity that complies with the accounting requirements promulgated by the Governmental Accounting Standards Board (GASB). GASB provides standards for the content of a CAFR in its annually updated publication *Codification of Governmental Accounting and Financial Reporting Standards*. A CAFR is compiled by a state, municipal or other governmental accounting staff and "audited" by an external American Institute of Certified Public Accountants (AICPA) certified accounting firm utilizing GASB requirements. It is composed of three sections – Introductory, Financial, and Statistical.

- **Introductory** – contains the Letter of Transmittal, Board of Directors, and Organization Chart;

[16] State and Local Energy Efficiency Action Network. (2014). *Energy Efficiency Finance Programs: Use Case Analysis to Define Data Needs and Guidelines.* Prepared by: Peter Thompson, Peter Larsen, Chris Kramer, and Charles Goldman of Lawrence Berkeley National Laboratory.

- **Financial (Audited)** – contains the Independent Auditor's Report, Management's Discussion and Analysis (unaudited), Basic Financial Statements (i.e., Statement of Net Position, Statement of Revenues, Expenditures, and Changes in Net Position, State of Cash Flows, and Notes to Financial Statements), and other required supplementary information; and

- **Statistical (Unaudited)** – contains various Financial Statistics (e.g., Financial Trends, Revenue Capacity, Debt Capacity, Demographic and Economic Information, and Operating Information) and Non-Financial Statistics (e.g., Governance, Income, Measures of Success, Market Transformation, etc.).

As the "gold standard" in government reporting, the CAFR is the mechanism the Connecticut Green Bank uses to report its fiscal year financial and statistical performance to its stakeholders.

5.5.2 Impact Evaluation

With respect to the independent evaluation of programs, some of the work might be done in-house (e.g., data collection, surveys, etc.) as part of the project implementation process, while a majority of the work (e.g., interviews, sampling, etc.) will be done at a later point by an independent evaluation contractor. To ensure quality assurance and quality control given the evaluative use of the data and its implications regarding the assessment of programs, having the ability to retain independent evaluators is important in order to examine the impacts of a particular program.

5.5.3 Process Evaluation

In the context of the Green Bank programs, a process evaluation is a systematic assessment of a program for the purposes of 1) documenting program operations at the time of the examination and 2) identifying and recommending improvements that can be made to the program to increase the program's efficiency or effectiveness for acquiring energy resources while maintaining high levels of participant satisfaction[17].

[17] Adopted from New York State Process Evaluation Protocols Dr. Katherine Johnson, April 2013, and California Energy Efficiency Evaluation Protocols The TecMarket Works Team, April 2006

6. Net Impact Analysis

Net impact analysis attempts to identify the impacts (e.g., energy savings, job creation, etc.) that would not have happened in the absence of a program. Net impact analysis thus tries to determine what share of savings can be attributed to a program. For example, Green Bank program participants might have implemented their clean energy project even without the loan for two reasons:

1. They also received a rebate or an incentive, which was equally or more important in their decision to go ahead with the project than the loan; and/or

2. They might have used alternative sources of financing, e.g., through private lenders or equipment vendors, or may have paid for the project using their savings.

In order to have an indication of the Green Bank programs' true impacts, when necessary, efforts should be made to determine what portion of the Green Bank supported projects (and the resulting savings) would not have happened in the absence of the program. Thus, some form of attribution analysis, either quantitative or qualitative, should be included in the Green Bank evaluation plans.

6.1 Quantitative Assessment: Net-to-Gross Ratio (NTGR)

Rigorous determination of net impacts requires establishing a NTGR that represents the share of the savings that are directly attributable to the program. This typically includes consideration of free-ridership and might include consideration of spillover. Free-ridership and participant spillover are often assessed through questions in a participant survey; consideration of non-participant spillover is less common in net impact evaluations and would require a non-participant or market actor survey. Many of the Green Bank programs co-exist with utility administered energy efficiency programs or other government incentives, which complicates attempts to establish a NTGR or its components for the Green Bank's programs. This should not, however, dissuade attempts to consider and implement approaches to estimate these effects.

6.2 Qualitative Assessment

An alternative to establishing a NTGR is to perform a qualitative assessment of the impact of Green Bank financing on the completed projects. This could include asking participants about the relative importance of different factors (e.g., including the loan and any rebates or incentive received) on their decision to complete the clean energy project or asking about the likelihood of completing the project in the absence of the financing.

In the absence of surveys, an expert opinion may provide qualitative assumptions to assign savings. Although this is not an accepted attribution technique, it may provide a framework to assess progress toward increasing the uptake of measures types specifically targeted in the program objectives (e.g., longer payback or non-incented measures).

While these qualitative approaches do not provide a value to be applied to program savings, they provide insights into the importance of the Green Bank financing in completing the clean energy projects.

6.3 Cost-Benefit Analyses

[OD-Dunsky team to work with Paul to draft broad section here to try and reconcile these things (i.e., Objective Function, Cost-Effectiveness, etc.) while improving indicators, metrics, etc. This section will focus on broader Benefit-Cost ratio analyses.]

7. Appendix I – Program Performance Indicators

The following program performance indicators were identified through interviews with staff of the Connecticut Green Bank from various programs and products. These indicators are important from the perspective of the Connecticut Green Bank – the program administrator. There are other actors (e.g., lenders, policy-makers, rating agencies, and investors) and use cases (e.g., program design, eligibility criteria, loan and cash management, loan refinance, and securitization) outside of the Connecticut Green Bank's evaluation framework,[18] but this represents a beginning to data that will be collected, analyzed and reported.

Financing Supply

The following is a list of the program performance indicators for financing supply, including if it is an indicator of market transformation (MT), its measurability, and the source of data:

CODE	INDICATOR	MT INDICATOR	MEASURABILITY	DATA SOURCE
S1	Total Available Program Loan Pool		High	= S2 + S3
S2	Available Public Loan Pool		High	GB Program Data
S3	Available Private Loan Pool	x	High	GB Program Data
S4	Ratio of Available Public to Private Loan Pool	x	High	= S2 / S3
S5	Total Public Funds Invested		High	= S6 + S7 + S8 + S9
S6	Total GB Loans to Participants		High	GB Program Data
S7	Other Public Loans to Participants		Low	Program Data
S8	Total Public Incentives Provided to Program Participants (IOU, RECs etc.)		Medium	GB Program Data, Incentive Program Data
S9	Total Tax Credits Issued to Program Participants (Federal ITCs, etc.)		Low	Program Data
S10	Green Bank Funds Available for Credit Enhancements		High	GB Program and Planning Data
S11	Total Private Funds Invested		High	= S12 + S13
S12	Private Third-Party Loans Delivered		Medium	Lender data and surveys
S13	Participant Funds Leveraged		Medium	GB program data, EM&V (participant survey)
S14	Bond Sales to Support Program Lending		Medium	GB Financial Data
S15	Total Public Loans to Participants		High	= S6 + S7
S16	Ratio of Public to Private Capital Deployed (Leverage Ratio)	x	Medium	= S5 / S11
S17	Ratio of GB Financing to Incentives		High	= S6 / S8
S18	Interest Rate: Weighted Average and Distribution	x	High	GB Program and Lender Data
S19	Loan Term: Weighted Average and Distribution	x	High	GB Program and Lender Data
S20	Customer Cost of Capital through GB		Medium	GB Program and Lender Data
S21	Financing Delivered for Energy Improvements (EE/RE)		Medium	GB Program and Lender Data
S22	Financing Delivered for Non-Energy Improvements		Low	GB Program and Lender Data
S23	Non-Debt Financing Delivered (Participants)		Medium	GB Program Data, EM&V (Participant Survey)
S24	Geographic Coverage of Private Lenders	x	High	GB Program Data
S25	Number of PACE Towns Opting In	x	High	GB Program Data

[18] State and Local Energy Efficiency Action Network. (2014). *Energy Efficiency Finance Programs: Use Case Analysis to Define Data Needs and Guidelines.* Prepared by: Peter Thompson, Peter Larsen, Chris Kramer, and Charles Goldman of Lawrence Berkeley National Laboratory.

S26	% of Eligible Population Located in PACE Towns	x	High	GB program Data, Secondary Data

Financing Demand

The following is a list of the program performance indicators for financing demand, including if it is an indicator of market transformation, its measurability, and the source of data:

CODE	INDICATOR	MT INDICATOR	MEASURABILITY	DATA SOURCE
D1	Total Value of Loans Issued	x	High	GB Program Data
D2	Number of Loans Issued	x	High	GB Program Data
D3	Loan Amount: Average and Distribution	x	High	GB Program and Lender Data
D4	Number of Customer Applications	x	Medium	GB Program and Lender Data
D5	Application Approval Rate	x	High	Program Data + GB Administration Data
D6	Green Bank Customer Acquisition Cost		High	GB Program Data
D7	Number of Customer Inquiries	x	Medium	GB Program Data
D8	% of Target Customers Aware of EE Loans	x	Medium	EM&V (General Population Survey)
D9	Number of Active Enrolled Contractors	x	High	GB Program Data
D10	Geographic Coverage of Active Contractors	x	High	GB Program Data
D11	% of Active Contractors with > X Applications	x	High	GB Program Data
D12	Number of New Contractors Bringing in Applications	x	High	GB Program Data
D13	% of Eligible Contractors Aware of EE Loans	x	Medium	EM&V (Contractor Survey)
D14	% of Active Contractors Growing their EE Business	x	Medium	EM&V (Contractor Survey)
D15	% of Active Contractors Cooperating with Others to Achieve Deeper Savings	x	Medium	EM&V (Contractor Survey)
D16	Portion of Total Addressable Market (TAM) Reached		Medium	GB Program Data, EM&V, Secondary Data
D17	Portion of Serviceable Addressable Market (SAM) Reached	x	Medium	GB Program Data, EM&V, Secondary Data

Loan Performance and Risk Profile

The following is a list of the program performance indicators for loan performance and risk profile, including if it is an indicator of market transformation, its measurability, and the source of data:

CODE	INDICATOR	MT INDICATOR	MEASURABILITY	DATA SOURCE
P1	Annual Default Rate		High	GB Program and Lender Data
P2	Average Delinquency Rate (Days Past Due)		Medium	GB Program and Lender Data
P3	Early Repayment Rate		Low	GB Program and Lender Data
P4	FICO Scores: Average and Distribution	x	High	GB Program and Lender Data
P5	Debt-to-Income (DTI) Ratio: Average and Distribution	x	Medium	GB Program and Lender Data
P6	Loan-to-Value (LTV) Ratio: Average and Distribution		Medium	GB Program and Lender Data
P7	Other Borrower Credit Quality Indicators (TBD)		Medium	GB Program and Lender Data
P8	Maximum Loan Term Offered		High	GB Program and Lender Data
P9	Minimum Interest Rate Offered		High	GB Program and Lender Data

Impacts and Benefits

The following is a list of the program performance indicators for impacts and benefits, including if it is an indicator of market transformation, its measurability, and the source of data:

CODE	INDICATOR	MT INDICATOR	MEASURABILITY	DATA SOURCE
I1	Capacity of Renewable Energy Systems Financed		High	GB Program Data
I2	Verified Demand Reduction from Renewable Energy Systems		Medium	GB Program Data / EM&V
I3	Estimated Energy Generated from Renewable Energy Systems		High	GB Program Data
I4	Verified Energy Generated from Renewable Energy Systems		Medium	GB Program Data / EM&V
I5	Estimated Demand Reduction from Energy Efficiency		High	GB Program Data
I6	Verified Demand Reduction from Energy Efficiency		Medium	GB Program Data / EM&V
I7	Estimated Energy Savings from Energy Efficiency		High	GB Program Data
I8	Verified Energy Savings from Energy Efficiency		Medium	GB Program Data / EM&V
I9	Project Depth: Average Energy Savings		High	GB Program Data
I10	Project Depth: % Projects With Multiple Measures		High	GB Program Data
I11	Jobs Created		Low	GB Program Data and Macro-Economic Factors
I12	Greenhouse Gas Emissions Reductions		Medium	GB Program Data and Energy GHG Intensity Factors
I13	Participant Non-Energy Benefits (TBD)		Low	GB Program Data
I14	Program Attribution		Low	EM&V (Participant survey)
I15	Average Project Savings-to-Investment Ratio (SIR)		High	GB Program Data
I16	Total Program SIR		High	GB Program Data
I17	Public Cost of Energy		High	GB Program Data

8. Appendix II – Example Data Release Form (C-PACE)

CUSTOMER RELEASE OF UTILITY DATA FORM

Utility and Fuel Supplier Information

Customer Name: _____
Electric Utility: _____ Account #:_____
Gas Utility: _____ Account #:_____
Other Fuel Supplier: _____ □ Oil □ Propane Account #:_____
If necessary, attach additional account numbers to this form.

Utility and Fuel Supplier and Program Information Release

Utility Customer Doing Business on the Property ("Company") **(only necessary if different from C-PACE Borrower)**	**C-PACE Borrower ("Borrower")**
Company Name:	**Borrower Name:**
Company Address:	**Borrower Address:**

PROJECT INFORMATION RELEASE – As a participant in the Connecticut Property Assessed Clean Energy (C-PACE) program and pursuant to Section 3.1(g) of the Financing Agreement between the Connecticut Green Bank ("Green Bank") and the Borrower dated _____, 2015 (the "Agreement"), I certify that I am a duly authorized representative of the Company/Borrower that is a customer of the above-named utility and that I hereby authorize and give permission to the utilities and/or fuel suppliers named above to release to the Green Bank and to any of its program partners, for their confidential use in connection with recording and calculating energy savings resulting from clean energy measures made pursuant to the Agreement at the Utility Service Address identified below. This permission is given for the following Data:

1) The monthly and interval usage, charges, and sales for fuels and/or utilities for the Release Period set forth below; and
2) Any supporting project documentation pertaining to calculating energy savings for efficiency measures.

In addition to the use of this Data for the Project, the Data may also be anonymized or aggregated to be used for non-commercial research purposes.

RELEASE PERIOD – This authorization covers Data for the period starting with the completion of the project and ending on the date of the complete repayment of the benefit assessment pursuant to the Agreement.

I hereby release and hold harmless the Green Bank, any Green Bank program partners, the above-named utilities and energy suppliers, and their affiliates and their respective directors, employees, officers and agents from any and all liabilities, damages, losses, penalties, claims, demands, suits and proceedings of any nature whatsoever associated with the dissemination and use of such account and program information and this authorization. An electronic copy of this authorization may be accepted with the same authority as the original.

Customer Signature: _____ Date: _____

Printed Name: _____

Email & Phone Number: _____

Mailing Address (if different)**: _____**

Utility Service Address (if different): _____

9. Appendix III – Example Data Release Form (Smart-E Loan)

CUSTOMER RELEASE OF UTILITY DATA FORM

WHY WE NEED A RELEASE – For Connecticut Green Bank to offer more Smart-E Loans over time, we need access to utility account and actual energy usage data for your home, energy costs, underwriting and loan repayment records, as well as data on energy saving measures installed in your home (collectively "Data"). This Data will allow us to aggregate and understand estimated and actual savings for home energy improvements provided by participating contractors, ensure that installed measures are delivering the expected energy savings, and understand the performance of these loans. This Data will also be used by the Connecticut Green Bank to evaluate the effectiveness of Smart-E Loans. We take the security and privacy of your information very seriously. The Connecticut Green Bank will protect the confidentiality of your Data in compliance with all applicable laws. Data may be anonymized and released in the aggregate, but we will never release personal data, and we will never sell or rent aggregated data.

ENERGY USAGE, CONSERVATION, UNDERWRITING and REPAYMENT INFORMATION RELEASE – As the holder of the above accounts, I hereby authorize and give permission to the utilities, energy suppliers, and loan providers named above to release the Data to Connecticut Green Bank or its agents for confidential use in connection with calculating estimated and actual energy savings, tracking my loan repayment record, and for evaluating the effectiveness of this financial product. This permission is given for 1) my historic and future energy usage and monthly and total amount of energy used at my utility service address; 2) the total monthly price charged for fuels used by my household; 3) my loan repayment record; and 4) program-related information. In addition to the use of the Data for the evaluation of the Smart-E Loan product, the Data may also be anonymized and released in the aggregate.

PROGRAM DATA RELEASE – As a recipient of financing supported by the Connecticut Green Bank, a quasi-public agency of the State of Connecticut, I hereby authorize Connecticut Green Bank to access my Data and release it to program partners for confidential use in connection with calculating estimated and actual energy savings, evaluation of the effectiveness of this product, and understanding performance of this type of financing in the aggregate; and, in addition, I authorize Connecticut Green Bank to use my anonymized data or anonymized aggregated energy usage data.

RELEASE PERIOD – This authorization covers Data for the period starting 18 months before the date below and ending at the time of repayment of the loan.

I certify that I have read and understand the program requirements and that I must use proceeds I obtain through a Smart-E loan to install energy-related measures based on, or non-materially modified from, the individual contractor(s)' proposal(s), which are submitted with this Proposal Cover Sheet and Data Release Form for eligibility approval. I understand that my contractor must submit this sheet, along with a proposal for energy upgrades to the Connecticut Green Bank for technical approval. A list of Participating Lenders, including a summary of applicable fees and charges, can be obtained at www.EnergizeCT.com/smarte. However, I understand that receipt of a loan is contingent upon the eligibility of the measures proposed for financing, and I must obtain a signed, itemized proposal from an approved contractor.

The actual amount of the Loan will be determined by the actual costs of all approved measures. The loan amount may be net of any additional state rebates from my utility company, the Connecticut Energy Efficiency Fund and/or Connecticut Green Bank.

I understand that completing this Proposal Cover Sheet and Data Release Form does not guarantee approval for a loan or membership in a participating lending institution. Loans must be provided directly by a Participating Lender. I understand that I should not complete any measures listed in my application or otherwise rely on the funds of the Loan until I receive a formal commitment from a Participating Lender.

Connecticut Green Bank is a "public agency" for purposes of the Connecticut Freedom of Information Act ("FOIA"). Information received pursuant to this proposal will be considered public records and will be subject to disclosure under the FOIA, except for information falling within one of the exemptions in Conn. Gen. Stat. Sections § 1-210(b) and § 16-245n(d), which may be withheld at Connecticut Green Bank's discretion.

HOMEOWNER:

I hereby release and hold harmless the Connecticut Green Bank, the above-named utilities and energy suppliers and loan account holders, and their affiliates, employees, officers and agents from any and all liability associated with the dissemination and use of such account and program information and this authorization.

I have read, understood, and agree to the Terms and Conditions above.

*Loan Applicant signature(s):*_____ *Date:*_____

Printed Name: _____

Mailing Address: _____

Utility Service Address: _____

CONTRACTOR:

By my signature below, I certify that, to the best of my knowledge, the information listed on this form is correct.

Contractor Signature: _____ *Date:*_____