845 Brook Street, Rocky Hill, CT 06067
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ctgreenbank.com

CONNECTICUT
GREEN BANK

December 11, 2015

Dear Connecticut Green Bank Board of Directors:

We have a regular meeting of the Board of Directors scheduled for Friday, December 18, 2015 from 9:00 to 11:00 a.m. in the Colonel Albert Pope Board Room of the Connecticut Green Bank at 845 Brook Street, Rocky Hill, CT 06067.

On the agenda we have the following items:

- **Consent Agenda** –
    1. meeting minutes approval for the October 16, 2015 Board of Directors meeting,
    2. approval of the schedule of meetings of 2016 for the Board of Directors and Committees,
    3. Revisions to the Employee Handbook, and
    4. A review of the transactions that the staff has approved per the under $300,000 and no more in aggregate than $1,000,000 policy.

- **President's Update** – I have included several reports that may be of interest to members of the Board, including:

    1. Making it Count – a report by the SEEAction Network Financing Solutions Working Group that the Connecticut Green Bank co-chairs with Citibank. The report begins a national conversation on the regulatory treatment of energy efficiency financing programs funded by electric ratepayers.

    2. Energy Investment Partnerships – a report by the U.S. Department of Energy issued at the Paris Climate Change Conference as part of the OECD event on finance. The report provides readers with an overview of how various states are engaging with private capital to increase clean energy deployment. The report features the Connecticut Green Bank – we were quoted in the press release of Secretary Moniz.

    3. Green Investment Banks – a report by OECD and Bloomberg Philanthropies issued at COP in Paris as part of an event on finance. The event announced the launch of the international Green Bank Network – which Connecticut is a co-founder of along with the UK, Australia, Japan, Malaysia, and New York.

- **Commercial and Industrial Sector** – with the upcoming closing of the new public-private partnership on C-PACE and its associated technical and financial underwriting, we will discuss the approval process for C-PACE transactions. Also, we have a prior approved C-PACE transaction of the Bridgeport International Academy that we are proposing be structured as an

Energy Savings Agreement (ESA). C-PACE has its limitations. We are seeing more opportunities to develop ESA's for universities, schools, and hospitals in Connecticut. We look forward to discussing this with you.

- **Residential Sector** – we are bringing back the Program Related Investment (PRI) from the MacArthur Foundation that was approved in January of 2015. Upon the Board's approval, we proceeded to finalize documentation and diligence. We, however, were unable to close on a final funding agreement, due to the fact that state contracting rules associated with the Green Bank's quasi-public status include a number of terms that presented compliance challenges for MacArthur as an out-of-state charitable foundation. Nevertheless, we both have remained committed to finding a solution to this state contracting challenge. As a solution we sought out a third party to receive and administer the MacArthur Funds – an organization that shares the Green Bank's programmatic goals, has experience in the state's affordable multifamily sector, and maintains a robust and proven lending platform. The Housing Development Fund ("HDF") meets all three criteria and is active in national affordable housing networks. We will be proposing a guaranty to support the PRI.

- **Audit, Compliance and Governance Committee** – the ACG Committee will be bringing forth a recommendation to the Board to approve the FY 2015 Comprehensive Annual Financial Report (CAFR), and we will review our legislative agenda for the 2016 session. The accounting team has been working hard with the auditors to assemble our second CAFR. You will see that it is quite a substantive document. We look forward to presenting and discussing this with you.

- **Other Business** – and lastly, we would like to spend some time updating the Board on an offsite strategic retreat we held with the senior team as well as some public policies we are working on. I would also like to save some time for an executive session on personnel matters.

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

We look forward to seeing you next week.

Sincerely,

Bryan Garcia
President and CEO

AGENDA (REVISED)

Board of Directors of the
Connecticut Green Bank
845 Brook Street
Rocky Hill, CT 06067

Friday, December 18, 2015
9:00-11:00 a.m.

Staff Invited: George Bellas, Andy Brydges, Craig Connolly, Mackey Dykes, Brian Farnen, Bryan Garcia, Dale Hedman, Bert Hunter, Kerry O'Neill, and Genevieve Sherman

1. Call to order

2. Public Comments – 5 minutes

3. Consent Agenda* – 5 minutes

    a. Approval of Meeting Minutes for October 16, 2015*
    b. Approval of Board of Directors, ACG Committee, B&O Committee, and Deployment Committee Regular Meeting Schedules for 2016*
    c. Employee Handbook*
    d. Transactions – Under $300,000 and No More in Aggregate than $1,000,000*

4. President's Update – 5 minutes

5. Commercial and Industrial Sector Program Update and Recommendations* – 20 minutes

    a. C-PACE Transactions – Extension of Approval Dates*
        i. Naugatuck – 1 Project
        ii. Newtown – 1 Project
        iii. Norwalk – 1 Project
        iv. Plainville – 2 Projects
        v. Stratford – 1 Project
    b. C-PACE Approval Process – Review
    c. Energy Services Agreement – Strategic Investment*
        i. Bridgeport International Academy

6. Residential Sector Programs Update and Recommendations* – 10 minutes

    a. MacArthur Foundation Program-Related Investment – Guaranty and Program Agreement with Housing Development Fund*

7. Audit, Compliance and Governance Committee Update and Recommendations – 45 minutes

    a. FY 2015 Comprehensive Annual Financial Report*
    b. 2016 Legislative Agenda

8. Other Business – 30 minutes
    a. Offsite Strategic Retreat
    b. Public Policies
    c. Executive Session

9. Adjourn

*Denotes item requiring Board action

Next Regular Meeting: Friday, January 15, 2016 from 9:00-11:00 a.m.
Connecticut Green Bank, 845 Brook Street, Rocky Hill, CT

RESOLUTIONS (REVISED)

Board of Directors of the
Connecticut Green Bank
845 Brook Street
Rocky Hill, CT 06067

Friday, December 18, 2015
9:00-11:00 a.m.

Staff Invited: George Bellas, Andy Brydges, Craig Connolly, Mackey Dykes, Brian Farnen, Bryan Garcia, Dale Hedman, Bert Hunter, Kerry O'Neill, and Genevieve Sherman

1. Call to order

2. Public Comments – 5 minutes

3. Consent Agenda* – 5 minutes

   a. Approval of Meeting Minutes for October 16, 2015*

Resolution #1

Motion to approve the minutes of the Board of Directors Meeting for October 16, 2015

   b. Approval of Board of Directors, ACG Committee, B&O Committee, and Deployment Committee Regular Meeting Schedules for 2016*

Resolution #2

Motion to approve the schedule of meetings for 2016 for the Board of Directors, ACG Committee, B&O Committee, and Deployment Committee

   c. Employee Handbook*

Resolution #3

RESOLVED, that the Board of Directors of the Connecticut Green Bank approve of the revisions to the Green Bank Employee Handbook materially consistent with this memorandum dated November 23, 2015 to the Audit, Compliance, and Governance Committee.

   d. Transactions – Under $300,000 and No More in Aggregate than $1,000,000*

Resolution #4

WHEREAS, on January 18, 2013, the Connecticut Green Bank (the "Green Bank") Board of Directors (the "Board") authorized the Green Bank staff to evaluate and approve funding requests less than $300,000 which are pursuant to an established formal approval process requiring the signature of a Green Bank officer, consistent with the Green Bank Comprehensive Plan, approved within Green Bank's fiscal budget and in an aggregate amount not to exceed $500,000 from the date of the last Deployment Committee meeting, on July 18, 2014 the Board increase the aggregate not to exceed limit to $1,000,000 ("Staff Approval Policy for Projects Under $300,000"); and

WHEREAS, Green Bank staff seeks Board review and approval of the funding requests listed in the Memo to the Board dated December 11, 2015 which were approved by Green Bank staff since the last Deployment Committee meeting and which are consistent with the Staff Approval Policy for Projects Under $300,000;

NOW, therefore be it:

RESOLVED, that the Board approves the funding requests listed in the Memo to the Board dated December 11, 2015 which were approved by Green Bank staff since the last Deployment Committee meeting. The Board authorizes Green Bank staff to approve funding requests in accordance with the Staff Approval Policy for Projects Under $300,000 in an aggregate amount to exceed $1,000,000 from the date of this Board meeting until the next Deployment Committee meeting.

4. President's Update – 5 minutes

5. Commercial and Industrial Sector Program Update and Recommendations* – 30 minutes

   a. C-PACE Transactions – Extension of Approval Dates*

Resolution #5

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

WHEREAS, pursuant to the C-PACE program the Green Bank Board of Directors (the "Board") or the Connecticut Green Bank Deployment Committee (the "Deployment Committee") has previously approved and authorized the President of the Green Bank to execute financing agreements for the six (6) C-PACE projects described in the Memo submitted to the Board on December 16, 2015 (collectively, the "Finance Agreements");

WHEREAS, the Finance Agreements were authorized to be consistent with the terms, conditions, and memorandums submitted to the Board or the Deployment Committee and shall be executed no later than 120 days from the date of Board or Deployment Committee approval; and

WHEREAS, due to delays in fulfilling pre-closing requirements for the C-PACE transactions listed above the Green Bank will need more time to execute the Finance Agreements.

NOW, therefore be it:

RESOLVED, that the Board extends authorization of the Finance Agreements to no later than 120 days from December 18, 2015 and consistent in every other manner with the original Board or Deployment Committee authorization for each Finance Agreement.

b. C-PACE Approval Process – Review
c. Energy Services Agreement – Strategic Investment*
    i. Bridgeport International Academy

Resolution #6

WHEREAS, in accordance with (1) Connecticut Green Bank's ("Green Bank") statutory mandate to foster the growth, development and deployment of clean energy sources that serve end use customers in the State of Connecticut, (2) the State's Comprehensive Energy Strategy and (3) Green Bank's Comprehensive Plan for Fiscal Year 2015 and 2016 (the "Comprehensive Plan") Green Bank continuously aims to develop financing tools to further drive private capital investment in clean energy projects in the commercial and industrial market sector;

WHEREAS, the Green Bank wishes to continue its support and commitment to driving investment in comprehensive clean energy projects in public purpose facilities underserved by current financing products and not well addressed by C-PACE;

WHEREAS, RENEW Energy Efficiency Bridgeport, LLC ("Borrower"), a limited liability company and affiliate of RENEW Energy Partners, LLC, is seeking financing from the Green Bank for the purchase and installation of multiple energy efficiency measures at a facility owned by Bridgeport International Academy, Inc. ("BIA"), a Connecticut nonprofit organization, located at 285 Lafayette Street, Bridgeport, CT. The installation of these measures shall be part of the energy services provided by Borrower to BIA pursuant to an Energy Services Agreement ("ESA") with a term of nine years (the "BIA ESA Project"); and

WHEREAS, Green Bank staff recommends that the Board of Directors approve a strategic selection and award of a term loan not to exceed **$130,000** (the "Loan") to Borrower to finance the BIA ESA Project because advantages of this strategic selection and award clearly outweigh the general public interest in an open and public process for the following reasons: the special capabilities of RENEW Energy Partners, LLC in developing such ESA projects, the uniqueness of the BIA ESA Project and its leverage, and the strategic importance and urgency of reducing energy costs for a nonprofit organization in a distressed municipality.

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors approves the Loan to Borrower for development of the BIA ESA Project as a strategic selection and award pursuant to the Green Bank Operating Procedures Section XII;

RESOLVED, that the President of the Green Bank and any other duly authorized officer is authorized to execute and deliver the Loan with terms and conditions consistent with the memorandum submitted to the Board dated December 11, 2015, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from the date of authorization by the Board of Directors; and

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

6. Residential Sector Programs Update and Recommendations* – 10 minutes

   a. MacArthur Foundation Program-Related Investment – Guaranty and Program Agreement with Housing Development Fund*

Resolution #7

WHEREAS, the Connecticut Green Bank ("Green Bank") is actively seeking to deploy private capital to support clean energy upgrades in the state's affordable multifamily housing sector;

WHEREAS, the John D. and Catherine T. MacArthur Foundation ("MacArthur") offers concessionary financing in the form of Program Related Investments ("PRIs") to support core social welfare goals;

WHEREAS, MacArthur agreed to make a PRI in the amount of $5,000,000 (the "MacArthur Funds") to support the Green Bank's efforts to accelerate energy efficiency and clean energy upgrades in affordable multifamily properties across the state of Connecticut;

WHEREAS, MacArthur selected the Housing Development Fund ("HDF") to receive and administer the MacArthur Funds;

WHEREAS, the Green Bank proposes to pay HDF an annual amount not-to-exceed $125,000 on a contracted, renewable basis, which amount shall include an annual fixed administrative fee initially set at $40,000 per annum, a direct pass-through loan servicing fee, carrying costs associated with interest payments on the PRI due to MacArthur, and related legal fees;

WHEREAS, the Green Bank proposes extending a guaranty (the "Guaranty"), in an amount not to exceed $5,000,000, to HDF for the purpose of securing loans for energy upgrades and clean energy to affordable multifamily owners made with MacArthur Funds; and

WHEREAS, the proposed Guaranty qualifies as a strategic selection and award pursuant to Green Bank Operating Procedures Section XII due to HDF's proven

experience in the state's affordable multifamily sector, the organization's robust and proven lending platform, and MacArthur's independent selection of HDF as an appropriate recipient of its PRI funds.

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors ("Board") authorizes the President of the Green Bank and any other duly authorized officer of the Green Bank, to pay HDF for its services and execute and deliver the Guaranty materially consistent with the memorandum submitted to the Board dated December 11, 2015, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from the date of authorization by the Board; and

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

7. Audit, Compliance and Governance Committee Update and Recommendations – 45 minutes

   a. FY 2015 Comprehensive Annual Financial Report*

Resolution #8

WHEREAS, Article V, Section 5.3.1(ii) of the Connecticut Green Bank ("Green Bank") Operating Procedures requires the Audit, Compliance, and the Governance Committee (the "Committee") to meet with the auditors to review the annual audit and formulation of an appropriate report and recommendations to the Board of Directors of the Green Bank (the "Board") with respect to the approval of the audit report;

WHEREAS, the Committee recommended to the Board for approval the 2015 Comprehensive Annual Financial Report which includes the Financial Statements and the Federal Single Audit Report of the Connecticut Green Bank for the Fiscal Year Ending June 30, 2015.

NOW, therefore be it:

RESOLVED, that the Board approves the 2015 Comprehensive Annual Financial Report which includes the Financial Statements and the Federal Single Audit Report of the Connecticut Green Bank for the Fiscal Year Ending June 30, 2015.

   b. 2016 Legislative Agenda

8. Other Business – 15 minutes
   a. Offsite Strategic Retreat
   b. Public Policies
   c. Other Items

9. Adjourn

*Denotes item requiring Board action

Join the meeting online at https://www4.gotomeeting.com/join/634439599

Or call in using your telephone:
Dial (619) 550-0003
Access Code: 634-439-599

Next Regular Meeting: Friday, January 15, 2016 from 9:00-11:00 a.m.
Connecticut Green Bank, 845 Brook Street, Rocky Hill, CT

CONNECTICUT
GREEN BANK

Board of Directors Meeting

December 18, 2015

Board of Directors

Agenda Item #1

Call to Order

Board of Directors

Agenda Item #2

Public Comments

Board of Directors

Agenda Item #3

Consent Agenda

Consent Agenda
Resolutions 1-2

- **Meeting Minutes** – approval of meeting minutes of October 16, 2015
- **Meeting Schedules** – approval of meeting schedules for BOD and Committees for 2016
- **Employee Handbook** – include new names and logo, housekeeping items (e.g., titles, IT and phones, etc.) and promotion eligibility (i.e., must work in their position for at least 6 months to be considered)
- **Transactions** – under $300,000 and no more in aggregate than $1,000,000 transactions that are consistent with the Comprehensive Plan and Budget

Transactions below $300,000 and No More in Aggregate $1,000,000

Project Name	Comprehensive Plan	Amount	Type
1341 Bank Street	C-PACE (Natural Gas)	$36,350	Benefit Assess.
Shiloh Baptist Church	C-PACE (EERE/Water)	$66,078	Benefit Assess.
Logee's Greenhouses	C-PACE (RE)	$204,303	Benefit Assess.
D&R Real Estate	C-PACE (RE)	$108,946	Benefit Assess.
Total		**$436,814**	

Approximately $440,000 in loans

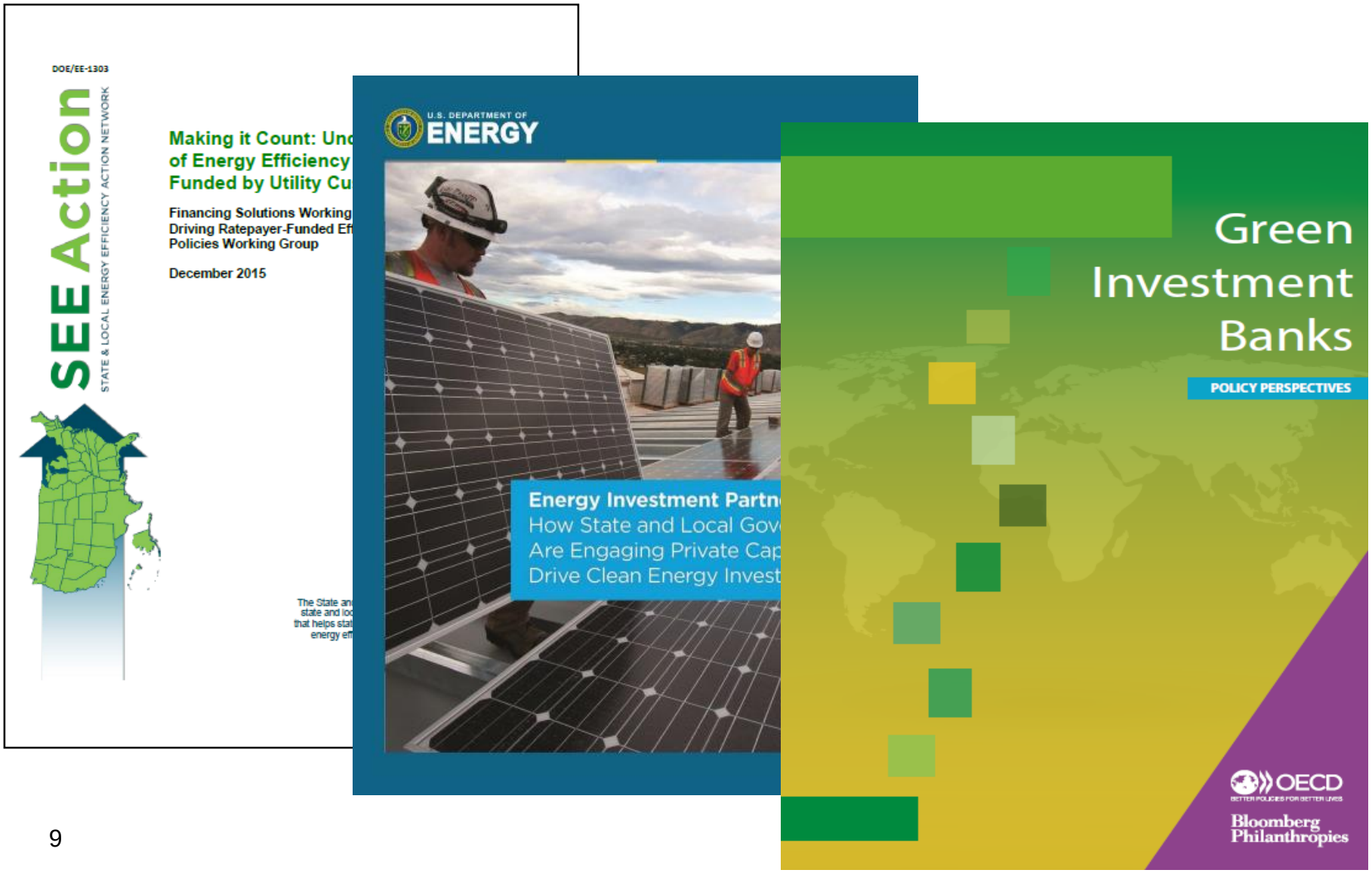
Board of Directors

Agenda Item #4

President's Update


C-TECSOLAR
C-TECSOLAR
"GREEN IS GOOD
A Clean Technology & Energy

Connecticut Green Bank Featured Reports



Public-Private Partnership
$100 Million C-PACE Facility

CONNECTICUT GREEN BANK

HANNON ARMSTRONG
SUSTAINABLE INFRASTRUCTURE

Board of Directors

Agenda Item #5

Commercial and Industrial Sector

C-PACE
Approval Date Extensions

- **<u>Date Extensions</u>** – seeking to extend approval dates from prior Board or Committee approved projects by 120 days to be able to close on transactions, including:

  - ✓ Naugatuck
  - ✓ Newtown
  - ✓ Norwalk
  - ✓ Plainville (2)
  - ✓ Stratford

C-PACE
Approval Process

- **Under $300,000 and No More in Aggregate than $1,000,000** – policy established in January of 2013 allowing staff approvals for transactions using less than $300,000 of funds from the Connecticut Green Bank and no more in aggregate than $500,000 as long as consistent with Comprehensive Plan and Budget. Policy was then revised in July of 2014 increasing the in aggregate amount up to $1,000,000. Staff must report out to the Deployment Committee to clear the queue.

- **Financial Underwriting** – with closing of Hannon Armstrong facility, Connecticut Green Bank would provide between 10% to 20% of the capital on a C-PACE project and the financial underwriting requirements change

C-PACE
Financial Underwriting

CONNECTICUT GREEN BANK

Inside "The Box"

STANDARD CRITERIA
(all transactions)

Expedited Criteria

- *≤ $1,000,000*
- *LiTV ≤ 15%*
- *No raw land, Ag or "Special Purpose"*

FULL CRITERIA

- *LiTV ≤ 35%**
- *Profitability, Cash Flow, DSCR & Leverage*

** can be higher – must satisfy additional criteria*

Exception

- *Higher LTV, higher leverage, lower DSCR, ≤ $1M*
- *May not exceed 10% of Facility outstanding*
- *Exception Projects will require 20% CGB funds*

C-PACE
Approval Process Overview

	CGB Capital Under $300,000	CGB Capital $300,000-$2,500,000	CGB Capital >$2,500,000
In "the Box"	Staff	Deployment	Deployment Board
Outside "the Box"	Deployment	Deployment	Deployment Board

Board of Directors

Agenda Item #5c
Commercial and Industrial Sector
Bridgeport International Academy
Energy Services Agreement (ESA)
Strategic Investment

Bridgeport ESA Strategic Loan Project Description

- **The CGB 2015-2016 Comprehensive Plan calls for creating an Institutional Off-Credit Energy Services Agreement (ESA) Program. This proposed investment serves that goal and advances C&I and Institutional strategies for financing cost-effective clean energy, particularly by developing a C-PACE "off-ramp"**
- Proposed $130,000 loan to RENEW Energy Efficiency Bridgeport, LLC (the "Borrower") leverages 3:1x in private capital to provide energy efficiency upgrades.
- Project host facility is owned by Bridgeport International Academy (BIA), a private school and residential property for students and faculty. BIA is representative of the underserved "public purpose building" market that struggles to access C-PACE and for which CGB seeks a solution.
- CGB investment would support implementation of multiple energy efficiency measures for BIA as part of a 9-year ESA.

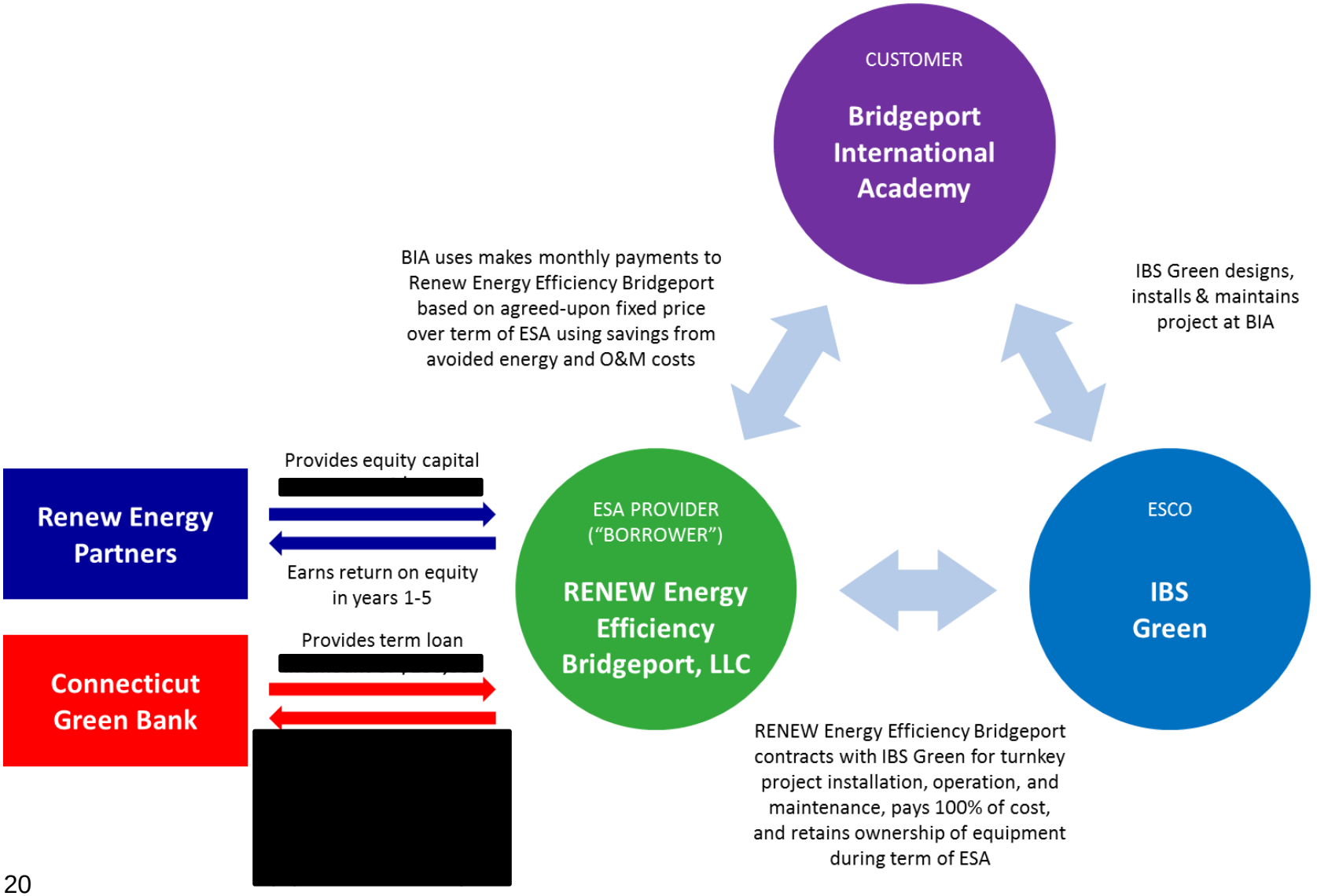
Bridgeport ESA Strategic Loan
C-PACE "Off-Ramp"

- Since the launch of C-PACE in January 2013, CGB has reviewed or approved nearly $40 million in projects that were ultimately unable or unwilling to execute a C-PACE loan
- Principal factors prohibiting access to C-PACE have included:
  - Inability to obtain consent from existing senior mortgage lender
  - Restrictive debt covenants
  - Insecurity around 'off-balance sheet' treatment
- Projects have primarily been located in "public-purpose facilities" such as education, healthcare, senior living, and/or recreation and public assembly.

Bridgeport ESA Strategic Loan Potential of ESA Model

- CGB staff research has sought to identify existing energy financing structures that achieve similar benefits to C-PACE, but obviate the need to secure energy improvements with a senior lien. Key aspects of a solution include:
  - 100% upfront financing
  - Performance-based (investments are repaid through energy savings)
  - Long terms (deep energy retrofit measures with long payback periods are financeable on a cash flow positive basis)
  - Off-balance sheet
- 2014 study identifies ESAs as promising financing structure to serve the ‘public purpose building’ market that is unable to access C-PACE
- October 2015: Renew Energy Partners requests a loan from CGB to fund ESA to implement comprehensive energy efficiency project at BIA

Bridgeport ESA Strategic Loan
ESA Schematic



Bridgeport ESA Strategic Loan Key Questions

- **Total Capital at Risk**: The maximum exposure is $130,000.
- **Terms and Conditions**: The term of the Loan shall be 9 years, matching that of the ESA. [redacted]
- **Collateral:**
  - First priority lien on all personal property of Borrower.
  - Collateral assignment of the ESA by and between Borrower and BIA. The ESA contract requires BIA to make fixed payments that are predetermined based on projected energy savings. The ESA contract includes operations and maintenance services to ensure savings are realized.
  - Collateral assignment of the Engineering, Procurement and Construction ("EPC") Contract by and between Borrower and Integrated Building Services, LLC.
  - In addition, Borrower shall exercise diligent efforts to acquire a lien on the Property, which would be subordinate to any mortgage on the property.

Bridgeport ESA Strategic Loan Key Questions

- **Objective Function:** The project is projected to deliver annual savings of 333,254 kWh of electricity and 1,957 therms of natural gas. The combined total savings over nine years is projected to be 11,988 MMBtu. Given the $130,000 total investment, the objective function result is 0.09 MMBtu saved per dollar at risk.

Bridgeport ESA Strategic Loan
Key Project Partners

- **RENEW Energy Partners, LLC:** a provider of energy efficiency and clean energy project development and financing solutions to commercial, industrial and institutional customers, and is a certified capital provider under C-PACE. In 2014, one year after forming, Renew signed an agreement with Advanced Energy Capital to provide project financing for up to $25M in energy efficiency and clean energy retrofit projects. Renew is focused on utilizing these funds to capitalize C-PACE loans and ESAs in commercial and non-profit facilities.
- **RENEW Energy Efficiency Bridgeport, LLC:** a limited liability company and affiliate of RENEW Energy Partners, LLC, that will serve as the borrower for the Green Bank loan and is the ESA provider for Bridgeport International Academy.
- **IBS Green Integrated Building Services:** a local building services company that specializes in sustainability, from energy efficiency audits to integrated clean energy deployment to turnkey project management and owner's representation services. IBS Green was the contractor for the proposed 2013 C-PACE project and is the contractor for the current proposed ESA project.

Bridgeport ESA Strategic Loan Strategic Plan

Staff believes the ESA for BIA fits well within the requirements for a Strategic Selection from the CGB Operating Procedures Section XII:

- **Special Capabilities:** Renew Energy Partners is focused on developing ESAs specifically for public purpose facilities.
- **Uniqueness:** BIA is highly representative of the type of public purpose building for which the CGB seeks to provide a C-PACE “off ramp.” The relatively small project and limited amount of Green Bank dollars at risk provides an excellent learning opportunity to build towards a more programmatic approach. BIA is well known to the Green Bank.
- **Strategic Importance:** As outlined in the 2015-2016 Comprehensive Plan, exploring an off-balance ESA product that can also serve as a C-PACE off-ramp is a priority for the Green Bank.
- **Urgency and Timelines:** The project timing is driven by core operational and seasonality needs in the facility. The project is also ‘shovel-ready’ with a vetted lending partner (Renew) and vetted off-taker (BIA).
- **Multiphase Project:** This project can serve as an important building block in the above-mentioned strategic priority to explore the viability of ESAs.

Bridgeport ESA Strategic Loan Recommendation

- Recommend to the full Board of Directors that CGB execute documentation to provide $130,000 in strategic investment loan to the RENEW Energy Efficiency Bridgeport, LLC to provide financing for purchase and installation of energy conservation measures as part of an Energy Services Agreement with Bridgeport International Academy.

Board of Directors

Agenda Item #6

Residential Sector

MacArthur Foundation PRI Background

- **In June 2014 Green Bank submitted proposal to MacArthur Foundation for $5MM in Program Related Investment ("PRI") funding for (at least) three new lending programs focused on affordable multifamily energy upgrades, including:**
  - *Energy Opportunity Assessment Loan Fund – pre-development costs (Programmatic Approval by BOD on June 2015)*
  - *Healthy Homes Loan Fund – health & safety measures*
  - *Finish Line Loan Fund – gap financing*
- **Key terms of that PRI, as approved by Green Bank Board of Directors in Jan. 2015:**
  - Principal of $5MM, advanced via two draws
  - 15-year, **REDACTED** loan (back-ended amort)
  - Unsecured, but with full recourse to Green Bank
- **Challenge: MacArthur unable to accept state contracting requirements, and so closing never occurred**

MacArthur Foundation PRI
Housing Development Fund Guaranty

- **In response to state contracting challenges, Green Bank and MacArthur sought out the Housing Development Fund ("HDF") to receive and administer the MacArthur PRI**
- **Under this arrangement, Green Bank and HDF will collaboratively:**
  - Formulate programmatic / underwriting guidelines for the various financing programs that will use MacArthur PRI funds;
  - Draft policies and procedures for each financing program;
  - Conduct marketing and serve as a source of origination for each program, both directly and through various channel partners; and
  - Directly underwrite applications for financing
- **Green Bank will provide a guaranty to HDF, in an amount not to exceed $5,000,000, to backstop program loans made using MacArthur PRI funds**
- **Green Bank will also pay HDF an admin fee and reimburse for legal and other direct professional services, amount not-to-exceed REDACTED annually:**
  - These expenses represent costs associated with accepting MacArthur PRI that the green Bank would have to bear regardless of HDF relationship

Board of Directors

Agenda Item #7

Audit, Compliance, and Governance Committee

CAFR FY 2015
Financial Statements

UPDATE
MARCUM

CAFR FY 2015
Statistical Section

- **Financial Statistics** – net position, changes in net position, operating revenue by source, significant sources of operating income, and other for 2013, 2014, and 2015
- **Geographic Impacts** – communities (i.e., "Top 5" and individual totals), distressed communities, and income
- **Operations** – FTE's, governance, and procurement (i.e., small to minority owned businesses)
- **Measures of Success** – mission metrics from Comp Plan
  - ✓ Objective Function
  - ✓ Attract Capital
  - ✓ Deploy Capital
  - ✓ Green Bank
  - ✓ Public Benefits
- **Program Logic** – PLM, application of PLM to subsidy (i.e., RSIP) and financing (i.e., CT Solar Loan, CT Solar Lease, and C-PACE) programs

CAFR FY 2015

Statistical Section – Marcum Review

1. **Purpose** – allow Marcum to provide an independent analysis of the "Non-Financial Statistic" section of the FY 2015 CAFR

2. **Data Collection Systems** – assess the process for how the organization collects data for its programs to determine robustness and appropriateness of the systems being used and the accuracy, comprehensiveness, and reasonableness of estimations being used.

3. **Project Status** – assess the process for how the organization determines the stage a project is in in order to determine whether or not projects are being appropriately classified from submission of application to completion of project with legal contracts and accounting payment tracking data systems.

4. **Project Reporting** – assess that the data being reported is an accurate representation of the project status and the overall benefits to society.

Seek an opinion as to the information in the "Non-Financial Statistics Contents" is a fair and accurate representation of the outputs and outcomes of the investments by the Connecticut Green Bank.

2016 Legislative Agenda

CONNECTICUT GREEN BANK

- **R-PACE** Residential Property Assessed Clean Energy program, with new federal guidance and in cooperation with the banking community, to attract national players in scaling up private energy improvement financing.
- **Administrative Powers** Authorizes powers to the Green Bank that are consistent with other quasi-public agencies, removing it from the Connecticut Innovations, Inc. statute.
- **SHREC** Technical fix to residential solar policy clarifying contract obligations.
- **C-PACE** Technical fix to improve consent language, and an addition to better facilitate financing for natural gas conversions.
- **Heat Loan (as of last Wednesday)** Extends sunset date on a ratepayer-subsidized loan product offered by utilities to 2019.

smart-e loan

CONNECTICUT GREEN BANK

Local bank and credit union financing

CorePlus Federal Credit Union
Eastern Savings Bank – Because it matters.
Thomaston Savings Bank
Workers' Federal Credit Union – Serving the Community For Over 75 Years
ion Bank
Patriot Bank
nutmeg state financial credit union
Union Savings Bank
The First National Bank of Suffield

Smart-E Parameters

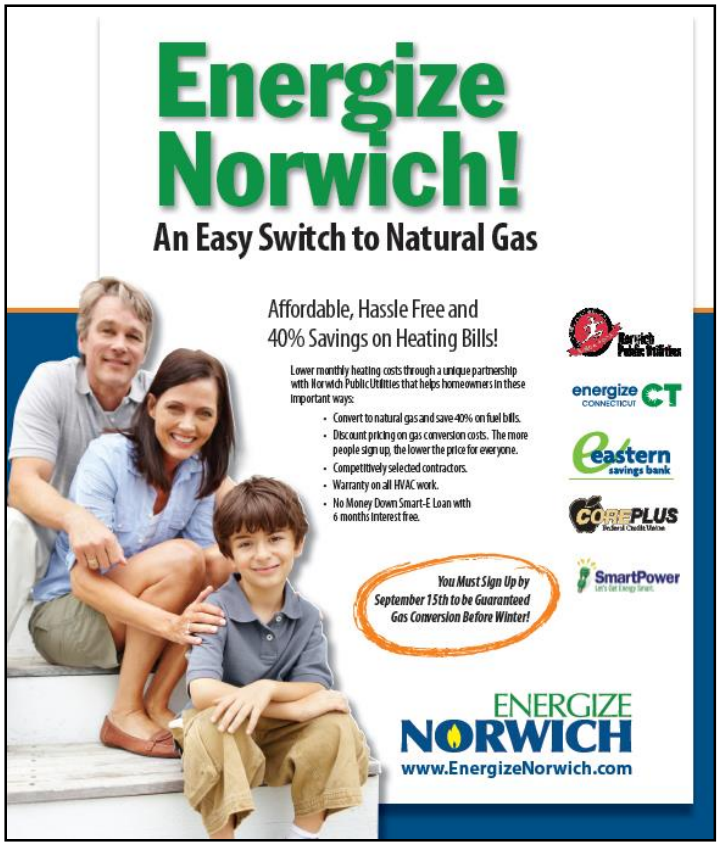
- **Leverage** – Over $30M of local lending capacity to start, attracted with $2.8M of credit enhancement
- **Affordable, Flexible Terms** – Below market interest rates for unsecured loans; lenders compete on rates, offer 5 to 12 year terms
- **Lower Credit** – offering loans for FICO scores between 640-679 (5 lenders, including 1 statewide)
- **Measures** – predominantly HVAC, hot water, and solar PV… and supports healthy home too
- **Strategic** – Supports "going deeper" with lower rates for multiple improvements

Low Uptake due to cheap government money

- Smart-E has done $10M since 2013 (600 loans)
  - Well below $30M available
- Heat loan has done $24M since 2014 (2,990 loans)
  - $17M in 2015 vs. $5.5M for Smart-E

Local lending is crowded out by the 0%-2.99% heat loan

Smart-E Market Potential



- Energize Norwich campaign
  - Solarize-style campaign aimed at natural gas conversions, spillover to broader community
  - Norwich has done 20% of Smart-E loans to date
    - 120 out of 600, 11% of principal lent, in a town with 1% of state's homeowners
  - Success despite what could be seen as challenging community for lending
    - "Distressed" community
    - Lower homeownership, 52% vs. 67% for state
    - 30% lower median household income vs. state
    - ***But… 24x Smart-E penetration vs. rest of state!***
      - 1.2% of homes in Norwich, vs. 0.05% in rest of state

- **Statewide Smart-E lending could be >$120 million today, based on Norwich**
  - **Substantial market penetration possible without 0% heat loan in the market**
- **Consumers do not need 0% financing to act**

Local Capital Wants to Play

Private Capital

A Sustainable Model

- The fastest and most economic way to support clean energy is to scale up the involvement of private capital.
- *Local lenders are ready* to finance and invest in clean energy improvements.
- With market forces working, ratepayer money can be better deployed elsewhere

Utilities' Subsidized Heat Loan

Market Cannibalization

- Reduces uptake of programs like Smart-E
- Not consistent with state's Comprehensive Energy Strategy
- Crowds out private lending from local banks and credit unions who would otherwise support clean energy (and whose dollars are needed in an era of constrained public resources)
- Is cheap government money, long so valuable in moving consumers toward clean energy, and which is now preventing the scale-up of the market

CONNECTICUT GREEN BANK

Board of Directors

Agenda Item #8

Other Business

Strategic Offsite Retreat

- **Purpose** – (1) assess past two years, (2) look ahead to shape next Comprehensive Plan, and (3) identify and prioritize 2016 legislative agenda

- **Agenda**
  - ✓ 2013 to the present – achievements and failures
  - ✓ Connecticut by 2020 by sector – what does it look like, what do we want to accomplish, what's our role, and what will prevent us from succeeding
  - ✓ Connecticut leadership in the green bank movement – two scenarios to (1) identify what press outlet running an article, (2) determine the headline and when, (3) determine 3 areas article attributes to CGB, and (4) determine 3 barriers overcome to achieve result
  - ✓ Legislative priorities for 2016

Realizing the Future

Leading the Green Bank Movement

CONNECTICUT GREEN BANK

THE WALL STREET JOURNAL.

FRIDAY, MAY 9, 2014

Goldman's Cleantech Activities Receive a Presidential Shout Out

MOUNTAINVIEW, CA – Goldman Sachs Group Inc.'s work financing and investing in clean-technology companies drew a mention Friday from President Barack Obama. "We've got public banks like Connecticut's Green Bank and private banks like Goldman Sachs ready to invest billions in renewable energy," the president Friday said during a speech at a Wal-Mart in Mountain View, Calif.

Realizing Connecticut's Future

Leading the Green Bank Movement

Hartford Courant

November 1, 2017

CT Green Bank Turns $30 MM into a $1 B

ROCKY HILL, CT – The Connecticut Green Bank leverage
million it receives a year from the electric ratepayers and R
and deploy over $1 billion of green energy in a year! It h
this result by tripling the market for **C-PACE**, issuing **green**
support the state's "Lead by Example" program, and grov
residential market for solar PV. It has had to work throug
challenges of advancing an **R-PACE policy**, collaborating v
to develop a **seamless process for green energy contractin**
procurement, and successfully navigating through a **chang**
and state policy landscape for solar PV.

Hartford Courant

December 31, 2018

CT on PACE for $100 MM in Home Energy Improvements

ROCKY HILL, CT – Connecticut Green Bank **adapts** its successful commercial property assessed clean energy (**C-PACE**) program **to the residential market**. Residential property assessed clean energy (R-PACE) provides an "open market" for investors and contractors to finance green energy improvements in homes. **All 169** Connecticut municipalities are now participating in R-PACE. The success of the program relied on **overcoming federal regulatory hurdles** and creating **collaborations** with the **Department of Banking** as well as local industry associations including the **CT Bankers Association** and the **CT League of Credit Unions**. After a slow start, the program is now rapidly growing.

Realizing the World's Future

Leading the Green Bank Movement

CONNECTICUT GREEN BANK

The Washington

November 1, 2017

CT Green Bank Fills Climate Change Funding Gap

HARTFORD, CT – The Connecticut Green Bank **establish**
community development financial institution (CDFI) to
successful efforts in Connecticut to the country. The Na
Bank applies the innovative, yet pragmatic, financing and r
solutions developed in Connecticut. Connecticut's **innovat**
a national model for accelerating private investment in cor
order to have formed the National Green Bank, Connecticu
through some **special purpose legal structures**, **raise gran**
support the bank's development, and received **seed capit**
from foundations.

The Economist

November 1, 2017

World Bank Creates Green Bank Subsidiary Modelled After CT

LONDON, UK– The **global efforts to reduce GHG emissions** in **developing countries** receive a shot in the arm from the World Bank. The **World Bank created a subsidiary** focused on public-private partnerships in green energy financing in developing countries **modelled after the Connecticut Green Bank**. The new entity expects to drive billions of dollars of **investment** creating local **jobs** and reducing GHG **emissions**. The effort **enables the growth of green energy** to continue **despite the reduction of government subsidies** worldwide. The World Bank first heard of the Connecticut Green Bank through the **Green Bank Network**.

Public Policies
In the Market

- **Public Act 15-107** – natural gas price impact in the winter of 2014 leading to a competitive procurement of resources (e.g., regional renewables, natural gas expansion, and local DER) to alleviate future problems
- **Public Act 15-5** – utility pilot on DER
- **Public Act 15-133** – Shared Clean Energy Facilities – or "Community Solar" – focused on "Location and Low Income"…also provide access to financing
- **Docket No. 15-09-08**– Virtual Net Metering for agricultural facilities, seeking to define "ownership" to support third-party owned facilities on farm lands

Board of Directors

Agenda Item #9

Adjourn

C-PACE
Financial Underwriting

CONNECTICUT GREEN BANK

Standard Underwriting Criteria - Base

Criterion	**Boundary**
Minimum Loan	$30,000
Base Valuation Methodology	• Assessed value • USPAP-certified "as is" appraised value
Valuation Adjustments Methodology	Greater of: • 50% of the hard costs of improvements, or • USPAP-certified "as complete" appraised value with cap of 150% of "as is" appraised value
Maximum Loan To Adjusted Value	80%
Payment History	Current on Mortgage and Taxes

C-PACE
Financial Underwriting

CONNECTICUT GREEN BANK

Expedited Underwriting Criteria (in addition to Standard Underwriting Criteria)

Criterion	**Boundary**
Maximum Loan	$1,000,000
Maximum Lien to Adjusted Value	15%
Eligible Projects	No restrictions
Excluded Property Types	Raw Land, Agriculture, Special Purpose[1]

[1] Special Purpose Property is defined as a limited-market property with unique physical design, special construction materials, or a layout that restricts its utility to the use for which it was built. Examples of special purpose include: gas stations, car washes, entertainment venues, churches, auto repair shops. Such facilities may be considered under the full underwriting process.

C-PACE
Financial Underwriting

CONNECTICUT GREEN BANK

Full Underwriting Criteria (in addition to Standard Underwriting Criteria)

Criterion	**Boundary**
Maximum Loan	None
Maximum Lien to Adjusted Value[1]	35%[2]
Eligible Projects	No restrictions
Excluded Property Types	None
Profitability	Positive EBIT and Net Income for 2 years
Cash Flow	Evaluated in Profitability and Minimum Debt Service
Minimum Debt Service	• 1.20x EBITDA/Debt Service for last fiscal year. • 1.20x NOI/Debt Service for single asset CRE
Minimum Liquidity	None
Maximum Leverage	• No maximum leverage for single asset CRE For multi-asset CRE or other businesses: • 3.0x Total Liabilities/Net Worth • 4.0x Senior Debt/EBITDA.

[1] Lien to Value in excess of 35% permitted by meeting three of the eight C-PACE conditions outlined for cash flow, asset conditions, and project conditions outlined in the RFP.

[2] Base Lien to Value may exceed 35% if Base Loan to Value is below 35% and Adjusted Loan to Value is below 80%.

Board of Directors of the Connecticut Green Bank

845 Brook Street
Rocky Hill, CT 06067
Friday, October 16, 2015
9:00 - 11:00 a.m.

1. Call to order

Bryan Garcia called the meeting to order at 9:03 am. Board members participating: John Harrity, Reed Hundt, Bettina Ferguson, Tom Flynn (by phone), Rob Klee, and Norma Glover.

Members Absent: Pat Wrice, Mun Young Choi, Catherine Smith, and Kevin Walsh.

Staff Attending: Kim Stevenson, Kerry O'Neill, Bert Hunter, Mackey Dykes, Cheryl Samuels, Matthew Yorzinski, Dale Hedman, Anthony Clark, Bryan Farnen (by phone), Ben Healey (by phone), Chris Magalhaes (by phone), Genevieve Sherman, Andy Brydges, and George Bellas.

Others attending: Henry Link, Jeffrey Orum

2. Public Comments

John Harrity explained that he participates in the Round Table on Climate and Jobs. He explained that they have been working with the Labor Network for Sustainability. He stated that the lead person is Frank Ackerman out of MIT. He explained that they are trying to cut carbon emissions by 80% by 2050, creating 500,000 U.S. jobs. He explained that in the process making energy more affordable. Bryan Garcia noted that he will distribute the report to the Board of Directors.

Bryan Garcia noted that BNE Energy used IBEW labor for the Colebrook Wind project. He passed around the Hartford Courant with

a picture of the Colebrook Wind South wind turbine tower in Colebrook.

3. Consent Agenda

Bryan Garcia provided an update on the consent agenda. Bryan Garcia requested a motion to approve Resolution number 1.

Motion was made by John Harrity and seconded by Bettina Ferguson. Resolution 1 was approved by Bettina Ferguson, John Harrity, Reed Hundt and Rob Klee **with an abstention from Norma Glover and Tom Flynn.**

Bryan Garcia then requested a motion to approve Resolutions 2 – 4.

Motion was made by Bettina Ferguson and seconded by John Harrity.

Resolutions 2-4 were unanimously approved.

a. Approval of Special Meeting Minutes for September 23, 2015

Resolution #1

Motion to approve the minutes of the Board of Directors Special Meeting for September 23, 2015

b. Approval of Director of Clean Energy Finance Position Description*

Resolution #2

WHEREAS, At the July 18, 2014, the Connecticut Green Bank (the "Green Bank") Board of Directors (the "Board") approved a new position structure for the CGB. One of the positions in the new

structure was Director, a senior position in the organizational structure.

NOW, therefore be it:

RESOLVED, Pursuant to Section 3.6 of the Green Bank Bylaws and Section VII of the CGB Operating Procedures, the Board approves the following Green Bank staff position submitted to the Board dated January 16, 2015: Director of Clean Energy Finance

c. Sector Updates and Progress to Targets for FY 2015 (Revisions)*

Resolution #3

WHEREAS, in July of 2011, the Connecticut General Assembly passed Public Act 11-80 (the Act), "AN ACT CONCERNING THE ESTABLISHMENT OF THE DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION AND PLANNING FOR CONNECTICUT'S ENERGY FUTURE," which created the Connecticut Green Bank (the "Green Bank") to develop programs to finance and otherwise support clean energy investment per the definition of clean energy in Connecticut General Statutes Section 16-245n(a);

WHEREAS, the Act directs the Green Bank to develop a comprehensive plan to foster the growth, development and commercialization of clean energy sources, related enterprises and stimulate demand clean energy and deployment of clean energy sources that serve end use customers in this state;

WHEREAS, on June 20, 2014, the Board of Directors of the Green Bank (the "Board") approved a Comprehensive Plan for FY 2015 and FY 2016, including an annual budget and targets for FY 2015.

NOW, therefore be it:

RESOLVED, that Board has reviewed and approved the Revised Program Performance towards Targets for FY 2015 memos dated

October 16, 2015, which provide an overview of the performance of the Statutory and Infrastructure, Residential, Commercial and Industrial, and Institutional sectors with respect to their FY 2015 targets.

d. Connecticut Green Bank – Investment and Public Benefit Performance from Clean Energy Projects from FY 20 12 through FY 2015*

Resolution #4

WHEREAS, in July of 2011, the Connecticut General Assembly passed Public Act 11-80 (the Act), "AN ACT CONCERNING THE ESTABLISHMENT OF THE DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION AND PLANNING FOR CONNECTICUT'S ENERGY FUTURE," which created the Connecticut Green Bank (the "Green Bank") to develop programs to finance and otherwise support clean energy investment per the definition of clean energy in Connecticut General Statutes Section 16-245n(a);

WHEREAS, the Act directs the Green Bank to develop a comprehensive plan to foster the growth, development and commercialization of clean energy sources, related enterprises and stimulate demand clean energy and deployment of clean energy sources that serve end use customers in this state;

WHEREAS, on June 20, 2014, the Board of Directors of the Green Bank (the "Board") approved a Comprehensive Plan for FY 2015 and FY 2016, including an annual budget and targets for FY 2015.

NOW, therefore be it:

RESOLVED, that Board has reviewed and approved the Investment and Public Benefit Performance from Clean Energy Projects from FY 2012 through FY 2015 memo dated October 16, 2015, which provides an overview of the economic development

and environmental protection benefits resulting from the investments by the Green Bank.

e. C - PACE Private Capital Warehouse (Revision)

4. Commercial and Industrial Sector Program Update and Recommendations

a. C - PACE Transactions*

Genevieve Sherman provided an update on C-PACE transactions. She stated that they are trying to put together a centralized place for information. She stated that slide 22 provided the information that is provided on the last two pages of the reports provided – which focuses on the Public Benefits (i.e. energy, economy, and environment) associated with the proposed project and portfolio of C-PACE projects approved to date.

Genevieve Sherman summarized the C-PACE projects that have been approved or closed. Bryan Garcia stated that John Harrity had asked that jobs information be included as part of the technical underwriting reports. Bryan Garcia stated that they now show the jobs and the CO2 benefits. Genevieve Sherman stated that the first year and the lifetime objective functions by project are now on those reports. She stated that they will report private capital on individual projects.

Bryan Garcia stated that the organization has built data platforms so that they can show visual infographics. He stated that they are a good communication vehicles to demonstrate the value that the organization is contributing. Reed Hundt suggested public versus private capital should be shown. He stated that it should show a line graph so that people are able to see the trends. He explained that this should be provided to the Board every quarter. Genevieve Sherman stated that PACE Setters is the name of the report, which will be released to stakeholders within a couple of weeks. Bryan Garcia stated that he will share the PACE Setters quarterly report with the Board of Directors.

i. Bristol – C - PACE Transaction*

Genevieve Sherman provided an update on 611 North Main Street, Bristol. She stated that it is approximately a $300,000 project that meets all of our standard underwriting criteria.

Resolution #5

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

WHEREAS, the Green Bank Board of Directors (the "Board") has approved a $40,000,000 C-PACE construction and term loan program; WHEREAS, the Green Bank seeks to provide a $309,000 construction and (potentially) term loan under the C-PACE program to G. Laviero Realty, LLC, the building owner of 611 North Main Street, Bristol, Connecticut (the "Loan"), to finance the construction of specified clean energy measures in line with the State's Comprehensive Energy Strategy and the Green Bank's Strategic Plan; and

WHEREAS, the Green Bank may also provide a short-term unsecured loan (the "Feasibility Study Loan") from a portion of the Loan amount, to finance the feasibility study or energy audit required by the Act, and such Feasibility Study Loan would become part of the Loan and be repaid to the Green Bank upon the execution of the Loan documents.

NOW, therefore be it:

RESOLVED, that the President of the Green Bank and any duly authorized officer of the Green Bank is authorized to execute and deliver the Loan in an amount not to be greater than one hundred ten percent of the Loan amount with terms and conditions consistent with the memorandum submitted to the Board dated October 9, 2015, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from the date of authorization by the Board;

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

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

ii. New Haven – C - PACE Transaction*

Genevieve Sherman provided an update on 300 East Street, New Haven. She stated that this project fits within the manufacturing section of PACE Setters. She stated that this is an $836,000 project. She stated that this project did not meet the lien to value ratio. She stated that projects that exceed that ratio need to meet three out of eight of the other standard underwriting criterion. She stated that it does fall within the full underwriting bucket and that the company is in good financial health.

Bryan Garcia stated that DECD has a program called the Manufacturing Innovation Fund. He stated that they are trying to establish a PACE Setter like campaign. He stated that the target for the campaign is 30% savings for energy. Commissioner Klee stated that they are one of only 24 regions across the U.S. doing this. He stated that this is an area for Federal Grants and other sorts of things.

Upon a motion made by Bettina Ferguson and seconded by Norma Glover Resolutions 5 and 6 passed unanimously.

Resolution #6

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

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

WHEREAS, the Green Bank seeks to provide a $836,128 construction and (potentially) term loan under the C-PACE program to Space-Craft Mfg., Inc., the building owner of 300 East St, New Haven, Connecticut (the "Loan"), to finance the construction of specified clean energy measures in line with the State's Comprehensive Energy Strategy and the Green Bank's Strategic Plan; and

WHEREAS, the Green Bank may also provide a short-term unsecured loan (the "Feasibility Study Loan") from a portion of the Loan amount, to finance the feasibility study

or energy audit required by the Act, and such Feasibility Study Loan would become part of the Loan and be repaid to the Green Bank upon the execution of the Loan documents.

NOW, therefore be it:

RESOLVED, that the President of the Green Bank and any duly authorized officer of the Green Bank is authorized to execute and deliver the Loan in an amount not to be greater than one hundred ten percent of the Loan amount with terms and conditions consistent with the memorandum submitted to the Board dated October 9, 2015, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from the date of authorization by the Board;

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

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

iii. **Key Public Benefit Metrics**

e. C - PACE Transaction Approval Process

5. Residential Sector Program Update and Recommendations*
Kerry O'Neill provided an update on the Residential Sector.

a. CHFA Solar PV Program Partnership*

Kerry O'Neill stated that they need to bring forward a request for program approval for a change in structure of these transactions. She stated that there is a list of about 15 Housing Authorities that are ready to move forward. She stated that CHFA is not able to give consent for C-PACE transactions due to existing bondholder restrictions. She stated that they are requesting that the Member Manager of the SL2 program, CEFIA Solar Services Inc., be allowed to receive a loan from CHFA instead of from SL2's standard lenders to avoid the C-PACE requirement.

Bettina Ferguson questioned the preferred return. Bert Hunter explained that it is 2% on their investment, paid quarterly.

Commissioner Klee questioned if this is roughly the same with the CHFA Bonds. Bert Hunter stated that they are better off because they can use the CHFA funds for 65% of the capital stack. The Green Bank does not have to put in as much. It allows for the Green Bank to accomplish the same goals with a lower cost, which will be factored into PPA pricing for each of the affordable multifamily properties who will be customers through this initiative.

Bettina Ferguson questioned if it was a limited dollar amount. Bert Hunter explained that yes, about $3 million is left in unallocated QECB monies and that CHFA has devoted the remaining QECB funds to this project. Kerry O'Neill explained that this was a key factor for this portfolio.

Bert Hunter stated that Clean Renewable Energy Bonds are available and this structure could use these for state properties. They are looking into this as a possibility. He stated that there is the issue of how the state can enter into power purchase agreements that has to be worked through.

Upon a motion made by Norma Glover and seconded by John Harrity Resolution 7 passed unanimously.

Resolution #7

WHEREAS, the Connecticut Green Bank ("Green Bank") has a mandate to deploy its resources to benefit all ratepayers, including affordable multifamily properties;

WHEREAS, households within affordable multifamily properties often bear a disproportionate burden of the state's high energy costs as a percentage of their income;

WHEREAS, municipal housing authorities and nonprofit owners of affordable multifamily properties do not benefit from existing federal incentives for clean energy adoption, given that such incentives require tax liabilities to be of value;

WHEREAS, the Green Bank already offers the CT Solar Lease 2 ("SL2") program, under which property owners can install a solar system via a lease or Power Purchase Agreement, and has established CEFIA Solar Services Inc. ("CSS") to serve as the member manager of the tax equity fund through which such projects are financed;

WHEREAS, the Green Bank has partnered with the Connecticut Housing Finance Authority ("CHFA") to support properties in the State Sponsored Housing Portfolio ("SSHP"), and other properties of similar use and purpose, in going solar; and

WHEREAS, the CHFA Board of Directors has authorized the issuance of Qualified Energy Conservation Bonds ("QECBs") for the purpose of funding a loan to CSS, the proceeds of which will help finance the installation of solar projects on affordable multifamily properties under the SL2 program;

NOW, therefore be it:

RESOLVED, that the President of the Green Bank and any other duly authorized officer of the Green Bank, is authorized, on behalf of CSS and any other relevant Green Bank affiliate, to execute a loan agreement (the "Note") and ancillary documentation with

CHFA with terms and conditions materially consistent with those presented in the memorandum to the Board dated October 9, 2015.

RESOLVED, that the President of the Green Bank and any other duly authorized officer of the Green Bank, is authorized, on behalf of CSS and any other relevant Green Bank affiliate, to execute amendments with all existing SL2 debt and equity investors to allow CSS to accept such a Note from CHFA.

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

b. Smart - E Program*

Kerry O'Neill provided an overview of the Smart–E Program. She stated that they are at almost $10 million approved and closed projects, with about 550 loans. She stated that it is a high credit profile portfolio. She stated that there have only been two delinquencies with no defaults. She stated that it has a high decline rate and is supported by $4.2 million in credit enhancements. She stated this allows them to attract $30 million in private local capital.

She stated that they are bringing forward a credit challenged version of this that will allow as low as a 580 FICO score. Reed Hundt questioned why the Green Bank cannot go down to a 580 FICO score. Kerry O'Neill explained that the Green Bank is not utilizing its own capital, therefore CHIF is the only option to go to a 580 score. Kerry stated that CHIF is already in this space and it's a benefit for the Green Bank to work with them. She stated that there is an ongoing relationship with CHIF and it fits with the model of working with the incumbents already in this space. She stated that it should help the contractors to meet the needs of new customers.

Commissioner Klee questioned if they send the lower income people to CHIF first or to local lenders first. Kerry O'Neill stated that they will determine that as they move forward. She stated that the contractor can send them to CHIF.

Reed Hundt questioned how many lenders there are. Kerry O'Neill stated that there are currently nine lenders. Reed Hundt questioned how many contractors. Kerry O'Neill stated that it is an open market and there are approximately 26,000 home improvement contractors in the state. She stated that they are looking for lenders that are active in the consumer lending area. She stated that it is a competitive market place and that they are competing with loan programs backed by ratepayer's capital. She stated that they are they do offer interest rate buy downs. She stated that the solar installers are happy with the product. She stated that the 0% heating loan will go to 2.99% in November. She stated that it's still competitive, but not as bad. She stated that they need to support the credit challenged consumers.

Kerry O'Neill stated that they need a centralized platform. She explained that on-bill repayment is a struggle for the lenders. She explained that the SMART–E Program is an umbrella product. Consumers can utilize their own contractor and a local lender or go to a centralized platform. She explained that it's very flexible in loan terms up to 15 – 20 year terms. She stated that they would like to see CHIF on the platform to capture more of the declines. She explained that roughly half of the declines can be picked up by CHIF.

Commissioner Klee questioned where PosiGen comes in. Kerry O'Neill explained that PosiGen is for solar sale, a solar offer with an efficiency add on. She stated that it's a lease not a loan. She explained that it's a different offering.

Bert Hunter explained that there are a number of solar installs and for the Green Bank to be competitive they need to go out for a longer period of time. He explained that CT Solar loan has moved

to 20 years. He explained that they're working on transferability upon the sale of the home.

Kerry O'Neill stated that the banking community has been very supportive of the Green Bank. Bert Hunter stated that the market has to be there and that they are trying to show the demand and the need for the funding. He stated that that will make it a more attractive sale to the banks.

Kerry O'Neill stated that they are focusing on contractors that are currently active in energy. Bryan Garcia explained that a large portion of the contractors who use the Smart-E Loan are solar contractors. Given that the Green Bank manages the incentive, which it has reduced over time, it has worked hard to transition the contractor reliance on subsidies towards a focus on financing. He explained that there are other incentive programs out there not managed by the Green Bank with a lot of contractors. Those markets are harder to pivot towards financing because they are reliant on subsidies. He stated that they are making steady progress.

Kerry O'Neill went on to advise of a new partnership with Home Depot for the SMART–E Program.

Kerry O'Neill stated that they are asking for approval on a centralized platform, additional capital, and eligible lenders alternative underwriting.

Upon a motion made by Norma Glover and seconded by John Harrity Resolution 8 passed unanimously.

Resolution #8

WHEREAS, in July of 2011, the Connecticut General Assembly passed Public Act 11-80, "AN ACT CONCERNING THE ESTABLISHMENT OF THE DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION AND PLANNING FOR CONNECTICUT'S ENERGY FUTURE," which created the

Connecticut Green Bank (the "Green Bank") to develop programs to finance and otherwise support clean energy investment in residential projects per the definition of clean energy in CGS Section 16- 245n(a);

WHEREAS, in February of 2013, the DEEP released the Comprehensive Energy Strategy ("CES") for Connecticut that includes developing financing programs that leverage private capital to make clean energy investments more affordable, including the pilot Smart-E Loan residential financing program and the development of an on bill repayment ("OBR") program for residential customers with a utility shutoff provision for failure to make loan repayments;

WHEREAS, in May of 2013, Green Bank launched the Smart-E Loan program, statewide as of November 2013, with 9 credit unions and community banks providing low cost and long-term financing for measures that are consistent with the state energy policy and the implementation of the CES. The Smart-E Loan uses $4.17 million of repurposed ARRA-SEP and Green Bank funds to attract nearly $30 million of private investment from local financial institutions; and

WHEREAS, Green Bank intends to develop and implement the Smart-E Loan program, as amended, to leverage private capital and enter the market quickly with options for direct and centralized lending platforms, underwritten via standard, OBR, and alternative underwriting methods.

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors (the "Board") approves of the centralized lending platform, and the ability to perform standard, OBR, or alternative underwriting methods across both direct and centralized lending platforms consistent with the memorandum submitted to the Board dated October 9, 2015;

RESOLVED, that the Board approves of increases in loan duration of up to 20 years across all Smart-E loan offerings; and

RESOLVED, that the Board approves of the reallocation of $466,982 in unused ARRA funds from the now closed Cozy Home Loan program to Smart-E to support additional interest rate buy-downs for the Smart-E Bundle offer.

c. Low Income Program Updates

Kerry O'Neill stated that there are three homes in a row in Bridgeport that have used PosiGen for their solar projects. She stated that they are working with a lot of state and federal agencies including utilities and innovative partners on financing aimed at low income residents.

She stated that on the capital side there is PosiGen, CHIF, HDF, C-PACE, and the MacArthur Foundation. She stated that they have a variety of multi and single family options. She stated that they are trying to support the different low income markets. She stated that the bulk of the resources, especially staff time, is spent on market transformation, alignment, and training.

6. Joint Committee Update and Recommendations*

Bryan Garcia provided an update on the Joint Committee and its recommendations.

a. Coordination on Goals and Priorities*

Bryan Garcia explained that it is a team effort to support the Joint Committee, which is a committee required by our enabling statute. He advised that there are five voting members on the Joint Committee. He explained that there are five areas that they are trying to tackle. The five areas are government, small business, medium to large business, and single and multi-family. He explained that the staff is working hard to coordinate programs with our utility partners administering the Connecticut Energy Efficiency Fund. He

explained that the members had come up with goals and priorities. He explained that they are working to include the Joint Committees' recommendations in the comprehensive plan. He explained that it will help to continue to make progress towards better coordination. Commissioner Klee stated that it's a useful way to make sure that everyone's in synchronicity.

Upon a motion made by Reed Hundt and seconded by Bettina Ferguson Resolution 9 passed unanimously.

Resolution #9

WHEREAS, in July of 2011, the Connecticut General Assembly passed Public Act 11-80 (the Act), "AN ACT CONCERNING THE ESTABLISHMENT OF THE DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION AND PLANNING FOR CONNECTICUT'S ENERGY FUTURE," which created the Connecticut Green Bank (the "Green Bank") to develop programs to finance and otherwise support clean energy investment per the definition of clean energy in Connecticut General Statutes Section 16-245n(a);

WHEREAS, the Act directs the Green Bank to develop a comprehensive plan to foster the growth, development and commercialization of clean energy sources, related enterprises and stimulate demand clean energy and deployment of clean energy sources that serve end use customers in this state;

WHEREAS, the Board of Directors of the Green Bank (the "Board") approved the Comprehensive Plan for FY 2015 and FY 2016 at a meeting on June 20, 2014 and then again on July 17, 2015; and

WHEREAS, the Board directed the members of the Green Bank serving on the Joint Committee of the Energy Efficiency Board and the Green Bank (the "Joint Committee")to bring forth recommendations for joint goals and objectives that can be included in the FY 2015 and FY 2016 Comprehensive Plan.

NOW, therefore be it:

RESOLVED, that the Board approves the recommendations of coordination on goals and priorities dated September 8, 2015 submitted by the members of the Joint Committee; and

RESOLVED, that the Board revises the Comprehensive Plan of the Green Bank to include the goals and priorities of the Joint Committee.

7. Bond Authorization Approvals – Green Connecticut Loan Guaranty Fund and the Renewable Energy and Energy Efficiency Finance Account*

Bryan Garcia provided an update on bond authorization approvals. He explained that they had attempted to protect the bond authorizations during the summer special session, but had lost much of the bond authorizations in that process. He explained that between REEEFA and GLGF they have protected $13 million of $36 million from those two bond authorizations. He recommended that they plan on how to deploy those funds and demonstrate performance before going back to request additional authorization.

Bryan Garcia stated that they will work through the political process to get on the Bond Commission agenda in early 2016. He explained that REEEFA supports renewable energy. He explained that they would design a program to advance objectives set forth in the Comprehensive Plan.

Bryan Garcia explained that GLGF is in support of non-profit organizations, but that definition is broad and includes single family, small business, and non-profit organizations, and that they support energy conservation projects. He explained that they can use the funds to support conservation projects, which are consistent with the Comprehensive Plan and the Comprehensive Energy Strategy.

Brian Farnen explained that GLGF was capped at $18 million per year, but was reduced to $10 million in the summer legislative session. He explained that $2.5 million has already been used through the Energy Conservation Loan Fund (ECLG) administered by the Connecticut Housing Investment Fund (CHIF) on behalf of the

Department of Housing, leaving $2.5 million for ECLF and $5.0 million for the Green Bank. He explained that the big issue is to figure out the next steps and to strategize. He explained that moving forward we need to look to use this bond funds in 2016. He stated that the current prediction is no additional funds coming in due to the tight state budgetary environment.

Bryan Garcia stated that the Green Bank has $13 million in statutorily authorized bond proceeds. He proposed that those funds be allocated into four programs. He explained that it would attract $78.5 million in investment. Bert Hunter stated that $3 million REEEFA will be used in solar lease. He stated that they are going to go to partners and ask to expand the facility to accommodate more of the small and midsize commercial scale projects. He explained that $3.5 million of the bond funds will be utilized for solar lease on the residential side. He is proposing switching out funds to use $3.5 million ARRA funds to support the SMART–E Program. Norma Glover stated that there needs to be more creativity to make up for the funds that have been removed.

Bert Hunter explained that PosiGen has $5 million that is capitalizing the low to middle income solar lease product. He explained that they would need them to work jointly to attract a senior lender. He explained that they would use the REEEFA funds in that way for the PosiGen product. He explained that the $1.5 million funds from GLGF they would swap out the funds that are currently supporting the SMART–E. He explained that they would leverage a lot of private investment in the programmatic areas. He explained that they will be in a stronger position to ask for more. He explained that they propose using the proceeds in this way. Bettina Ferguson stated that the resolution needed to be revised to reflect the proposal for REEEFA as it was incorrectly written.

Upon a motion made by John Harrity and seconded by Bettina Ferguson Resolution 10 passed unanimously.

Resolution #10

WHEREAS, the State Bond Commission exists under the provisions of the State General Obligation Bond Procedure Act through Section 3-20 of the Connecticut General Statutes to approve project and program funding requests deemed to be in the state's best interest;

WHEREAS, Connecticut General Statutes direct the Connecticut Green Bank (Green Bank) to establish a Green Connecticut Loan Guaranty Fund and Renewable Energy and Efficient Energy Finance Account, whose operations and purposes are prescribed by C.G.S. Sections 16a-40f and 16-245aa respectively; and

WHEREAS, the Green Bank has a demonstrated record of effective stewardship of ratepayer funds, leveraging such funds to attract many multiples of private investment into furthering Connecticut's clean energy goals.

NOW, therefore be it:

RESOLVED, that the Board instructs staff to request of the State Bond Commission an amount of $5 million from the Green Connecticut Loan Guaranty Fund, from which the proceeds of $1.5 million will be used to attract multiples of private investment toward residential clean energy, health, and safety measures through the Smart-E Loan program, and from which the proceeds of $3.5 million will be used to attract multiples of private investment into solar photovoltaic projects through an innovative lease structure; and

RESOLVED, that the Board instructs staff to request of the State Bond Commission an amount of $8 million from the Renewable Energy and Efficient Energy Finance Account, from which the proceeds of $5.0 million will be used to attract multiples of private investment into solar photovoltaic projects and energy efficiency measures targeted to the low-to-moderate income residential market, and from which the proceeds of $3.0 million will be used to finance the expansion of the CT Solar Lease commercial projects.

8. Institutional Sector Program Update

Andy Brydges provided an overview on the Institutional Sector. He explained that the best path forward is to use the previously allocated G.O. Bonds. He explained that there had been some discussion on a financial strategy for the Green Bank. He stated that they discussed an opportunity to create pooled financing options as well as proposing interest rates that would not differ much from the general rate. He stated that there were 20 respondents in total. He stated that 10 were selected to interview for Senior Manager Roles. He explained that the evaluation panel included the CT Green Bank finance, legal, and accounting teams along with the Office of the Treasurer and various consultants.

Andy Brydges stated that they would like to immediately use the proposal from Bank of America that offered a direct placement bond model. He explained that they still need to determine if this would be the lowest cost of capital. He explained that they have access to a $150 million interest rate buy down product. He stated that they could access this and it would benefit the state projects by further improvement in the rate. He stated that they recommend structuring these bonds as public offerings.

Andy Brydges stated that they will investigate the potential use of the Clean Water Fund Program. Bryan Garcia explained that more recently the EPA has started to look at SCRF to see if there is a nexus between clean water and clean power. Commission Klee stated that Connecticut is unique. He stated that there is a queue for the use of the Connecticut funds.

Andy Brydges stated that for the other 19 firms they recommend qualifying all of the respondents in three categories. The three categories would be Senior Managers, Co-Managers, and a Selling Group. Reed Hundt questioned the amount of money. Andy Brydges explained that it's for $40 - $45 million, over time. Reed Hundt questioned why there were so many firms. Bettina Ferguson stated that it's much better to have more firms. She stated that this is an Inaugural issue. She stated that they will be fighting and arguing to be Senior Managers per issue. She stated that there will be one Senior Manager per issue. She stated that they will all have

participation in selling the bonds. She explained that the Selling Group members don't have their name on the cover, but will have access to sell the bonds.

Andy Brydges stated that they need to determine and finalize how to access the direct placement program by Bank of America. He stated that they are working on development of the master bond indenture with finalization in Q1 of 2016.

9. Audit Update

George Bellas provided an audit update. He stated that last fiscal year 14 was the first year with expanded disclosures. He stated that they received a certificate of achievement for their validation efforts to supply full disclosure. He stated that they will continue to work in this area for the fiscal year 15 audit. He stated that there have been no weaknesses and no material errors or adjustments identified.

He stated that this is the first year that the state is implementing GASB 68. He stated that they are working through this currently. He stated that they plan to present the final draft to the Audit Committee in November. He stated that when they look at the first quarter of 16 they are accomplishing their goals to move away from a grant based entity. He stated that total assets of $127 million versus $120 million for the previous fiscal year.

Reed Hundt stated that the budget sheet should be a topic for future discussion and that it would appear that the current financial position is exactly where the Green Bank wanted it to be as it transitioned from a subsidy model to a financing model.

10. Sector Updates and Progress to Targets

Bryan Garcia provided an update on the targets for the fiscal year - $670 million of clean energy investment. He started by providing a comparison of this stretch goal with that of the utilities which have about a $310 million capital improvement budget for the year. He stated that the Green Bank is fundamentally changing the model on

how energy improvements are made on the customer side of the meter. He stated that the changes will be seen in the numbers as the team pushes forward. He stated that these are big targets and that the organization is making steady progress, which says a lot about customers wanting change in how they're managing their energy costs and budgets.

11. Other Business

There was no other business.

12. Adjourn

Commissioner Klee requested adjournment of the meeting at 11:09 am.

Upon a motion made by Norma Glover and seconded by John Harrity the meeting was adjourned at 11:09 am.

Respectfully submitted,

_____

Robert Klee, Vice Chair

BOARD OF DIRECTORS

REGULAR MEETING SCHEDULE FOR 2016

The following is a list of dates and times for **regular meetings** of the Connecticut Green Bank Board of Directors through **2016**.

- January 15, 2016 – Special Meeting from 9:00 to 11:00 a.m.
- April 22, 2016 – Regular Meeting from 9:00 to 11:00 a.m.
- June 17, 2016 – Regular Meeting from 9:00 to 11:00 a.m.
- July 15, 2016 – Regular Meeting from 9:00 to 11:00 a.m.
- October 21, 2016 – Regular Meeting from 9:00 to 11:00 a.m.
- December 16, 2016 – Regular Meeting from 9:00 to 11:00 a.m.

Should a **special meeting** need to be convened for the Connecticut Green Bank board of Directors to review staff proposals or to address other issues that arise, a meeting will be scheduled accordingly.

All regular and special meetings will take place at the:

Connecticut Green Bank
845 Brook Street, Building #2
Albert Pope Board Room
Rocky Hill, CT 06067

AUDIT, COMPLIANCE AND GOVERNANCE COMMITTEE
REGULAR MEETING SCHEDULE FOR 2016

The following is a list of dates and times for regular meetings of the Connecticut Green Bank Audit, Compliance and Governance Committee through **2016**.

- Wednesday, April 13, 2016 – Regular Meeting from 8:30am - 9:30am
- Wednesday, October 12, 2016 – Regular Meeting from 8:30am - 9:30am

All regular meetings will take place at:

Connecticut Green Bank
845 Brook Street, Building #2
Albert Pope Board Room
Rocky Hill, CT 06067

CONNECTICUT GREEN BANK BUDGET AND OPERATIONS COMMITTEE
2016 REGULAR MEETING SCHEDULE

The following is a list of dates and times for regular meetings of the Connecticut Green Bank Budget and Operations Committee through **2016**.

- Friday, February 5, 2016 – Regular Meeting from 10:00 to 11:00 a.m.
- Wednesday, May 25, 2016 – Regular Meeting from 2:00 to 3:30 p.m.
- Tuesday, June 7, 2016 – Regular Meeting from 9:00 to 10:30 a.m.

All regular meetings will take place at:

Connecticut Green Bank
845 Brook Street, Building 2
Rocky Hill, CT 06067

REGULAR DEPLOYMENT COMMITTEE 2016 MEETING SCHEDULE

The following is a list of dates and times for regular meetings of the Connecticut Green Bank Deployment Committee through **2016**.

- Tuesday, February 9, 2016 – Regular Meeting from 3:00pm – 4:00pm
- Wednesday, March 2, 2016 – Regular Meeting from 2:00pm – 3:00pm
- Friday, May 13, 2016 – Regular Meeting from 3:00pm – 4:00pm
- Thursday, September 15, 2016 – Regular Meeting from 2:00pm – 3:00pm
- Friday, November 18, 2016 – Regular Meeting from 3:00pm – 4:00pm

All regular meetings will take place at:

Connecticut Green Bank
845 Brook Street, Building #2
Albert Pope Board Room
Rocky Hill, CT 06067

845 Brook Street, Rocky Hill, CT 06067
T 860.563.0015
ctgreenbank.com

CONNECTICUT GREEN BANK

Memo

To: Audit, Compliance & Governance Committee of the CGB Board of Directors

From: Brian Farnen, General Counsel and Chief Legal Officer and Suzanne Kaswan, Vice President, Human Resources

CC: Bryan Garcia and Mackey Dykes

Date: November 23, 2015

Re: Annual Governance Review

We have performed an annual review of the Connecticut Green Bank's (Green Bank) governance and operating documents. The items reviewed are as follows:

- Bylaws
- Operating Procedures
- Resolution of Purposes
- **Green Bank Employee Handbook**

At this time, staff does not recommend revisions to the Green Bank's Bylaws, Operating Procedures and Resolution of Purposes. If the Green Bank moves forward with a legislative change to remove itself from within Connecticut Innovations for administrative purposes, revisions to the Green Bank's Bylaws and Operating Procedures will be required at a later date.

Staff proposes the following revisions to the Green Bank's Handbook:

1. CEFIA's name was changed to CGB throughout the handbook.

2. Housekeeping changes were made throughout the handbook to reflect job title changes (Chief of Staff to Chief Operating Officer) and to reflect changes in our new IT and phone system resulting from the fact that we no longer partner with Connecticut Innovations for these services.

3. In Section II, Employment, under our promotion policy, a statement was added from Green Bank's operating procedures to clarify that employees must work in their positions for at least six months in ordered to be considered for promotion.

Resolution

RESOLVED, that the Audit, Compliance, and Governance Committee hereby recommends to the Board of Directors of the Connecticut Green Bank approval of the revisions to the Green Bank Employee Handbook materially consistent with this memorandum dated November 23, 2015.

845 Brook Street, Rocky Hill, CT 06067
T 860.563.0015
ctgreenbank.com

CONNECTICUT GREEN BANK

Memo

To: Connecticut Green Bank Board of Directors

From: Mackey Dykes, VP and Chief Operating Officer

CC: Bryan Garcia, President and CEO; Bert Hunter, EVP and CIO; Brian Farnen, General Counsel and CLO

Date: December 11, 2015

Re: Approval of Funding Requests below $300,000 – Update

At the July 18, 2014 Board of Directors (BOD) meeting of the Connecticut Green Ban ("Green Bank") it was resolved that the BOD approves the authorization of Green Bank staff to evaluate and approve funding requests less than $300,000 which are pursuant to an established formal approval process requiring the signature of a Green Bank officer, consistent with the Comprehensive Plan, approved within Green Bank's fiscal budget and in an aggregate amount not to exceed $1,000,000 from the date of the last Deployment Committee meeting. This memo provides an update on funding requests below $300,000 that were evaluated and approved. During this period, four projects were evaluated and approved for funding in an aggregate amount of approximately $436,814. Also provided in the online agenda is an electronic link to internal documentation of the review and approval process Green Bank staff and officers go through.

Project Name:	1431 Bank Street, Waterbury
Amount:	$36,350 +10%
Comprehensive Plan:	C-PACE Transaction
Staff Request:	Genevieve Sherman, Director, Commercial and Industrial Programs; Bert Hunter, Chief Investment Officer

Description

The property at 1431 Bank Street is a 3,553 square foot mixed use building (the "Property") that was acquired by Fonte Enterprise, LLC ("Fonte" or the "Company") in March, 2015 for the purpose of leasing the existing space to new tenants. The building is [redacted]% occupied with tenants as of May 2015.

The proposed investment is a C-PACE transaction under which the Connecticut Green Bank ("Green Bank") would provide construction financing (at a per annum 5.0% interest rate) and a 15-year term loan commitment (at a per annum 5.5% interest rate), in the amount of $36,350 to support oil-to-gas boiler upgrades.

The contractor for the project will be [redacted]

Given the size of the transaction, staff proposes an expedited underwriting review. With a total investment of $36,350, the LiTV for this property would be [redacted]. In addition, [redacted], the LTV is [redacted], [redacted]. Finally, the AATV (annual assessment-to-value, is at [redacted], even with the [redacted] threshold the market has communicated as an acceptable threshold).

Furthermore, from a financial perspective, staff has confidence that the property has sufficient cash flow to service the C-PACE Benefit Assessment. Using the current rent roll provided by management and applying the conservative assumption of flat lease prices across the 15 year financing term, the average Debt Service Coverage Ratio ("DSCR") for [redacted] C-PACE Assessment is [redacted] against Net Operating Income ("NOI") and Energy Savings.

Taking all of these factors into consideration, along with an SIR of 1.04x, staff recommends the project for approval, pursuant to the Project Approval Form for projects under $300,000.

Project Name:	Shiloh Baptist Church
Amount:	$66,078 +10%
Comprehensive Plan:	C-PACE Transaction
Staff Request:	Genevieve Sherman, Director, Commercial and Industrial Programs; Bert Hunter, Chief Investment Officer

Description

The property at 477 Broad Street, Bridgeport, Connecticut is a 6,226 sq. ft. church building owned and occupied by Shiloh Baptist Church ("Shiloh") since 1964.

The proposed investment is a C-PACE transaction under which the Connecticut Green Bank ("Green Bank") would provide construction financing (at 5.0%) and a 20-year term loan commitment (at 6.0%) in the amount of $66,078 to support the installation of LED lighting, water conservation measures and a 15.1 kW roof-mounted solar PV system.

The contractor for the project will be [redacted]

Given the size of this transaction, staff proposes an expedited underwriting review. With a total investment of $66,078, the LiTV for this property would be [redacted] figure that multiple private capital providers have suggested to staff is an acceptable threshold for purchasing C-PACE projects. In addition, [redacted], further enhancing the transaction from an underwriting perspective.

Furthermore from a financial perspective, staff has confidence that the property has both sufficient and stable enough cash flow that it should be able to service the C-PACE Benefit Assessment. Shiloh practices [redacted]), a standard practice for these types of organizations. [redacted] Green Bank staff is comfortable with Shiloh's ability to service the C-PACE Benefit Assessment after considering the 50-year operating history, a tangible net worth of [redacted]

Finally, with respect to the technical perspective, while the project includes additional water conservation measures that bring the SIR close to 1, the Green Bank's third-party technical administrator, Sustainable Real Estate Solutions ("SRS"), has reviewed the project and concluded that it has [redacted] with respect to energy savings and SIR. Taking all these factors into account, staff recommends the project for approval, pursuant to the Project Approval Form for projects under $300,000.

Project Name:	Logee's Greenhouses/Martin Holdings LLC - 141 North Street, Danielson, CT
Amount:	$204,303
Comprehensive Plan:	C-PACE Transaction
Staff Request:	Genevieve Sherman, Director, Commercial and Industrial Programs; Bert Hunter, Chief Investment Officer

Description

The property at 141 North Street in Danielson, Connecticut (Danielson is a borough in the town of Killingly) a 40,700 square foot greenhouse and retail facility ("the property") that is owner-occupied by Martin Holdings LLC and houses Logee's Greenhouses ("Logee's"). Founded in 1892, Logee's is currently in its third generation of family ownership and features over 1,000 varieties of tropical and subtropical rare and unique plants.

The proposed investment is a C-PACE transaction under which the Connecticut Green Bank ("Green Bank") would provide financing in the amount of $204,303 to support the installation of a 48.16 kilowatt rooftop solar photovoltaic system. The project's overall SIR is 1.04 and net cash flows from the project are immediately positive in year one. DSCR for the project across the financing term averages [redacted].

Upon project completion, the Green Bank will retain 100% ownership of the construction loan via conversion to a term loan (envisioned to be 20 years at a 6.0% interest rate) with the aim of selling it off to a private capital provider.[1] Regardless, a C-PACE assessment through the Town of Killingly will provide security.

The Green Bank may also extend a short-term unsecured loan (the "Feasibility Study Loan") to the property owner to finance the feasibility study and/or energy audit work which is statutorily required by the C-PACE Program. All Feasibility Study Loans are programmatically limited to $30,500 with an interest rate of 5% with all principal and interest due 15 months from disbursement. Once the Green Bank executes a C-PACE financing agreement with the property owner then the principal and accrued interest of such Feasibility Study Loan will be added into the principal of the benefit assessment and financing agreement and repaid to Green Bank upon closing.

Project Name:	D & R Real Estate LLC - 237 South Main Street, East Windsor, CT
Amount:	$108,946 + 10%
Comprehensive Plan:	C-PACE Transaction
Staff Request:	Genevieve Sherman, Director, Commercial and Industrial Programs; Bert Hunter, Chief Investment Officer

Description

The property at 237 South Main Street is a 2,050 square foot commercial building (the "Property") that is occupied by Action Glass, LLC ("Action Glass"), a full-service glass and vehicle upgrade facility servicing customers in Connecticut since 2001. The Property is owned by a related entity, D & R Real Estate, LLC ("D&R Real Estate" or the "Company").

The proposed investment is a C-PACE transaction under which the Connecticut Green Bank ("Green Bank") would provide construction financing (at a per annum 5.0% interest rate) and a 15-year term loan commitment (at a per annum 5.5% interest rate), in the amount of $108,946 to support a 19 kW Solar PV Renewable Energy System.

The contractor for the project will be [redacted].

With a total investment of $108,946, the LiTV for this property is [redacted]. In addition, [redacted] the LTV is [redacted], [redacted].

[1] Alternatively, if the new capital facility being negotiated with the winner of the C-PACE Warehouse RFP is closed sooner, the construction loan will be advanced by the capital provider's SPV and converted to a term loan in accordance with the provisions of that capital facility.

Furthermore, from a financial perspective, staff has confidence the operating company has sufficient cash flow to service the C-PACE Benefit Assessment. Staff examined the financials of Action Glass, the operating company, [redacted]. Additionally, the building owner has already been awarded a Zero-emission Renewable Energy Contract (ZREC), which is factored in the Energy Savings analysis. Across the 15 year financing term, the average Debt Service Coverage Ratio ("DSCR") for the [redacted] C-PACE Assessment is [redacted] against EBITDA and Energy Savings.

Taking all of these factors into consideration, along with an SIR of 1.00x, staff recommends the project for approval, pursuant to the Project Approval Form for projects under $300,000.

Resolution

WHEREAS, on January 18, 2013, the Connecticut Green Bank (the "Green Bank") Board of Directors (the "Board") authorized the Green Bank staff to evaluate and approve funding requests less than $300,000 which are pursuant to an established formal approval process requiring the signature of a Green Bank officer, consistent with the Green Bank Comprehensive Plan, approved within Green Bank's fiscal budget and in an aggregate amount not to exceed $500,000 from the date of the last Deployment Committee meeting, on July 18, 2014 the Board increase the aggregate not to exceed limit to $1,000,000 ("Staff Approval Policy for Projects Under $300,000"); and

WHEREAS, Green Bank staff seeks Board review and approval of the funding requests listed in the Memo to the Board dated December 11, 2015 which were approved by Green Bank staff since the last Deployment Committee meeting and which are consistent with the Staff Approval Policy for Projects Under $300,000;

NOW, therefore be it:

RESOLVED, that the Board approves the funding requests listed in the Memo to the Board dated December 11, 2015 which were approved by Green Bank staff since the last Deployment Committee meeting. The Board authorizes Green Bank staff to approve funding requests in accordance with the Staff Approval Policy for Projects Under $300,000 in an aggregate amount to exceed $1,000,000 from the date of this Board meeting until the next Deployment Committee meeting.

1431 Bank Street: A C-PACE Project in Waterbury, CT

Address	1431 Bank Street, Waterbury, CT 06708	
Owner	Fonte Enterprise, LLC	
Proposed Assessment[1]	$36,350	
Term (*years*)	15	
Term Remaining (*months*)	Pending construction completion	
Annual Interest Rate	5.5%	
Annual C-PACE Assessment	$3,590	
Savings-to-Investment Ratio (SIR)	1.04x	
Annual Net Operating Income (NOI)	[redacted]	
Average Debt-Service Coverage Ratio	[redacted]	
Lien-to-Value	[redacted]	
Loan-to-Value	[redacted]	
Annual Assessment-to-Value (AATV)	[redacted]	
Projected Energy Savings (mmBTU)		EE
	Over term of loan:	520
	Per year (avg):	35
Projected Cost Savings (incl. ZRECs and tax benefits)	Over term of loan:	$56,048
	Per year (avg):	$3,737
Objective Function	14.31 kBTU / ratepayer dollar at risk	
Location	Town of Waterbury, CT	
Type of Building	Mixed Use – Retail / Apartment	
Year of Build	1930	
Building Size (*sf*)	3,553	
Year Acquired by Current Owner	2015	
Appraised Value	[redacted]	
Status of Mortgage Lender Consent	[redacted]	
Proposed Project Description	Gas conversion	
Est. Date of Construction Completion	Pending closing	
Current Status	Awaiting approval	
Energy Contractor	[redacted]	
Notes	[redacted]	

Shiloh Baptist Church:
A C-PACE Project in Bridgeport, CT

Address	477 Broad Street, Bridgeport, CT			
Owner	Shiloh Baptist Church of Bridgeport, Inc.			
Proposed Project Description	LED Lighting Upgrade & 15.1 kW Solar PV System			
Proposed C-PACE Assessment	$66,078			
Appraised Parcel Value	[redacted]			
Loan-to Value & Lien-to-Value Ratio	[redacted]			
Assessment Term (*years*)	20			
Annual Interest Rate	6%			
Annual C-PACE Assessment	$5,717			
Most Recent Full Year P&L	[redacted]			
Tangible Net Worth	[redacted]			
Savings-to-Investment Ratio ("SIR")	1.00			
SIR Risk Rating	"B – Medium Risk" (95% CI of 0.96 – 1.06)			
Energy Savings / Clean Energy Production		EE	RE	Total
	Per year (kWh)	4,947 kWh	18,583 kWh	23,530 kWh
	Over term (kWh)	71,822 kWh	355,334 kWh	427,156 kWh
Estimated Cost Savings	Per year ($)	$5,711		$5,711
	Life Cycle ($)	$114,215		$114,215
Objective Function	22.06 kBtu per ratepayer dollar at risk			
Location	City of Bridgeport			
Type of Building	Special Purpose Property – Church			
Year of Build	1955			
Building Size (*total sf*)	6,226			
Year Acquired by Current Owner	N/A			
Status of Mortgage Lender Consent	[redacted]			
Est. Date of Construction Completion	Pending closing			
Current Status	Pending President & CEO approval			
Energy Contractors	[redacted]			
Additional Comments:				

Logee's Greenhouses:
A C-PACE Project in Killingly, CT

Address	141 North Street, Danielson, CT 06239		
Owner	Martin Holdings LLC[1]		
Proposed Project Description	48.16 kW rooftop solar array[2]		
Proposed C-PACE Assessment	$204,303		
Assessment Term (*years*)	20		
Term Remaining (*months*)	Pending Construction Completion		
Annual Interest Rate	6.0%		
Annual C-PACE Assessment	$17,677		
Savings-to-Investment Ratio (SIR)	[redacted]		
Average Debt-Service Coverage Ratio	[redacted]		
Loan-to-Value Ratio	[redacted]		
Projected Energy Savings		RE	Total
	Per year (mmBTU)	166	166
	Over term (mmBTU)	3,175	3,175
Estimated Cost Savings	Per year ($)	$19,346	$19,346
	Over Term ($)	$415,730	$415,730
Objective Function	15.54 kBTU per ratepayer dollar at risk		
Location	Danielson (Borough in the Town of Killingly)		
Type of Building	Retail – Big Box		
Year of Build	1892-1900[3]		
Building Size (*total sf*)	40,700		
Year Acquired by Current Owner	2001[4]		
Property Value	[redacted]		
Status of Mortgage Lender Consent	[redacted]		
Est. Date of Construction Completion	Pending closing		
Current Status	Pending CT Green Bank Board of Directors Approval		
Energy Contractors	[redacted]		
Additional Comments	[redacted]		

237 South Main St Street: A C-PACE Project in East Windsor, CT

Address	237 South Main St			
Owner	D & R Real Estate LLC			
Proposed Assessment	$108,946			
Term (*years*)	15			
Term Remaining (*months*)	Pending construction completion			
Annual Interest Rate	5.5%			
Annual C-PACE Assessment	$10,760			
Savings-to-Investment Ratio	1.00x			
Average DSCR	[redacted]			
Lien-to-Value	[redacted]			
Loan-to-Value	[redacted]			
Projected Energy Savings (mmBTU)		EE	RE	Total
	Per year		58	58
	Over term		869	869
Estimated Cost Savings (incl. ZRECs and tax benefits)	Per year		$10,762	$10,762
	Over term		$161,436	$161,436
Objective Function	7.98 kBTU / ratepayer dollar at risk			
Location	East Windsor			
Type of Building	Office/Warehouse			
Year of Build	1903			
Building Size (*sf*)	2,050			
Year Acquired by Owner	2004			
As-Complete Appraised Value	[redacted]			
Mortgage Lender Consent	[redacted]			
Proposed Project Description	Renewable Energy – 19 kW Solar			
Est. Date of Construction Completion	Pending closing			
Current Status	Awaiting Approval			
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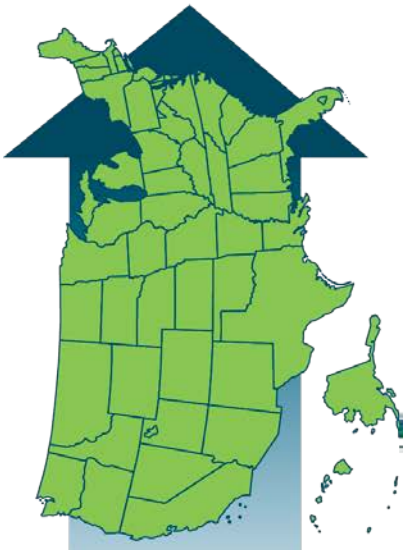

Making it Count: Understanding the Value of Energy Efficiency Financing Programs Funded by Utility Customers

Financing Solutions Working Group and
Driving Ratepayer-Funded Efficiency through Regulatory Policies Working Group

December 2015

The State and Local Energy Efficiency Action Network is a state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020.

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Acronyms

ARRA—American Reinvestment and Recovery Act
CAEATFA—California Alternative Energy and Advanced Transportation Financing Authority
CGB—Connecticut Green Bank
CPUC—California Public Utilities Commission
DEEP—Department of Energy and Environmental Protection
EEB—Energy Efficiency Board
EM&V—Evaluation, Measurement, and Verification
iDR—Implied Discount Rate
IRB—Interest Rate Buydown
LAO—Legislative Analyst Office
LLR—Loan Loss Reserve
MEA—Maryland Energy Administration
MHELP—Maryland Home Energy Loan Program
MT—Market Transformation
NRDC—Natural Resources Defense Council
NTG—Net to Gross
NYCEEC—New York City Energy Efficiency Corporation
NYSERDA— New York State Energy Research and Development Authority
OBF—On-bill Financing
PACE—Property Assessed Clean Energy
PACT—Program Administrator Cost Test
PCT—Participant Cost Test
PSC—Public Service Commission
PUC—Public Utilities Commission
PURA—Public Utilities Regulatory Authority
PV—Photovoltaic
RA—Resource Acquisition
REC—Renewable Energy Credit
RGGI—Regional Greenhouse Gas Initiative
RIM—Ratepayer Impact Measure Test
SBC—Systems Benefits Charge
SCT—Societal Cost Test
TRC—Total Resource Cost Test
TRM—Technical Reference Manuals

Executive Summary

Utility customer-supported financing programs are receiving increased attention as a strategy for achieving energy saving goals. Rationales for using utility customer funds to support financing initiatives include:

- **Some market segments have difficulty accessing financing**, and utility customer funds, as credit enhancements or as direct investment, are needed to expand access to these consumers.
- **Ratepayer funds are limited** and larger cost contributions from participants can increase leverage and minimize rate impacts of efficiency programs.[1] Utility customer-funded financing offers may encourage larger cost contributions by participating consumers.
- **Private markets are not providing attractive financing for energy efficiency projects** due to a lack of information, education, and loan performance data. Utility customer-funded credit enhancements or direct investment may be able to mitigate this gap and allow the needed loan performance data to accumulate.
- **Specialized financing products like on-bill financing or property assessed clean energy (PACE) are needed** to overcome the unique challenges of financing energy efficiency investments in certain market sectors (e.g., renter/owner split incentives, balance sheet treatment); utility customer funds may be needed to encourage these new products.

In most jurisdictions, financing is either offered as a small component of a larger portfolio that includes rebates, technical assistance, education, audits, and training, or is not offered. In other jurisdictions (CT, NY, MA, CA, MD) policy makers are considering or implementing large-scale financing programs using utility customer funds and/or are considering shifting away from traditional energy efficiency program strategies over time. To compare these two approaches, we use the construct of "financing as a complement"—using financing as an enhancement to existing programs—and "financing as a substitute"—transitioning away from traditional programs over time and toward financing as a primary strategy to achieve energy efficiency goals.[2]

The SEE Action Financing Solutions and Driving Ratepayer-Funded Efficiency through Regulatory Policies Working Groups commissioned this report as groundwork for a dialogue to explore regulatory and policy mechanisms for ensuring that efficiency financing initiatives provide value for society and protection for consumers. In this study, we identify and explore many of the emerging regulatory and practical issues that jurisdictions will need to consider when contemplating an increased reliance on financing programs as a primary program strategy.

Large-scale financing programs present at least two challenges for state policy makers, utility regulators, and program administrators:

- Some program administrators believe that attracting private-sector capital partners requires greater flexibility than a public utility commission (PUC)-overseen model allows and have placed these programs

[1] Rebates and incentives also achieve leverage, in the form of customers' cash contributions or use of private, non-utility customer-supported financing. However, utility customer-supported financing may increase this leverage.

[2] Note that these two approaches are not mutually exclusive in the short-term; even in jurisdictions where policy makers have made statements emphasizing an eventual substitution, financing currently operates as a complement (e.g., consumers may make use of existing programs and new financing-focused offers).

partially or wholly outside of oversight by state utility regulators.[3] In some cases, administrators of finance programs have not been subject to existing planning and evaluation approaches utilized for existing energy efficiency programs. If a shift toward financing as a primary strategy for acquiring energy efficiency is accompanied by less regulatory oversight or different approaches to ensuring accountability, then it may be more difficult to assess impacts from eliminating or cutting back traditional efficiency programs.

- Unique aspects of financing programs may create challenges in adapting traditional regulatory planning, evaluation, and performance tools that are used to assess the impacts and cost-effectiveness of efficiency programs (e.g., potential studies, cost-effectiveness screening, and impact evaluation). To a large extent, these tools have been developed and designed around traditional rebate and incentive programs, and adapting these tools to financing will take careful consideration and may require modification for use in a financing context. For example, because private financing options are often available to many customers, it is important to understand to what extent savings attributed to program financing are truly "additional" compared to savings that would have occurred in the absence of a utility-customer funded program.

In exploring these issues, we focus on identifying information and tools that state regulators need in order to fulfill their oversight role while balancing the interests of utility customers, shareholders, and the public.

Placing Energy Efficiency Financing Programs in a Regulatory Context

The regulatory context under which efficiency financing programs operate is heavily influenced by three variables: (1) use of utility customer funding, (2) type of program administrator, and (3) program classification and treatment. As shown in Figure ES-1, the use of utility customer funds often triggers requirements for some type of oversight by state regulators or governing boards. Financing programs that are implemented by existing efficiency program administrators are typically subject to a state's regulatory planning and oversight requirements. However, when finance programs are administered by new entities (e.g., a Green Bank), state policymakers do not necessarily place those entities under PUC oversight or apply existing regulatory mechanisms.[4] The regulatory context of financing programs is also influenced by the way the program is treated and categorized under a state's efficiency policy guidelines, including:

1. Whether financing is treated as a distinct program within the energy efficiency portfolio;[5]
2. Whether financing is treated as a resource acquisition program and/or viewed as a market transformation effort);[6] and

[3] Evaluation of financing programs does require data collection, although it is not yet clear what level of data collection will fall to private financial institutions who partner with ratepayer-funded programs. In one example, the California evaluation team identified only six data fields that would need to be reported by financial institutions because the majority of information needed for evaluation (e.g., customer information, property information, measure information) was already collected by program administrators, contractors, or other parties (Opinion Dynamics, 2014, p. 4). Some additional information may be required from consumers (e.g., consumer surveys).

[4] In some cases, state policymakers or financing proponents have cited concerns that attracting private-sector capital partners requires greater flexibility than a PUC-overseen model allows.

[5] For example, in jurisdictions that are considering financing as a substitute for traditional efficiency programs, it may be advantageous to treat financing as a distinct program because it would be easier to assess and document savings and cost-effectiveness through periodic impact evaluations.

[6] Resource acquisition tends to focus on energy savings that are achieved directly through program activities, whereas market transformation generally focuses on achieving energy savings via impacts on the broader market. Market transformation and resource acquisition approaches

3. Whether financing programs are linked to opportunities for the program administrator to earn performance incentives.

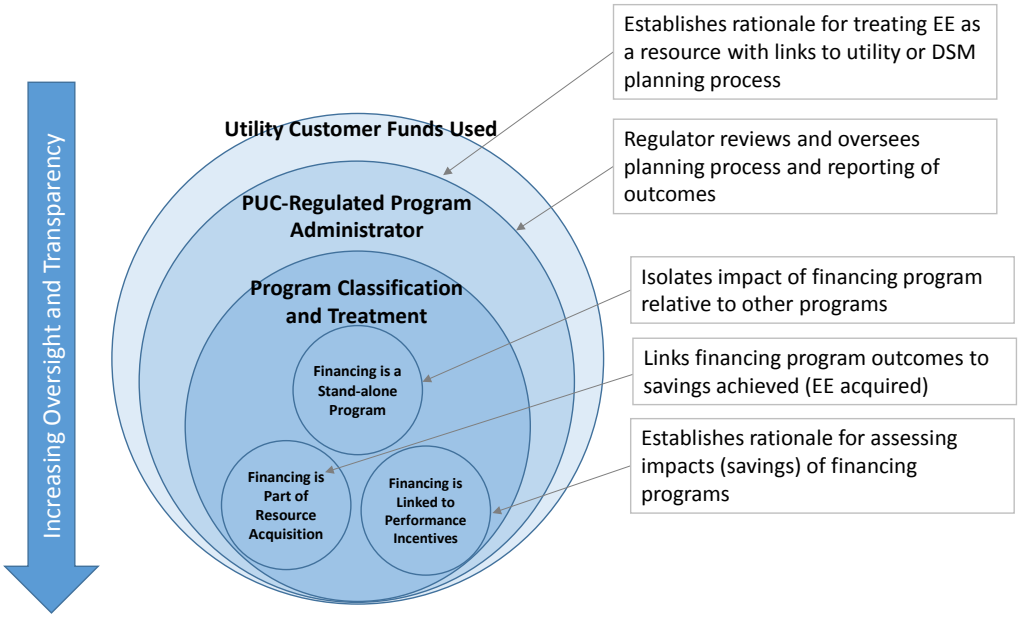

Figure ES-1: Placing Financing Programs in a Regulatory Context—Variables That Affect the Degree of Regulatory Oversight

In Table ES-1, we summarize key characteristics of five financing programs and initiatives that we reviewed in this study (see Chapter 2 for a more detailed case study of the five programs and the policy and regulatory environment in which they operate). Each of the programs makes use of (or seeks to make use of) utility customer funds, in amounts ranging from $5 million to nearly $1 billion. These five programs are *not* necessarily representative of national energy efficiency financing activity; however they were selected because they provide insights on issues related to the applicability of planning, performance, and evaluation tools for large-scale finance programs.

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are not mutually exclusive. Proponents of large-scale shifts toward financing as a core strategy for achieving energy efficiency goals often frame this type of effort as transformational (and long-term).

Table ES-1: Summary Characteristics of Financing Programs Reviewed

	CA	NY	CT	MA	MD
Financing program reviewed	Statewide Financing Pilots	NY Green Bank	Connecticut Green Bank (CBG)	HEAT Loan	Maryland Home Energy Loan Program (MHELP)
Utility customer funds sought or used?	Yes	Yes	Yes	Yes	Yes
Utility customer funds dedicated to selected financing program[7]	$75M[8]	$947M ($165M initial funding, $150M additional funding approved in July, $631.5M follow on request)[9]	$27.6M (2014)[10]	Approx. $15M (2013)	$4.6M proposed (2013 and 2014)
Regulated program administrator?	Yes, California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)[11]	Yes, New York State Research and Development Authority (NYSERDA)	No, Connecticut Green Bank	Yes, utilities' third-party administrator	No, Maryland Clean Energy Center
Financing envisioned as a complement?	Yes	Yes	Yes	Yes	Yes
Financing envisioned as a substitute?	Potentially	Yes	Yes	No	Potentially
Part of resource acquisition portfolio?	Yes	No	N/A[12]	Yes	No, but under discussion
Treated as a distinct program?	Potentially	Yes	N/A	No	Potentially
Tied to performance incentives?	Yes, via linkage to other EE programs	TBD	No	Yes, via linkage to other EE programs	No
Type of financing or credit enhancement offered by program	Loans, leases, energy savings agreements, loan loss reserves (LLRs) and debt service reserves	Guarantees, loan capital (credit facilities, subordinate capital, senior capital)	Interest rate buy downs (IRBs), LLRs, and loan capital	IRBs	IRBs

[7] CA (California Public Utilities Commission, 2013). NY (NYSERDA, 2014c). CT (CEFIA, 2014). MA (NSTAR, 2014) (WMECo, 2014) (National Grid, 2014). MD (EmPOWER Finance Work Group, 2013).
[8] $65.9M initial commitment; $9M held in reserve.
[9] Remaining capitalization proposed to be transferred over ten years (2016-2025), but supplemented by an external borrowing facility, supported by a pledge of the approved collections, that will allow NY Green Bank to deploy capital when needed but also would allow transfers to be scheduled to meet objectives for overall declining ratepayer collections. Funds are to be transferred over four years in equal installments beginning in June 2015.
[10] CGB's budget is for both renewable and energy efficiency efforts; utility customer funds of $28M in 2014 were used for administration and renewable energy programs.
[11] CAEATFA is a state agency that the California PUC designated as the administrator of California's financing pilots, in collaboration with utilities.
[12] Although the Connecticut Green Bank as the administrator of the Connecticut Clean Energy Fund is not responsible for resource acquisition, the utilities as administrators of the Connecticut Energy Efficiency Fund are focused on resource acquisition. Through a Joint Committee there is coordination on goals and priorities between the administrators, see http://www.ctcleanenergy.com/Portals/0/board-materials/5a_Consolidated%20Priorities_Joint%20Committee_090815.pdf

In reviewing experiences to date in these five programs, we found that:

- None of the reviewed programs currently operate as substitutes—consumers who take advantage of financing may also access rebates, education, and other efficiency programs offered by the program administrator. However, in several states (New York, Maryland, and Connecticut), policymakers or commissions have indicated their intention to explore financing as a substitute for traditional programs.
- Financing programs in California and Massachusetts are classified as resource acquisition efforts; this designation seems to correlate with increased requirements for evaluating the impacts of financing programs specifically (versus financing in combination with other program offerings).
- Financing programs that are treated as distinct programs (e.g., California, New York) within an overall portfolio may be required to demonstrate savings specifically attributable to the program, which may be especially important in jurisdictions considering using financing as a substitute for traditional programs in the future.
- Linking financing programs to performance incentives, whether directly or through their contribution to aggregate portfolio savings as in California and Massachusetts, may bring increased attention to evaluations that focus on savings that are attributable to program financing.

What Savings Could Financing Potentially Deliver?

In Chapter 3, we review the types of potential studies (technical, economic, and achievable), discuss studies that estimate the theoretical potential for financing of efficiency and their use by policymakers and program administrators, and discuss the applicability and inclusion of financing strategies in achievable potential studies.

Several initial studies examined how much capital could potentially be deployed in the energy efficiency market. For example, Booz & Co. completed a study for New York that estimated energy efficiency represented $55 billion of the $85 billion of addressable clean energy technical potential in the state over the next ten years.[13] This study was cited by NYSERDA in its petition sizing the NY Green Bank efficiency funding at $1 billion; some stakeholders took issue with using "theoretical estimates of investment potential" as the basis for capitalization levels of the Green Bank (City of New York, 2012).

A few initial efforts have attempted to incorporate financing into more traditional energy efficiency potential studies. For example, as part of a state-wide potential study in California, analysts focused on estimating the additional achievable energy savings that could be realized by introducing financing programs. The authors used a framework based on changes in a customer's implied discount rate (iDR) due to financing and found that the "incremental savings potential due to financing is modest" in California (Navigant, 2014, p. 142). A 2015 update to the study found that financing could increase potential savings by 4.5 percent in the residential sector and 3.5 percent in the commercial sector (Navigant, 2015). Explanations for the modest incremental savings potential include limited eligibility for proposed financing programs in the commercial and multifamily sectors and the relatively low importance of access to financing as a barrier to overall energy efficiency adoption (i.e., financing barriers are a small component of consumers' implied discount rate).

[13] Booz & Co. estimated what they described as the addressable potential for efficiency (and clean energy) over a ten year period; they did exclude customers in markets that had credit worthiness issues or were likely to be addressed by private financing.

Including energy efficiency financing as part of achievable potential studies could offer important insights regarding:

- **How financing might increase the total amount of achievable potential** (i.e., to what extent can program financing help grow the efficiency market, ensuring that program financing is not replacing existing private sector financing).
- **The amount of program-supported financing that might be appropriate to meet customer demand**, which could help administrators size their financing programs. Without incorporating the full range of barriers into an "achievable" estimate of financing potential, market-sizing analyses may lead to an overestimate of the amount of program capital actually needed.
- **The total savings financing could delivery,** for use in goal setting. Achievable potential studies can help decision makers to understand the incremental savings that financing could produce and to set savings goals against this benchmark.

Given the interest in financing as a potential substitute for traditional energy efficiency activities, additional research on the best methods to incorporate financing into achievable potential studies would be useful.

Financing Programs: Cost-Effectiveness Screening Issues

In Chapter 4, we discuss planning and performance metrics—benefit/cost screening tests and net program benefits—and their applicability to financing programs, and we identify unique features of financing programs that pose challenges for administrators when conducting cost-effectiveness screening analyses.

In thinking about cost-effectiveness screening tests for efficiency financing programs, it is helpful to distinguish between those tests that focus on costs and benefits from a utility or program administrator perspective (i.e., the Program Administrators Cost Test or PACT) and those that involve a broader comparison of costs and benefits (e.g., the Total Resource Cost or Societal Cost Test). The PACT is particularly relevant because a key rationale offered by proponents of large-scale financing programs is that they can effectively leverage limited program funds, attract a large amount of private capital, and induce participants to bear most or all of the costs of efficiency measures. From a PACT perspective, benefit-cost ratios for financing programs may be encouraging (i.e., greater than one) due to lower costs borne by the program administrator than would occur in a rebate program. However, the ratio alone does not indicate if total net savings are increasing as a result of introducing financing. If the total level of savings attributable to a financing program is modest or is less than what occurred using traditional programs, then the total amount of net benefits achieved may be lower. Thus, states that are considering a shift toward financing as a core energy efficiency strategy should examine both total net benefits and benefit/cost ratios in order to assess the complete picture.

Several states that are implementing large-scale financing programs have also begun to examine the unique features of financing strategies that may be addressed in screening these programs for cost-effectiveness. Specifically, decision makers are considering how to account for:

- **Measure Costs.** Depending on the application, incremental measures costs (i.e., the additional cost of a high-efficiency air conditioner versus a standard air conditioner) are often included in cost effectiveness calculations. However, program-supported loans cover the full cost of measures and may even include non-energy measures. These are real costs to the program; however one could argue that only the energy-related portion of the loan should be included in cost-benefit analysis.

- **Write Offs and Loss Reserves**. Regulators and program administrators may need to use reasonable assumptions for expected loan performance to estimate the cost of write offs and loss reserve payouts over time.

- **Opportunity Costs**. Opportunity costs, or the value of forgone alternatives, of capital dedicated to financing programs may need to be properly accounted for in cost-effectiveness tests. For example, programs that lend utility customer capital at below-market rates arguably may be foregoing higher potential returns. Determining an appropriate rate of return that these funds could have generated may be a matter of discussion among stakeholders. Similar opportunity cost questions arise when utility customer funds are used to establish a loss reserve.

Evaluating the Impact of Financing Programs

Evaluation has been used for decades to verify the impacts and cost-effectiveness of energy efficiency programs. Efficiency financing programs have typically not been evaluated as separate programs within utility customer-funded portfolios to determine their incremental savings contribution. Chapter 5 discusses the increasing relevance of evaluation in jurisdictions where financing is gaining prominence, either as a complementary strategy or as a potential substitute for traditional efficiency programs.

When evaluating financing as a resource acquisition strategy, the broad availability of alternative private financing options (e.g., credit cards, home equity lines of credit, savings) should be considered. Evaluations would ideally assess whether *program* financing was a critical factor in influencing participants' decision to move forward with their project (e.g., did the program-supported financing generate incremental savings?). This question may be more complex for efficiency financing programs compared to traditional efficiency programs because:

1. **Program financing is often offered in markets in which private financing is also readily available.** Thus, it may be more difficult to determine whether the project would have moved forward in the absence of a program offering.

2. **Program financing is often promoted as an element or option in a broader program offering** that may include other design components (e.g., technical assistance, rebates). Typical program evaluations generally do not parse out the specific impacts of particular program elements, focusing instead on the overall effectiveness of the program.

Figure ES-2 illustrates the multi-layered nature of the savings attribution question for energy efficiency programs that include and offer financing as part of their portfolio.

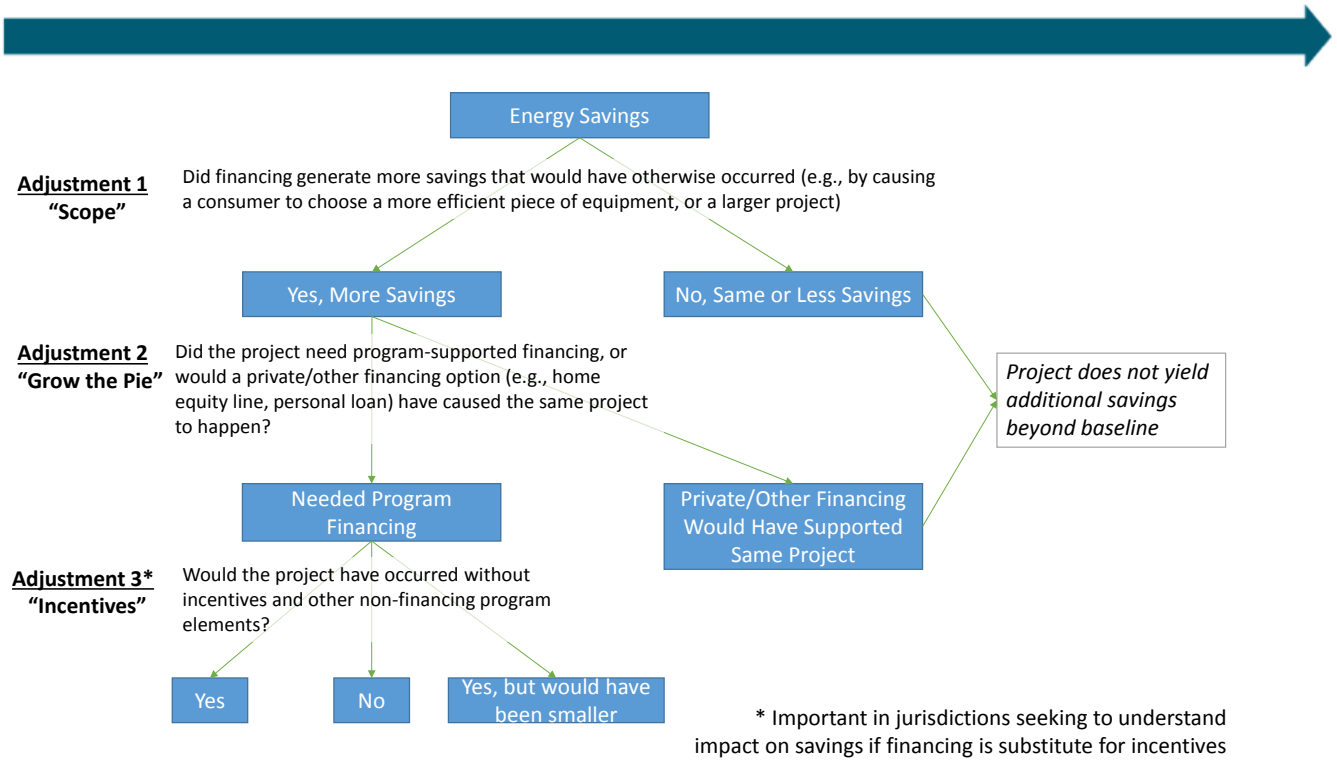

Figure ES-2: Savings Attribution in the Context of Energy Efficiency Financing[14]

Other financing programs focus on transforming the energy efficiency marketplace away from utility customer-funded rebates/incentives and towards a partially or fully private sector-funded model. Given the importance of understanding the effectiveness of financing as a transformational strategy, regulators and program administrators may wish to establish clear direction regarding evaluation requirements for programs with market transformation objectives. Best practices for evaluating programs that have market transformation objectives include (NMR Group, 2013):

- **Developing a logic model** to illustrate the market transformation theory;
- **Establishing baselines** against which progress will be measured;
- **Agreeing upon interim metrics** to show progress;
- **Committing to a timeline** of progress indicators; and
- **Measuring ultimate results** attributable to the program over an extended period of time.

Illinois and Massachusetts recently evaluated their financing programs; summary findings include:

[14] This figure is provided for illustrative purposes. It depicts savings attribution (adjustments) as a yes or no question when in reality each adjustment may result in partial yes answers. For example, financing had "some" influence or the financing resulted in the consumer investing in a larger efficiency project, but not whether to do efficiency or not.

- **Massachusetts (HEAT Loan Program).** In Massachusetts, the zero-percent interest residential HEAT Loan program has grown to roughly $100 million of loans originated annually, with interest-rate buy-downs in the range of $1,400 per loan.[15] Customers used HEAT loans primarily to finance equipment replacement (~80 percent of loans; 10 percent of loans were used for weatherization). A survey of ~950 aimed to assess the relative importance of the HEAT loan compared to other incentives in encouraging participation. Eighty-five percent of customers who used a HEAT loan reported that it allowed them to make improvements that they otherwise would have passed over. Evaluators found that only 9 percent of customers who received incentives also chose to use a HEAT loan. Those who did use the loan reported that it was slightly more influential in their decision-making than incentives, which are generous, including an insulation incentive of up to 75 percent of project cost. Among customers that did not take a HEAT loan, only 21 percent of customers reported that upfront costs were a barrier (compared to 39 percent of HEAT loan participants) (The Cadmus Group, 2015a).
- **Illinois (On-Bill Financing).** $7.6 million of loans had been made at the time of the evaluation (over 1600 loans), primarily to single-family residential customers. Nearly 90 percent of the loans financed replacement or upgrades of furnaces or central air conditioning systems). Based on self-reported surveys of 75 participants, the evaluation team estimated a free ridership rate of 13 percent; that is, 87 out of 100 projects were estimated to be due to the on-bill financing program and not to incentives, which were also available to on-bill financing (OBF) participants. However, participants were also asked if they planned to complete a project prior to learning about the program; almost half (43 percent) of all participants reported that they were planning to complete the upgrade.[16] All programs were cost effective from the program administrator perspective (PACT ranged from 1.27 to 3.13) although the pilot programs did not pass a total resource cost (TRC) test (The Cadmus Group, 2015b).

Evaluation can help state policy makers and program administrators assess whether savings are attributable to financing programs versus other programs components, offering insight on the impact of shifting resources to financing and away from other program options. Conventional evaluation methods can be adapted to assess financing programs, such as survey methods and various experimental and quasi-experimental approaches, including randomized control trials. However, further research is required on refining these approaches for financing programs and assessing which approaches are the most effective, and on cost-effective ways to assess savings and market transformation.

Conclusion

Our review of several leading states that are implementing or considering these large-scale financing programs suggests that additional work on adapting planning, performance, and evaluation tools is warranted in order to assess the role of large-scale financing programs. Table ES-2 outlines early applications of these tools to financing programs.

[15] Only approximately $15M of ratepayer funds was used to support total activity of $100M.

[16] This percentage varied by measure type; 76 percent of survey respondents who installed a new furnace had planned to do so before hearing of the program, but none of the respondents who installed insulation planned to do so prior to participating in the program. However, respondents were not asked to differentiate between plans to install a high efficiency unit versus a standard efficiency unit, so the evaluation team does not draw conclusions from this statistic.

Table ES-2: Early Experience with Adapting Traditional Planning and Performance Tools to Financing Programs

	CA	NY	CT	MA	MD
Program Reviewed	Statewide Financing Pilots	NY Green Bank	Connecticut Green Bank	HEAT Loan	EmPower
Achievable Potential Analysis Used?	Yes	No	No	No	No
Cost-Effectiveness Screening Used?	Yes (under development)	No	No (voluntary protocols used)	Yes	Yes
EM&V Process with Regulatory Oversight/Review?[17]	Yes	Yes	No	Yes	No

The perception that financing programs must be flexible enough to attract private capital has led some jurisdictions to modify regulatory reporting requirements. This could create situations in which financing is used as the primary mechanism to achieve energy efficiency goals but is subject to less regulatory oversight than has been applied to traditional efficiency programs. The ability of large-scale financing programs to achieve aggressive energy efficiency savings or market transformation objectives is still an open question. Achievable potential studies, such as those conducted in California, suggest that financing programs may increase electric and gas savings potential by only three to five percent (Navigant, 2014). This suggests some uncertainty regarding the ability of financing to drive energy efficiency to a new scale on its own, rather than as one component in a more comprehensive mix of programs and strategies.

Impact evaluations of existing large-scale financing programs that have achieved relatively high levels of loan volume may address other remaining issues. For example, in the residential sector, single measures like HVAC and windows often far outstrip the number of comprehensive whole-house projects that are financed; evaluations in Illinois and Massachusetts confirm this trend. HVAC equipment replacements and windows have relatively high naturally-occurring demand; robust impact evaluations may help determine whether these types of projects would have moved forward in the absence of a program offering, to avoid using utility customer funds to support projects that would have been completed anyways.

Jurisdictions that are considering a shift toward financing as a primary strategy to achieve their energy efficiency objectives may want to consider implementing a regulatory framework that has adequate oversight and accountability as strategic choices are pursued. Several key elements of a regulatory framework include:

1. **Independent Oversight Entity.** Regulatory oversight by an entity (e.g., PUC, city council, governing board) that is independent of the program administrator and applies performance and accountability requirements as robust as those applied to traditional efficiency programs.
2. **Program Classification and Treatment.** Treatment of energy efficiency financing programs in ways likely to generate periodic and rigorous assessments of program performance. Examples include treating financing as a stand-alone program and linking evaluated performance to administrator performance incentives.

Jurisdictions may wish to consider utilizing planning and evaluation tools that can help provide objective information regarding the prospects and performance of energy efficiency financing programs.

[17] Many of these entities are also overseen by a Board of Directors and conduct annual financial audits.

- **Achievable Potential Studies.** Achievable potential studies that focus on the incremental savings financing can unlock are likely to be more useful than "market sizing" studies that estimate a theoretical maximum investment need without considering demand for financing.
- **Cost-Effectiveness Screening Analysis.** It is important to estimate and report both total net benefits as well as benefit/cost ratios in order to assess the overall value of financing programs.
- **Evaluation.** Assessing the impacts of and savings attributable to financing programs may be more complex due to readily available private market alternatives. A robust evaluation may require an examination of (1) whether financing was needed to produce the savings; (2) whether program financing was needed, as opposed to private financing alternatives; and (3) whether the savings would have occurred in the absence of other program offerings, such as rebates and incentives.

Chapter 1: Introduction

Empirical studies suggest that current levels of public and utility customer (ratepayer) funding are insufficient to access all cost-effective energy efficiency opportunities in most jurisdictions (Navigant, 2014) (Goldman, et al., 2010). Utility customer-supported financing may be able to address the upfront costs of energy efficiency upgrades and stretch the impact of limited program dollars. Given this situation, the offer of financing to customers has received increasing attention in recent years as a key strategy for achieving energy efficiency goals.

At present, many program administrators are using utility customer funds to support financing products designed to encourage energy efficiency, either by making loans directly with customer funds or by using these funds to offer credit enhancements (e.g., loan loss reserves) to attract private capital.[18,19] Typically, financing is a small component of a larger portfolio of energy efficiency programs that includes rebates, technical assistance, education, training, and other strategies.

By contrast, policy makers in some jurisdictions have expressed interest in shifting away from traditional energy efficiency program strategies over time, seeking to increase the prominence and availability of financing products. In these jurisdictions, policy makers are testing new approaches and have directed program administrators to launch large-scale financing programs, often using a combination of utility customer funds and third-party private capital. This larger pool of capital would make more loans, leases, and other financing solutions available to customers interested in energy efficiency upgrades. Examples of policy makers' interest in this approach include:

- *New York*, where the New York State Energy Research and Development Authority (NYSERDA) requested $947M of utility customer funds to capitalize the NY Green Bank (which came partially from uncommitted system benefit charge funds for traditional efficiency programs). This is supplemented by $53M allocated by NYSERDA from revenues from Regional Green House Gas Initiative proceeds(NYSERDA, 2014c).
- *Connecticut*, which advanced a "goal of transitioning programs away from government-funded grants, rebates, and other subsidies, and towards deploying private capital to finance energy efficiency" (Connecticut Department of Energy and Environmental Protection, 2013, p. 8).
- *California*, which allocated $65 million to launch a suite of statewide energy efficiency financing pilots to "stimulate deeper energy efficiency projects than previously achieved through traditional program approaches (e.g., audits, rebates, and information)" (California Public Utilities Commission, 2013, p. 3).
- *New Jersey*, which is proposing a shift away from existing programs and into financing strategies (New Jersey Board of Public Utilities, 2015).

[18] This report focuses on energy efficiency financing programs funded by utility customers. Many state and local agencies also offer financing for clean energy projects using other funding sources. Under the American Recovery and Reinvestment Act, state and local governments dedicated over $650M in new funds for financing of efficiency projects using various strategies (e.g. revolving loan funds, loan loss reserves). See Goldman, Stuart, Hoffman, Fuller & Billingsley, 2011 for more discussion of how ARRA-funded efficiency finance programs interacted with ratepayer-funded programs.

[19] For example, a 2014 SEE Action study identified 30 programs that allow utility customers to repay loans for energy efficiency upgrades via their utility bill. In aggregate these programs have financed over $1.8 billion of improvements over several decades (SEE Action Financing Solutions Working Group, 2014).

To compare these two approaches, throughout this report we use the construct of "financing as a complement"—using financing as an enhancement to existing programs that are built on direct incentive strategies—and "financing as a substitute"—transitioning away from traditional programs and toward financing as a primary strategy to achieve energy efficiency goals (see Table 1 and Chapter 2 for more detailed discussion). Note that these two approaches are not mutually exclusive in the short-term; even in jurisdictions where policy makers have made statements emphasizing an eventual substitution, financing currently operates as a complement across the board (e.g., consumers may make use of existing programs and new financing-focused offers).

Table 1: Role of Financing: Complement or Substitute for Existing Efficiency Program Strategies?

Role of Financing	Description	Key Questions
Financing as a Complement	Deployment of financing strategies to enhance existing efficiency programs	- Effectiveness of financing relative to other existing program strategies - Ability of financing to enhance existing programs - Optimal mix of program budgets/resources to allocate to financing versus other program strategies (e.g., rebates)
Financing as a Substitute	Eventual transition from rebates to financing-only strategies	- Effectiveness of a paradigm shift away from traditional rebates and toward financing. How much participation is achieved? Energy savings realized? Hard-to-reach market segments accessed?

Rationales for Utility Customer-Supported Financing

Any utility customer-funded activity should be based on a well-articulated rationale for offering the program. This "problem statement" can inform program design and allow program administrators to measure progress towards goals. Rationales for offering financing include:

- **Addressing "first cost barriers:"** [20] Consumers may be put off by a large upfront expense for efficiency retrofits for benefits (e.g. bill savings) that are received over time and may be unwilling to use financing options available to them (e.g., savings, home equity line of credit).
- **Some market segments have difficulty accessing financing**, and utility customer funds, as credit enhancements or as direct investment, are needed to expand access to these consumers. Many consumers have access to attractive financing, but some market segments (e.g., small businesses, affordable multifamily properties) do not. Gap analyses may be useful in determining which segments are not being adequately served by private financing options and what additional savings might be achieved by filling these financing gaps.
- **Larger consumer cost contributions are needed to increase leverage of limited ratepayer funds.** Utility customer-funded financing offers may encourage larger cost contributions by participating consumers.
- **Private capital markets are not providing attractive financing for energy efficiency projects due to a lack of information, education, and data.** Because energy efficiency financing is a relatively new type of lending, performance history and loan data are limited. Without this information, private financing

[20] Financing does not actually reduce the first (or total) cost of a project; if interest is charged, financing increases total project cost. Financing alters the timing of when costs are paid and eliminates a large, upfront outlay of cash. Rebates do not address timing of payments but do reduce total project cost.

markets may not offer financing terms that reflect the true performance of and risks associated with energy efficiency loans. Utility customer funding, in the form of credit enhancements or direct investment, may be able to mitigate this gap and allow the needed loan performance data to accumulate.

- **Specialized financing products are needed to overcome the unique challenges of financing energy efficiency** (e.g., renter/owner split incentives, balance sheet treatment). Utility customer funds may be needed to encourage new products that may not be widely offered by private lenders. Examples of specialized financing products include property assessed clean energy (PACE) and on-bill financing.

Challenges for Regulators and Administrators

The concept of large-scale financing programs presents several challenges for state policy makers, utility regulators and program administrators. First, a threshold issue is the regulatory environment in which financing programs operate. As states create larger roles for energy efficiency financing strategies, several states are considering or have decided to place financing programs partially or wholly outside of oversight by state utility regulators. Some program administrators believe that attracting private-sector capital partners requires greater flexibility than a public utilities commission (PUC)-overseen model allows. We explore the trade-offs that may arise as administrators of financing programs seek to utilize the program design flexibility that they have been allowed while still providing sufficiently robust analysis to policy makers to assess the effectiveness of financing as a core program strategy. Ultimately, this issue involves performance and accountability mechanisms for administrators of financing programs. In the worst case, if a shift toward financing as a primary strategy for acquiring energy efficiency is accompanied by less effective oversight and accountability, it may be more difficult to assess adverse impacts from eliminating or cutting back traditional efficiency programs.[21]

Second, financing programs have unique aspects that may create challenges in adapting traditional regulatory planning, evaluation, and performance tools that are used to assess the impacts and cost-effectiveness of efficiency programs (see sidebar "Oversight of Energy Efficiency Programs Funded by Utility Customers"). Administrators of energy efficiency programs typically must demonstrate the results of their efforts using a suite of planning and assessment tools, including efficiency potential studies, cost-effectiveness screening, and impact evaluation.[22] To a large extent, these tools have been developed and designed around traditional rebate and incentive programs. For example, energy efficiency potential studies, which are frequently used in utility resource planning and demand-side planning proceedings, may assess the level of achievable energy efficiency potential by forecasting adoption with and without utility rebates. Similarly, evaluation, measurement, and verification (EM&V) studies often attribute net savings to program activity based largely on whether or not a rebate motivated customer participation. Many customers can currently finance energy efficiency projects using private options; thus, it is important for evaluations to focus on what savings attributed to financing are truly "additional" or would have occurred even in the absence of a utility customer-funded program. Adapting these tools to financing will take careful consideration.

[21] If state regulators are unable to detect a situation in which a utility achieved lower aggregate energy savings as it relied on a large-scale efficiency financing programs (rather than its traditional efficiency portfolio), the utility may rely on more expensive supply-side resources to fill the gap, potentially increasing overall energy costs to customers.

[22] Traditionally, efficiency programs that use utility customer funds are overseen by a state public utility commission (PUC) or another oversight body (e.g., city council, board of directors elected from the membership of rural electric cooperatives).

OVERSIGHT OF ENERGY EFFICIENCY PROGRAMS FUNDED BY UTILITY CUSTOMERS

Nearly every state in the United States offers programs to utility customers to promote energy efficiency. These programs are developed and managed by program administrators to meet state policy or regulatory goals (e.g., achieve an energy savings target, implement all cost-effective efficiency) (Billingsley, et al., 2014). In many states, energy efficiency is defined, in statute or regulation, as a resource that can potentially avoid or defer generation or transmission and distribution investments. Utilities collect funding for efficiency programs as part of the bundled electricity rate or through a line-item charge on customer bills, often called a system benefits charge (SBC). Energy efficiency programs are often designed to meet "resource acquisition" and/or "market transformation" objectives (although these distinctions are not always neatly drawn within a portfolio of efficiency programs and some programs may have elements of both):

- *Resource acquisition* (RA) is aimed at acquiring cost-effective energy efficiency resources using various program strategies (e.g., rebates, financing, technical assistance) to help meet future electric system needs that would otherwise have been met by additional infrastructure or fuel purchases.
- *Market transformation* (MT) is "the strategic process of intervening in a market to create lasting change in market behavior by removing identified barriers or exploiting opportunities to accelerate the adoption of all cost-effective energy efficiency as a matter of standard practice" (NEEA, n.d.). The term "market transformation" refers to both the policy objective and a program strategy that works to permanently alter a marketplace so that greater levels of energy efficiency become standard practice. Market transformation involves strategic intervention in specific markets (made up of definable market actors and decision makers), results in sustainable changes (e.g. continues after the program intervention ends), changes the behavior of supply-side and demand-side market actors, addresses market barriers and leverages opportunities, and accelerates and/or increases market adoption. Examples include building market capacity to apply more energy efficient new construction and support codes, offering rebates to "upstream" or "mid-stream" providers of energy-efficient technologies, and labeling energy efficient products.

Several planning and performance tools are used to assess energy efficiency program offerings and include prospective planning tools—energy efficiency potential studies and cost-effectiveness screening mechanisms—and retrospective program evaluations. Applying these tools to energy efficiency financing programs may involve some modifications from standard practice.

- Potential studies are estimates of the technical, economic, and achievable opportunity for savings from energy efficiency in a given jurisdiction (see Chapter 3).
- Cost effectiveness screening compares a program's benefits to its costs, using one or a combination of tests that represent different perspectives (e.g., program administrator, societal, participant) (see Chapter 4). Cost effectiveness tests are used for planning purposes to help determine the composition of energy efficiency program portfolios as well as retrospectively as an element in assessing the net benefits (benefits minus costs) of programs that have been implemented (see Chapter 4).
- Impact evaluations, a component of evaluation, measurement, and verification (EM&V), involve a retrospective assessment of the performance of an efficiency program or portfolio of programs. Impact evaluations typically estimate energy and peak demand savings attributable to programs. These savings cannot be directly measured and are often estimated using specified protocols, including utility billing analysis before and after retrofits for treatment and control group, verification of savings that use deemed or deemed calculation methods using field measurements (e.g., hours of operation of equipment, audits of installations), and building simulation models for new construction calibrated to occupancy and operating schedule (see Chapter 5).

Objectives and Approach

The State and Local Energy Efficiency Action (SEE Action) Financing Solutions and Driving Ratepayer-Funded Efficiency through Regulatory Policies Working Groups commissioned this report as groundwork for a dialogue among regulators and stakeholders in the energy and financing sectors to explore regulatory mechanisms for ensuring that efficiency financing initiatives provide value for society and protection for consumers. The primary audiences for this report are state regulators and other policy makers, program administrators, current and prospective providers of financing services in the efficiency market, and other stakeholders. This report builds on a previous SEE Action report that reviewed 30 on-bill programs and analyzed results (e.g., loan volume, savings, participation rates) and examined key program design issues (SEE Action Financing Solutions Working Group, 2014). In that report, we identified several states that were implementing large-scale finance programs and/or considering shifting away from traditional efficiency programs to much greater reliance on financing.

In this report, our primary objectives are: (1) to identify and analyze key policy and technical issues that are emerging around integration of financing into energy efficiency portfolios with a particular focus on those states considering and/or implementing large-scale efficiency financing programs and (2) to better understand the practical and regulatory challenges in order for financing initiatives to deliver on their potential. In exploring these issues, we focus on identifying information and tools that state regulators need in order to fulfill their oversight role and balance the interests of utility customers, shareholders, and the public.

We conducted interviews with about 20 regulators and stakeholders in five states (California, New York, Connecticut, Massachusetts, and Maryland) and reviewed publicly available documents (e.g., regulatory proceedings on efficiency financing initiatives, potential studies and evaluations of financing programs). These states were chosen because of their recent experiences grappling with the key issues identified in this report.

Report Organization

The remainder of this report is organized as follows. In Chapter 2, we discuss the regulatory context under which energy efficiency programs operate, the relationship between a program administrator and state regulatory commission, and the objectives of a financing program and its treatment and classification by state regulators. We also describe financing programs and energy efficiency policy environments in our five case study states. In Chapters 3 through 5, we discuss existing planning, performance, and evaluation tools and early efforts to apply them to large-scale financing programs.

In Chapter 3, we review the types of energy efficiency potential studies and discuss attempts to estimate achievable potential for financing program, including other planning tools that have been used to support financing programs: studies that estimate the theoretical maximum opportunity and studies that estimate long-term market addressable potential. In Chapter 4, we discuss benefit/cost screening tests and analysis of net program benefits and identify unique features of financing programs that pose challenges for administrators that need to conduct cost-effectiveness screening and benefits analysis. In Chapter 5, we discuss EM&V issues that arise in relation to financing programs and review evaluation studies and approaches used to assess impacts of large-scale finance programs that have resource acquisition or market transformation objectives. It is important to emphasize that open questions remain to be answered regarding the use and application of these planning, performance and evaluation tools for efficiency financing programs.

Chapter 2: Placing Energy Efficiency Financing Programs in a Regulatory Context

In this chapter, we describe and discuss the regulatory context under which efficiency financing programs operate. We define regulatory context as a combination of three variables: (1) use of utility customer funding, (2) type of program administrator, and (3) program classification and treatment. These three factors, visualized in Figure 1, may affect the type and rigor of regulatory oversight applied to financing programs. In practice, decisions on how financing programs will be regulated and overseen and what level of accountability will be required of them are complex and multidimensional. A program's regulatory context is not the only determinant of oversight and accountability mechanisms, but it is often an important factor.

KEY TAKEAWAYS

- Use of utility customer funds in energy efficiency financing programs provides a foundational rationale for regulatory oversight of program planning and performance.
- Effective PUC governance may depend on how the regulator engages in program oversight (e.g., reviewing links to a state's overall energy and efficiency policy goals), as well as how financing programs are treated within the regulatory context. Potentially important aspects of program treatment include (1) classification of financing as a distinct program, (2) resource acquisition/market transformation classifications, and (3) links to performance incentives.
- Financing programs that are treated as distinct programs within an overall portfolio may be required to demonstrate savings specifically attributable to the program, which may be important in jurisdictions considering using financing as a substitute for traditional programs in the future.
- Resource acquisition and market transformation objectives are not mutually exclusive. For financing programs, applying both classifications may have important regulatory implications. Financing programs typically have short-term goals in early years designed to be achieved directly through program activity, which may exist alongside longer-term market transformation goals. Examining early outcomes resulting directly from program activity (e.g., direct lending, credit enhancement) through the lens of resource acquisition may shed light on the prospects for transforming the broader market in future years.
- Linking financing programs to performance incentives of the program administrator, whether directly or through their contribution to aggregate portfolio savings, may lead to increased attention on evaluations of the impacts of efficiency financing programs.

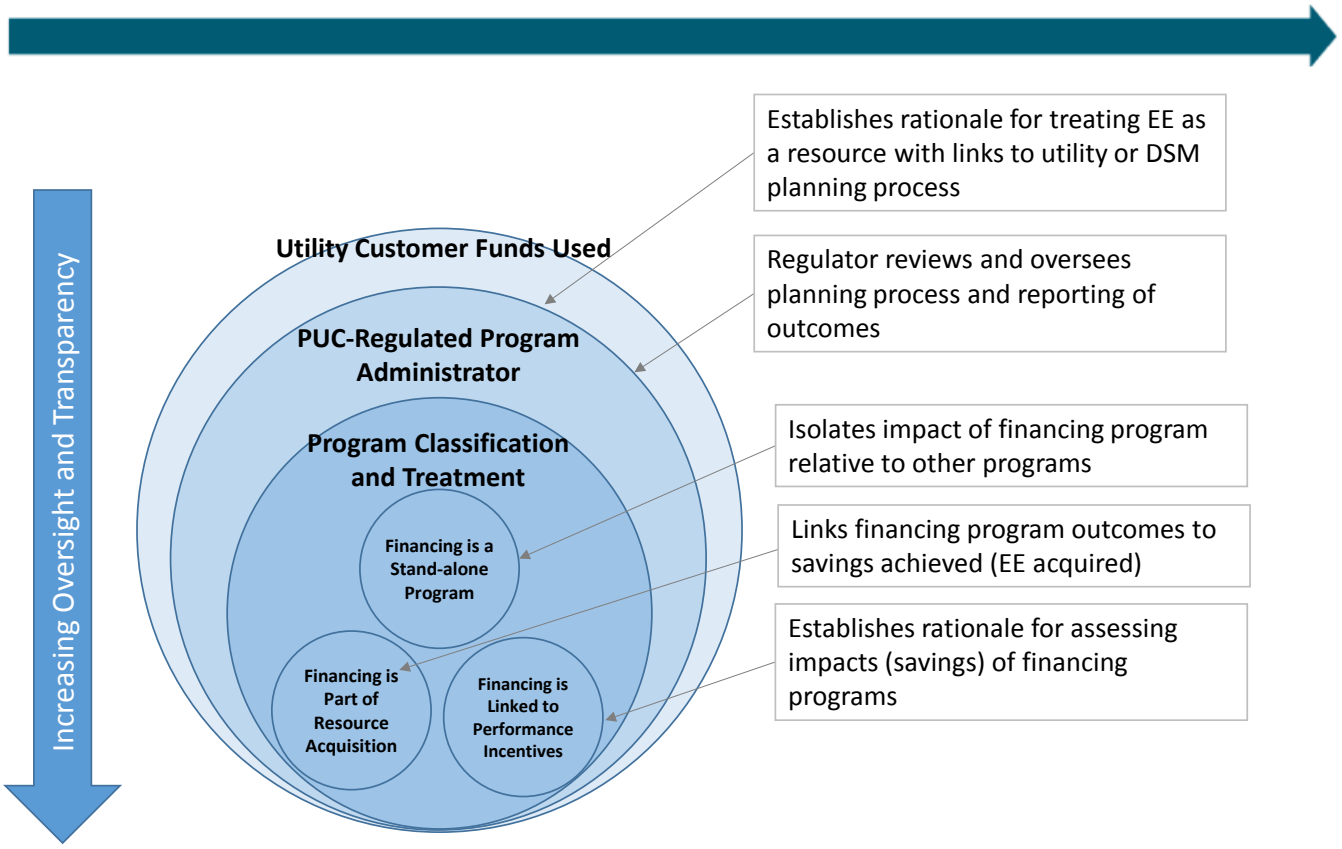

Figure 1: Placing Financing Programs in a Regulatory Context—Variables That Affect the Degree of Regulatory Oversight

Utility Customer Funded Energy Efficiency

Nearly all states offer energy efficiency programs for utility customers. These programs are developed and managed by program administrators to meet state policy or regulatory goals (e.g., achieve an energy savings target established in state legislation, implement all cost-effective efficiency) (Billingsley, et al., 2014). The use of utility customer funds for an energy efficiency program presents a clear rationale for regulatory oversight of program planning and performance (see Figure 1) although oversight by a state PUC (or governing board) does not automatically guarantee transparency and accountability.

State regulators who oversee efficiency programs that use utility customer funds have traditionally required program administrators to demonstrate accountability based on policy guidelines (e.g. cost-effectiveness screening, EM&V requirements). As a recent survey of North American energy efficiency programs stated, "Collection of funds from rate-paying utility customers to finance energy efficiency acquisition from those same customers involves a type of covenant between the energy utilities, customers, and any third parties, usually overseen by public utility commissions" (Instutite for Industrial Productivity, 2012, p. 25). This covenant provides one rationale for requiring program administrators that use utility customer funds to demonstrate their effective use through impact evaluations of program outcomes.

PUC Oversight

The regulatory context of an efficiency financing program may also be influenced by the entity selected to administer such programs, and whether that entity is overseen by a PUC. We found that financing programs implemented by the existing efficiency program administrator are typically subject to that state's regulatory oversight requirements for efficiency programs, as those programs generally fall under PUC purview. However,

when programs are administered by new or non-traditional entities, state policy makers and regulators do not necessarily place these entities under PUC oversight or apply existing regulatory mechanisms.

Oversight by a state PUC (or governing board) is one type of governance model. Reliance upon a board of directors and/or independent financial audits are examples of other governance and oversight models, which may play an important role in ensuring sound administration.[23] PUCs focus on reviewing energy savings targets and reporting, and also typically play a unique role in coordinating oversight of customer-supported energy efficiency programs within the broader context of a state's overall energy procurement strategies and policy efforts.[24]

Program Classification and Treatment

The mechanisms used to assess energy efficiency financing programs may also be shaped by the way the program is treated and categorized under a state's efficiency policy guidelines, including:

1. Whether financing is treated as a distinct program within the energy efficiency portfolio;
2. Whether financing is treated as a resource acquisition program or a market transformation effort; and
3. Whether financing programs are linked to opportunities for the program administrator to earn performance incentives.

Treatment as a Distinct Program

In many jurisdictions, financing is treated as a component of an overall portfolio, rather than as a distinct program. In other cases, administrators treat financing offerings as a cross-cutting effort that is available for use in multiple programs (e.g., a customer may use a residential loan product to help finance their purchase of high-efficiency equipment in an HVAC program as well as participate in a home performance program). In jurisdictions that treat financing as a complementary activity, classifying financing as a program component (or cross-cutting offering) may be consistent with the notion that financing must work in conjunction with other program elements in order to provide a comprehensive package of service offerings to customers.

However, there may be advantages in treating financing as its own distinct program.[25] For example, it is more likely that stand-alone finance programs will be asked to demonstrate and document savings and cost-effectiveness through periodic impact evaluations. If financing is not treated as a distinct program, it may be more difficult to conduct an impact evaluation that characterizes the results that are specifically attributable to financing. Under these circumstances, program administrators and regulators may have less information as to the likely effectiveness of using financing as a substitute for traditional efficiency programs.

Resource Acquisition and Market Transformation

[23] A board of directors of a non-profit or for-profit entity (or independent auditors) is focused primarily on firm conduct, financial performance, and broad policy objectives rather than demonstrating savings created or assessing cost-effectiveness.
[24] State PUC oversight may involve reviewing savings targets to ensure that the program administrators meet an agreed-upon portion of the energy load and, in some jurisdictions, reviewing claims by program administrators for performance incentives based on accomplishments.
[25] Treatment of financing as a distinct program would not necessarily mean that customers would be ineligible to participate in other programs if they took advantage of financing offerings. For example, in the California financing pilots, customers may take advantage of rebates and incentives along with financing, though they these offerings are made via separate programs. One effect of this structure has been a focus on attribution (see Chapter 5).

Proponents of large-scale shifts toward financing as a core strategy for achieving energy efficiency goals often frame this type of effort as transformational (and long-term). It should be emphasized that market transformation and resource acquisition approaches are not mutually exclusive (Eto, Prahl, & Schlegel, 1996).[26] Resource acquisition tends to focus on energy savings that are achieved directly through program activities, whereas market transformation generally focuses on achieving energy savings via impacts on the broader market.

For example, in the short term, an administrator of a financing program may pursue a resource acquisition strategy by directly lending out funds from its program budget or by using these funds as credit enhancements and interest-rate buy-downs to encourage immediate improvements of rates and terms offered by private financial institutions. These activities are expected to generate a certain number of loans and associated energy savings as a result of their immediate impact on the cost of capital. The administrator may also design the finance program so that loan performance data is made available to private market lenders without violating customer confidentiality; in the long term, this may lead to more favorable loan terms and increased lender participation even without credit enhancement.

Evaluating the effectiveness of and resource acquisition savings that can be attributed to these direct program strategies may help shed light on the prospects for financing to serve effectively as a large-scale market transformation strategy. If savings are significant and can be attributed to the financing program strategy, then it may be reasonable to expect that further efforts to improve the availability and cost of capital in the broader market may have even greater effects. On the other hand, if the immediate outcomes are more limited, then greater caution may be warranted in shifting towards financing as a substitute for other program strategies.

Linking Program Results to Performance Incentives

In some states, program administrators have the opportunity to earn performance incentives if they achieve program goals and targets. In jurisdictions that are contemplating large-scale shifts toward the use of financing as a core strategy for achieving energy efficiency savings objectives, policy makers should consider whether offering performance incentives provides a mechanism to motivate administrators and also assess prospects for using financing as a means to achieve large-scale energy savings targets.

Designing performance incentives for programs focused on financing as a core strategy is largely theoretical at this stage. None of the jurisdictions reviewed for this paper had performance incentives in place specifically tied to financing, although, in California, financing program outcomes will contribute to the overall results of the resource acquisition portfolio, which in turn are linked to performance incentives.

From a resource acquisition perspective, jurisdictions considering linking performance incentives to program outcomes should consider designing incentive structures that reward actual savings attributable to financing-related efforts. Rewarding loan volume may be less effective than rewarding savings attributable to loans originated.[27] If market transformation is an important policy objective, then it may be appropriate initially to reward administrators based on financing metrics and goals (e.g., changes in the availability or cost of capital) that have been established, which are ultimately expected to increase savings over the longer term. In such cases,

[26] See, for example, in Eto, Prahl, & Schlegel, 1996, p. xii: "Market transformation is not a label that uniquely identifies certain energy efficiency program designs to the exclusion of others. It is instead an objective that all energy-efficiency programs have at least a theoretical potential to achieve to varying degrees."

[27] As discussed in Chapter 5, in some cases, financing activity may not necessarily correlate with increased savings, particularly if program activity replaces private activity that might otherwise have occurred.

performance metrics may need to evolve over time to correspond with expected market transformation timelines (see Chapter 5 for a discussion of market transformation and interim metrics).[28]

Linking financing programs to performance incentives, either directly or through their contribution to aggregate portfolio savings, may lead to increased attention on evaluations of the impacts of efficiency financing programs.[29] Understanding how performance incentives impact the outcomes of financing programs is an area worthy of further exploration.

Role of Financing in an Efficiency Portfolio: Complement vs. Substitute for Traditional Programs

As noted in Chapter 1, we observe two schools of thought regarding the role of utility customer-supported financing programs in an energy efficiency portfolio:

1. *Financing as a Complement.* In some jurisdictions, financing is advanced as an enhancement that complements existing programs (e.g., rebates, technical assistance, information/audits).
2. *Financing as a Substitute.* In other jurisdictions, policy makers have expressed aspirations to transition away from traditional energy efficiency program designs and toward financing as a primary strategy to achieve energy efficiency goals.

These scenarios are not mutually exclusive, particularly in the short term. Most jurisdictions reviewed in this report have expressed a desire to shift more toward financing as a partial or even complete substitute for their existing rebate incentive efficiency programs. However, in practice, financing still is being used in some form as a program complement (i.e., consumers may take advantage of both financing and rebate programs).

Programs Reviewed

Table 2 introduces the five programs reviewed for this report. We focused selectively on states where financing programs are a relatively large part of the energy efficiency portfolio or provide insights on issues related to the applicability of planning, performance, and evaluation tools for finance programs. These five programs are not necessarily representative of national energy efficiency financing activity.

California

Selected Energy Efficiency Policies

In 2003, California formalized its commitment to acquire all cost-effective energy efficiency and introduced the "loading order" concept, which requires that electricity demand be first reduced through energy efficiency and demand response, then met by renewable resources and distributed generation, and lastly by clean and efficient

[28] See also, "Performance Metrics for Market Transformation Programs: Incentivizing Progress without Strangling Creativity," (Nadel, Hewitt, Horowitz, & Casentini, 2000).

[29] For example, in California, the classification of financing as a resource acquisition program, which together with other resource programs is tied to performance incentives at the portfolio level, influences the evaluation of the financing programs in several ways. First, evaluators will be required to ensure that financing savings are not double-counted with savings from other programs. Second, evaluators will seek to establish a net-to-gross ratio for financing programs, which—in addition to accounting for the impact of other programs—will also examine free ridership rates in light of the availability of private market financing. Only the remaining savings that are actually attributable to the financing program itself would contribute to resource portfolio savings, with the potential to increase performance incentives.

fossil-fueled generation (State of California, 2003). Legislation in 1996 and 2000 authorized collection of a public goods charge (i.e., a system benefit charge or SBC) to pay for pursuit of all cost-effective energy efficiency opportunities. After the SBC sunset in 2011, utilities were authorized to use their resource procurement budgets to support energy efficiency acquisition and are eligible for performance incentives awarded for meeting energy efficiency targets.

Both legislation and regulatory orders require evaluation of energy efficiency programs, with focus on net benefits, cost-effectiveness, and "the extent to which the programs have delivered cost-effective energy efficiency not adequately provided by markets" (CPUC Code §399.8(f)(4)(G), 1999).

Table 2: Summary Characteristics of Financing Programs Reviewed

	CA	NY	CT	MA	MD
Financing program reviewed	Statewide Financing Pilots	NY Green Bank	Connecticut Green Bank (CGB)	HEAT Loan	MHELP Loan Program
Utility customer funds sought or used?	Yes	Yes	Yes	Yes	Yes
Regulated program administrator?	Yes, California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)[30]	Yes, NYSERDA	No, Connecticut Green Bank	Yes, utilities' third-party administrator	No, Maryland Clean Energy Center
Part of resource acquisition portfolio?	Yes	No	N/A[31]	Yes	No, but under discussion
Treated as a distinct program?	Potentially	Yes	N/A	No	Potentially
Tied to performance incentives?	Yes, via linkage to other EE programs	TBD	No	Yes, via linkage to other EE programs	No
Financing envisioned as a complement?	Yes	Yes	Yes	Yes	Yes
Financing envisioned as a substitute?	Potentially	Yes	Yes	No	Potentially
Utility customer funds dedicated to selected financing program[32]	$75M[33]	$947M ($165M initial funding, $150M additional funding approved in July, $631.5M follow on request)[34]	$27.6M (2014)[35]	Approx. $15M (2013)	$4.6M proposed (2013 and 2014)
Type of financing or credit enhancement offered by program	Loans, leases, energy savings agreements, LLRs and debt service reserves[36]	Guarantees, loan capital (credit facilities, subordinate capital, senior capital)	IRBs, LLRs, and loan capital	IRBs	IRBs

[30] California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) is a state agency that the California PUC designated as the administrator of California's financing pilots, in collaboration with utilities.
[31] Although the Connecticut Green Bank as the administrator of the Connecticut Clean Energy Fund is not responsible for resource acquisition, the utilities as administrators of the Connecticut Energy Efficiency Fund are focused on resource acquisition. Through a Joint Committee there is coordination on goals and priorities between the administrators, see http://www.ctcleanenergy.com/Portals/0/board-materials/5a_Consolidated%20Priorities_Joint%20Committee_090815.pdf
[32] CA (California Public Utilities Commission, 2013). NY (NYSERDA, 2014c). CT (CEFIA, 2014). MA (NSTAR, 2014) (WMECo, 2014) (National Grid, 2014). MD (EmPOWER Finance Work Group, 2013).
[33] $65.9M initial commitment; $9M held in reserve.
[34] Remaining capitalization proposed to be transferred over ten years (2016-2025), but supplemented by an external borrowing facility, supported by a pledge of the approved collections. This will allow NY Green Bank to deploy capital when needed but allow transfers from utility customer funds to be scheduled to meet objectives for overall declining ratepayer collections.
[35] CGB supports both renewable and energy efficiency efforts; utility customer funds ($28M in 2014) are currently used for administration and renewable energy programs.
[36] LLR = loan loss reserve, IRB = interest rate buy down. See each state for more detailed description of financing structures offered.

Financing Program Reviewed: State-wide Financing Pilots

In 2012, the California Public Utilities Commission (CPUC) directed that existing pilot financing efforts, some of which began as local government or non-profit-led efforts during the American Recovery and Reinvestment Act (ARRA) period, be expanded state-wide, noting that "Lowering the barriers to energy efficiency retrofits and financing, particularly in under-served market sectors, is …critical to reaching the state's goals of reduced energy consumption" (California Public Utilities Commission, 2013, p. 2). The pilot programs are funded with $65.9 million of utility customer funds plus $9.3 million held in reserve until after a midpoint review of the pilots (California Public Utilities Commission, 2013).

In the near-term, the pilot programs act as a complement to other energy efficiency programs; customers may make use of financing offers as well as incentives. However, the CPUC notes that the pilots are "designed to test market incentives for attracting private capital through investment of limited ratepayer funds….The Commission's goals include developing scalable and leveraged financing products to stimulate deeper EE projects than previously achieved through traditional program approaches (e.g., audits, rebates, and information)" (California Public Utilities Commission, 2013, p. 3).

New York

Selected Energy Efficiency Policies

In 1996, New York authorized NYSERDA to use SBC funds to offer state-wide energy efficiency programs. In 2008, the New York Public Service Commission (PSC) established a statewide goal of a 15 percent reduction in electricity usage by 2015 and increased the SBC collection accordingly (New York State Department of Public Service, 2008). The PSC emphasized the importance of rigorous program evaluation and called for "transparent and technically sound methods for measurement and verification of net energy savings, benefits and costs, as well as assessment of customer satisfaction and program efficacy" (New York State Department of Public Service).

The state's energy efficiency programs have historically been administered by the state's utilities and NYSERDA. The current Reforming the Energy Vision and Clean Energy Fund proceedings propose a reduction in collections from ratepayers, a gradual wind down of many of NYSERDA's currently authorized programs, and a shift in NYSERDA's focus to market transformation activities (NYSERDA, 2015). The PSC makes clear that, even with lower budgets, NYSERDA and New York's utilities must still meet the 15 percent electricity reduction goal using "market-based approaches to drive greater value for customers" (New York Public Service Commission, 2015, p. 75).[37]

Financing Program Reviewed: NY Green Bank

The NY Green Bank is a public-private partnership designed to use public dollars to attract private sector capital into the clean energy sector. When fully capitalized, the NY Green Bank will manage nearly $1 billion of public funds to attract private funding to energy efficiency. The Green Bank's ultimate goal is to transform the energy efficiency marketplace so that, in the long run, the price of clean energy goods and services declines and becomes more attractive to consumers, leading to greater energy savings.

[37] See p.81 of New York State Public Service Commission, 2015; "Parties question whether NYSERDA's targets will be added to utility targets and whether utilities will be adopting NYSERDA programs. Utility targets will not be increased for 2016; rather, we expect that the utility targets established here in addition to NYSERDA metrics established in the CEF proceeding will equal or exceed the current aggregate of utility and NYSERDA energy savings."

In 2013, the NY PSC approved NYSERDA's request for an initial $165 million of utility customer funding to capitalize the Green Bank.[38] Utility customer funds were augmented with $53 million of proceeds from the sale of Regional Greenhouse Gas Initiative (RGGI) credits.[39] An additional approval to increase the capitalization of the NY Green Bank by an additional $150 million from uncommitted and reallocated NYSERDA ratepayer funds was approved in July 2015. NYSERDA submitted a request to the PSC in June 2015 as part of the Clean Energy Fund proceeding to request future ratepayer funding of $631.5 million to reach the $1 billion capitalization goal (NYSERDA, 2014c). NYSERDA proposed that the additional funding, scheduled at varying amounts over 10 years, would be supplemented by an external borrowing facility, supported by a pledge of the requested ratepayer funds. This would allow NY Green Bank to meet projected market demand but also would allow ratepayer collections to be reduced over time, as envisioned by the Clean Energy Fund proceeding.

As the Green Bank evolves, its relationship to existing energy efficiency programs will come into sharper focus. Today, it is most accurately characterized as both a complement to and a substitute for existing energy efficiency programs. In its petition to establish the Green Bank, NYSERDA characterized the Green Bank as "a cost-effective, powerful and complementary addition to New York's existing portfolio of clean energy support programs" (NYSERDA, 2013b, p. 3). In its order establishing the Green Bank, the PSC stated that, "the effect of the Green Bank on reducing the cost of capital can also enable the potential reduction or even the possible elimination of incentives in some sectors over time" (NYSERDA, 2013b, p. 3).

Connecticut

Selected Energy Efficiency Policies

In 2007, Connecticut adopted legislation directing that "resource needs shall first be met through all available energy efficiency and demand reduction resources that are cost effective, reliable and feasible" (Connecticut General Statutes §16a-3a(c)). The state's regulated electric utilities file a plan with the Department of Energy and Environmental Protection (DEEP) and the Public Utilities Regulatory Authority (PURA), developed with the advice and assistance of the Energy Efficiency Board (EEB) and its consultants, to establish comprehensive conservation and load management plans that specify what energy efficiency programs will be used to acquire these savings. Energy efficiency activities are administered by utilities and funded by an SBC, in place since 1998.[40]

Regulators in Connecticut require annual program evaluations to ensure that utility customer-funded programs are "administered appropriately and efficiently … programs and measures are cost effective … and evaluation results are appropriately and accurately taken into account in program development and implementation" (Connecticut General Statues §16-245(m)). An independent Evaluation Committee oversees program evaluation activity, from planning and contractor selection to presentation of results, to ensure objectivity and transparency (Connecticut Energy Efficiency Board, 2012).

Financing Program Reviewed: Connecticut Green Bank

[38] The funding was comprised of uncommitted ratepayer funds: NYSERDA $3.5M in uncommitted NYSERDA EEPS I funds; $22.1M in uncommitted NYSERDA SBC III funds; $90.0M in uncommitted utility EEPS I funds; and $50.0M in NYSERDA RPS funds. NYSERDA also allocated $52.9M in RGGI proceeds to the Green Bank (NYSERDA, 2013b).

[39] RGGI is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont to cap and reduce carbon emissions from the power sector. States sell nearly all emission allowances through auctions and invest proceeds in energy efficiency, renewable energy, and other consumer benefit programs. See http://www.rggi.org.

[40] SBC was established by 1998 "An act concerning electric restructuring" PUBLIC ACT NO. 98-28

The Legislature established the Connecticut Green Bank in 2011 as a successor to the Renewable Energy Investment Fund (renamed the Clean Energy Fund).[41] The Renewable Energy Fund was initially established using proceeds from a line-item charge on customer bills to "promote investment in renewable energy sources … [to] stimulate demand for renewable energy … and for the further purpose of supporting operational demonstration projects" (Connecticut General Statutes §16-245n, 2009). As modified, the Connecticut Green Bank has the additional mandate to "provid[e] low-cost financing and credit enhancement mechanisms for clean energy projects and technologies," (Connecticut General Statutes §16-245n) including not just renewable energy resources but all types of clean energy including energy efficiency.

Connecticut's Comprehensive Energy Plan lays out a clear vision for the long-term goals of the Green Bank's financing activity as a substitute for traditional energy efficiency acquisition activities:

> While consistent ratepayer support at levels sufficient to leverage (or sell) the customer investment is essential, the larger investment that will be required to take efficiency to scale will require new sources of capital to help fund those upfront costs. In order to access new sources of capital, this Strategy proposes that the State take steps to shift from a reliance on ratepayer funding to a much greater focus on using existing funding to leverage private capital…. [T]he foundation for this Strategy's goal of transitioning programs away from government-funded grants, rebates, and other subsidies, and towards deploying private capital to finance energy efficiency is underway (Connecticut Department of Energy and Environmental Protection, 2013, p. 7).

Currently, Green Bank-funded projects are eligible for utility customer-supported rebates, and customers assert that many projects still depend on rebates to move forward. For example, a recent joint analysis by the Connecticut Green Bank and the Connecticut Energy Efficiency Board showed that 92 percent of Green Bank commercial property assessed clean energy (PACE) projects receive rebates, and that 46 percent could not move forward as originally scoped without building in utility customer incentives (Connecticut Energy Efficiency Board, 2015).

Massachusetts

Selected Energy Efficiency Policies

Massachusetts has required utilities to offer energy efficiency programs to their customers, funded by an SBC enacted in 1999. The 2008 Green Communities Act built on this foundation and required utilities to "provide for the acquisition of all available energy efficiency and demand reduction resources that are cost effective or less expensive than supply options" (Massachusetts General Laws §21(b)(1)). The Act similarly stated that "electric and natural gas resource needs shall first be met through all available energy efficiency and demand reduction resources that are cost effective or less expensive than supply" (Massachusetts General Laws §21(b)(1)).

Both the legislation and associated regulations direct energy efficiency program administrators to assess the cost-effectiveness of offered programs. Evaluations are administered collaboratively by program administrators and the Energy Efficiency Advisory Council.

[41] The Connecticut Green Bank was originally called the Connecticut Clean Energy Finance and Investment Authority.

Financing Program Reviewed: HEAT Loan

Since 2005, the HEAT Loan program has offered residential customers no-interest loans to finance home energy upgrades. Customers receive loans from one of HEAT's partner lending institutions and utilities use utility customer funds to reimburse the lenders for the interest rate that they otherwise would have charged.

As explained in the utilities' program plan, the HEAT Loan and other financing programs are intended to complement the existing set of energy efficiency programs "to the extent that access to low-cost capital is a barrier for certain customers, financing can alleviate that and encourage energy efficiency investments" (MassSave, 2012, p. 92).

Maryland

Selected Energy Efficiency Policies

In 2008, Maryland's EmPower Act set a statewide goal of reducing per capita electricity use 15 percent by 2015, compared to a 2007 baseline. Utilities are directed to "procure or provide for [their] electricity customers cost-effective energy efficiency and conservation programs and services with projected and verifiable electricity savings that are designed to meet [the 2015 savings goal]" (Maryland General Code §7–211(g)(1)). Efficiency programs are funded by the EmPower surcharge. In 2015, the Maryland Public Service Commission issued an order requiring utilities to ramp up to 2 percent of annual incremental gross savings per year.

The EmPower Act requires the PSC to evaluate the cost effectiveness and the impact of utility customer-funded energy efficiency programs. Utilities are responsible for annual evaluation reviews, which are verified by the PSC's independent evaluation contractor.

Financing Program Reviewed: MHELP Residential Energy Efficiency Financing

The Maryland Home Energy Loan Program (MHELP) began as a joint effort of the Maryland Clean Energy Center and the Maryland Energy Administration (MEA). Initially funded by ARRA dollars, the MHELP program generated $2.5 million in loans by buying down interest rates on loans made by private sector partners (EmPOWER Finance Workgroup, 2013). As ARRA funding ended, MEA and the Maryland PSC began to explore options for offering residential sector financing as part of the energy efficiency program portfolio funded by utility customers, noting that "the lack of convenient, accessible financing at favorable rates is a missing link in all of the Companies' EmPOWER programs" (Maryland Public Service Commission, 2011, p. 13). A PSC-appointed working group explored options for incorporating the MHELP program or other residential financing offerings into the utility customer-funded portfolio. To date, the PSC has not approved such incorporation. However, in April 2015, a Maryland Public Utility Law Judge Division report makes recommendations and observations of how a statewide residential financing program could be offered (Romine, McGowan, Sober, & McLean, 2015).

As proposed by the EmPOWER Work Group, energy efficiency financing for the residential sector is framed as a complement to existing energy efficiency activities, at least in the near term: "Financing is not a stand-alone program. Financing facilitates the goals of associated energy efficiency program and must be 'in synch' with the characteristics of its associated program(s)—which themselves can have significant variations" (EmPOWER Maryland Work Group, 2013, p. 15). However, the working group does not preclude the possibility that, over time, financing may reduce the need for rebates, stating, "The mix of rebates and financing should be expected to shift over time in favor of financing" (Maryland Energy Administration, 2014, p. 33).

Observations on Regulatory Context of Programs Reviewed

State policy makers typically establish explicit links that involve regulatory oversight and accountability for the use of utility customer funding. Comparing the New York and Connecticut Green Banks is illustrative in this respect.

Both green banks use utility customer funds. The NY Green Bank is housed within NYSERDA, which has administered a portfolio of efficiency programs since 1998 and is overseen by the New York PSC.[42] By contrast, the Connecticut Green Bank is not overseen by the state regulatory commission and operates as a separate quasi-public agency within the state government, an expanded successor to an agency that primarily focused on the promotion of emerging renewable energy technologies. This difference in program administrator oversight may explain some of the differences in the extent of regulatory involvement as the two green banks took shape.

In New York, interviewees indicated that, because the Green Bank was created through a regulatory proceeding under the oversight of the PSC, the Green Bank's mission, goals, and performance metrics were created in a transparent and open process (Pitkin, Hale, & Griffin, 2014).[43] NYSERDA held an open workshop on the development of its performance metrics and evaluation plan and stakeholders were given the opportunity to comment on the plan through regulatory filings.[44] NYSERDA also allocated up to $4 million in its plan for evaluation activities to assess how the Green Bank is performing against these metrics (NYSERDA, 2014b).

Program administrators in the five states included in this report are required to verify the impacts of traditional energy efficiency programs using EM&V processes that involve oversight by a regulatory agency. However, the extent to which traditional EM&V processes are applied to energy efficiency financing programs varies among these states. California's energy efficiency financing pilots will be subject to robust EM&V processes that are currently under development. Connecticut's Green Bank efficiency programs are not currently subject to regulated EM&V requirements, although the Green Bank recently hired a team to scope out a voluntary evaluation plan for the institution and certain specific programs.

Chapter 3: Characterizing the Role of Financing in Energy Efficiency Potential Studies

Since the 1980s, policy makers and regulators in many states have periodically required program administrators to conduct potential studies to gauge both the technical potential for efficiency as well as the estimated economic and achievable potential. In this chapter, we review the types of potential studies, discuss the applicability and inclusion of financing strategies in achievable potential studies, and discuss studies that estimate the theoretical potential for financing of efficiency and their use by policy makers and program administrators.

The Three Potentials: Technical, Economic, and Achievable

A potential study is a quantitative analysis of the amount of energy savings that exists technically, or is cost-effective (i.e., economic), or could be realized through the implementation of efficiency policies and programs (i.e., achievable). Historically, potential studies have provided input for the design of policies and programs aimed at

[42] The role of NYSERDA going forward may be somewhat in flux as a result of ongoing state proceedings.
[43] The NYPSC order directed NYSERDA to collaborate with stakeholders to develop metrics for the evaluation of the Green Bank's performance.
[44] For example, the Natural Resources Defense Council (NRDC) and the Pace Energy and Climate Center submitted joint comments asserting that in order to demonstrate the influence of green bank programs, it would be essential to develop performance metrics identifying net benefits specifically attributable to the program's influence.

KEY TAKEAWAYS

- A few early efforts incorporate financing into energy efficiency potential studies or have been completed. These studies vary in their methodological approach.
- Some studies have attempted to estimate the theoretical maximum opportunity and focus on the investment needed if the vast majority of technically feasible upgrades were implemented, assuming vastly expanded customer adoption rates for efficiency projects.
- One such potential study in New York was cited by the program administrator as supporting justification for investing large amounts of ratepayer dollars in efficiency financing programs.
- Some stakeholders have raised concerns over using these types of studies, indicating that they overstate the amount of financing required under current and future market conditions and likely levels of demand.
- A recent potential study in California found that "incremental savings potential due to financing is modest." Offering financing increased achievable potential savings by about 45 percent.
- Including energy efficiency financing in potential studies could offer important insights regarding:
- How financing might increase the total amount of achievable energy efficiency potential (i.e., how financing can help "grow the pie")
- The amount of program-supported financing that might be appropriate to meet customer demand, which could help administrators size their financing program budgets and expected activity level in the near and long-term (for goal setting)
- Additional research is needed to refine methods for estimating the incremental impacts of financing on achievable market potential for efficiency.

increasing the penetration of efficiency (National Action Plan for Energy Efficiency (NAPEE), 2007).[45] See Figure 2 for a characterization of the types of potential studies and their relationship to each other:

- Technical potential is the theoretical maximum amount of energy use that could be displaced by energy efficiency and is often a snapshot in time that assumes that all technologically feasible energy savings measures could be implemented.
- Economic potential represents the amount of savings from energy efficiency that is cost effective as compared to utility supply-side resources, again assuming immediate implementation.
- Achievable potential is the amount of savings from energy efficiency that can be achieved assuming aggressive and effective program strategies and accounting for market barriers, program administration costs and the capability of program administrators to ramp up efforts over time (National Action Plan for Energy Efficiency (NAPEE), 2007).

[45] Three broad applications for which a potential study can provide useful insights include: (1) building a case for energy efficiency investment, (2) identifying alternatives to supply-side investments, and (3) detailed design and planning for efficiency programs.

Potential studies typically focus on technology characterization (e.g. efficiency strategies for each end use) and also tend to rely on more common program design strategies (e.g. rebates, technical assistance) in estimating achievable potential. Thus, because financing programs have not played a dominant role in efficiency portfolios in most states, they are often not explicitly treated or analyzed as part of potential studies.

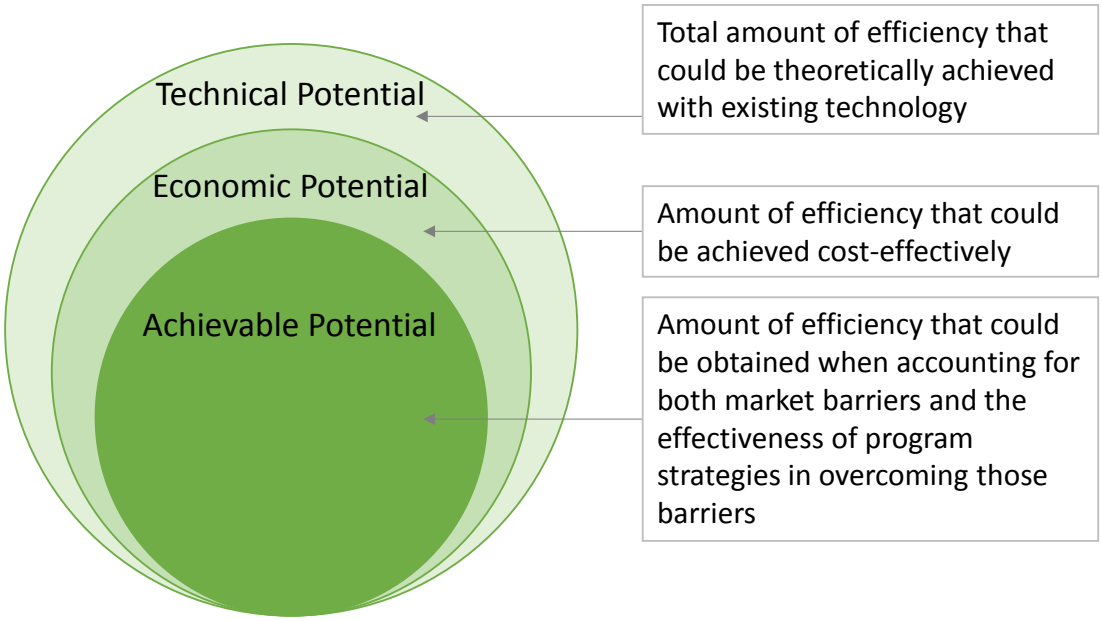

Figure 2: Technical, Economic, and Achievable Potential

"Theoretical" Financing Potential: United States

Some recent studies focus on the amount of capital that could be deployed if all energy efficiency projects were completed.[46] These studies are not analogous to technical, economic, or achievable potential studies, in that they focus on a theoretical maximum investment potential using widely expanded assumptions on uptake and penetration and do not make use of established potential study methodologies. For example, Deutsche Bank and Rockefeller Foundation conducted a foundational effort that assessed the total opportunity for capital deployment through energy efficiency financing.[47] This study developed estimates of the upper bound of total capital that could possibly be deployed for energy efficiency in the United States of $279 billion. Authors assumed a 30 percent reduction in energy use in all buildings built prior to 1980 and assumed 100 percent participation by customers. The authors also assume that all energy efficiency costs will be supported through financing strategies, assume no upfront customer cost contribution, and effectively treat total costs and required financing capital broadly as one and the same.

The study authors acknowledge that market barriers can hinder the deployment of energy efficiency financing and that there are limitations to existing market strategies. For example, in discussing the single-family residential sector, the authors observe:

[46] For example, NYSERDA, 2013b
[47] Rockefeller Foundation 2012. "United States Building Energy Efficiency Retrofits: Market Sizing and Financing Models"

> [T]here are at least two main challenges associated with market development in this segment. The first is the extreme fragmentation that exists within the single family market, which results in fragmented demand that is difficult to aggregate. The second is the relatively low level of effective demand, which is only likely to be addressed through strong regulatory requirements, retail consumer engagement strategies and/or other significant non-financial interventions. (Rockefeller Foundation, 2012, p. 15)

While market barriers are discussed qualitatively, the estimate of total market capital is not revised downwards to reflect these market barriers. These theoretical financing potential studies may be useful in estimating an upper bound for the demand for capital for energy efficiency improvements but do not provide insights on the level of participation and likely demand for capital that may be achieved by employing financing as a strategy for energy efficiency.

Addressable Financing Potential: New York

In September 2013, NYSERDA petitioned the New York PSC for an initial capitalization of approximately $165 million to launch a Green Bank, followed by a petition in October 2014 for full capitalization at a level of $1 billion (NYSERDA, 2013b) (NYSERDA, 2014c). In its request, NYSERDA cited a 2013 "New York State Green Bank Business Plan Development" analysis by Booz & Co.:

> Booz has developed a directional estimate of the potential addressable investment of $85 billion over the next ten years. Due to initial private sector leverage and the recycling of the Green Bank's capital, the Booz report projects that an initial $1 billion NYGB capitalization will lead to as much as $8 billion of additional private sector investment in clean energy projects over the next ten years … which would represent approximately 10% of the $85 billion potential addressable market. (NYSERDA, 2013b, p. 7)[48]

Booz & Co.'s study estimates that energy efficiency represents $55 billion of the total $85 billion of addressable clean energy potential (Booz & Co., 2013). To arrive at this figure, the report's authors first approximated the total technical potential for energy efficiency—$78.1 billion—using an assumed 100 percent participation rate for all building stock (pre-2008 or 2009, depending on the sector) and multiplied by the estimated retrofit cost per unit or square foot (see Figure 3). This figure is adjusted downwards by removing the portion of the market deemed "unaddressable" based on creditworthiness considerations and the potential market already being addressed through private market funding to arrive at $55 billion (Booz & Co., 2013, p. 47).

[48] The $85 billion value includes both energy efficiency ($55 billion), solar Photovoltaic (PV) ($13 billion), cogeneration ($8 billion), and other renewable technologies ($9 billion).

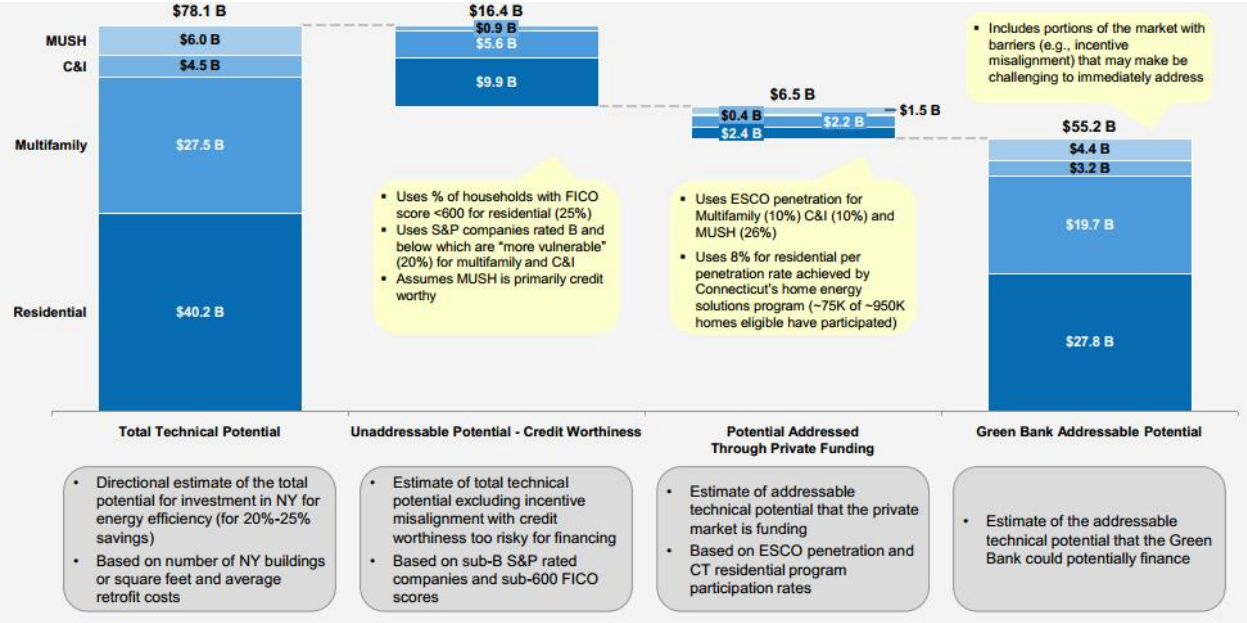

Figure 3: Booz Addressable Potential Methodology (Booz & Co., 2013)

NYSERDA's use of the Booz & Co. report has drawn comments from stakeholders. For example, the New York Energy Efficiency Corporation (NYCEEC), which provides financing for energy efficiency improvements in New York City, noted that:

> NYCEEC and the City are concerned that the proposed capitalization level of $1 billion is supported primarily by a ***theoretical*** estimate of the 'upper bound of investment potential,' and not by an estimate of the market-achievable potential for investment. In NYCEEC's experience, there currently is not $5.5 billion of annual market demand (i.e., $55 billion over 10 years) for energy efficiency projects in New York State. This is based on the level of demand that NYCEEC has experienced directly (not theoretically) for its various financing offerings. (City of New York, 2012, p. 13)

NYSERDA's reply comments acknowledge that the Booz estimate "did not attempt to identify a current market-achievable potential for energy efficiency or renewable energy, but rather to identify a conservative long term market addressable potential, in order to provide context for the current Green Bank capitalization plan" (NYSERDA, 2013a, p. 3).

Over time, questions regarding the true achievable potential of energy efficiency financing in New York may be resolved through observation of program results and retrospective impact evaluations. Concerns raised by some stakeholders in New York suggest that developing an achievable potential estimate for deployment of financing capital may be useful and would allow decision-makers to consider the amount of utility customer dollars to put into financing programs in the context of potential energy savings and costs for other energy efficiency opportunities.[49]

[49] New York did produce an achievable potential analysis in the same year as the Booz report, though that analysis focused principally on achievable potential energy savings using rebates and incentives as a primary strategy. The achievable potential analysis treated "access to

Achievable Potential: California

California's analysis of energy efficiency financing was conducted as a part of the state's overall 2013 California Energy Efficiency Potential and Goals Study (Navigant, 2014). The study focused on estimating the additional achievable energy savings that could be realized by introducing financing programs in California.

The study's authors assert that it was "the first potential study known to include financing as a driver of energy efficiency savings" (Navigant, 2014, p. 146) and acknowledged that, "currently, there are no established best practices to incorporate financing into EE potential models" (Navigant, 2014, p. 81). Given this situation, the Navigant authors devised their own methodology to assess the achievable potential of energy efficiency financing.

Navigant Consulting used consumers' implied discount rate (iDR) as an input to a larger model that determines achievable energy savings:

> Peer-reviewed research demonstrates that the discount rate that consumers apply to EE purchases is higher than market interest rates. The higher [implied discount rate] applied to energy efficiency purchases indicates that the consumer accounts for a range of perceived risks other than financial risks; such risks may include lack of access to capital, liquidity constraints, split incentives, hassle factor, information search costs, and behavioral failures. The difference between a consumer's implied discount rate and the market interest rate is often referred to as the 'efficiency gap.' (Navigant, 2014, p. 82)

The authors began with a typical consumer economic discount rate and built up an implied discount rate that incorporates the full range of these perceived risks or market barriers (see Figure 4). The authors reasoned that, to the extent that access to financing reduces these barriers, the implied discount rate should come down, leading to more energy efficiency upgrade activity. The authors then re-ran their achievable potential savings model using the lower implied discount rate to determine a new overall level of achievable savings.

As Figure 5 shows, "The difference in output in the two model runs (without financing and with financing) determines the incremental impact of EE financing" (Navigant, 2014, p. 86).[50] Ultimately, the study indicated that the "incremental savings potential due to financing is modest" (Navigant, 2014, p. 142). The study found that financing could increase potential savings by 2.5 percent in the residential sector and 1.5 percent in the commercial sector. Explanations for the modest incremental savings potential include limited eligibility for proposed financing programs in the commercial and multifamily sectors and the relatively low importance of access to financing as a barrier to overall energy efficiency adoption (i.e., financing barriers are a small component of consumers' implied discount rate) (Navigant, 2014, pp. 87-89).[51,52]

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financing" as only one subset among several market barriers related to cost; financing was listed as one among several categories of market barriers that could impact achievable potential. This study listed access to financing as a barrier, although it did not attempt to quantify the specific impact of that financing barrier on total achievable savings potential nor did it examine the potential additional savings that could be achieved by addressing this barrier with effective programmatic financing solutions. See http://www.nyserda.ny.gov/Cleantech-and-Innovation/EA-Reports-and-Studies/EERE-Potential-Studies

[50] The authors point out that the methodology described above provides the flexibility to "estimate market adoption with (a) rebates only, (b) rebates and financing, and (c) financing only."

[51] Navigant utilized past survey results, observations from financing programs in California and other states, expert interviews, literature research, and a process evaluation of California's small business On-Bill Financing Program in estimating the impact of access to financing on reducing the implied discount rate. Uncertainty in estimates of changes in the implied discount rate can be addressed by providing a range of possible outcomes and then re-estimating impact on the achievable potential savings from access to financing.

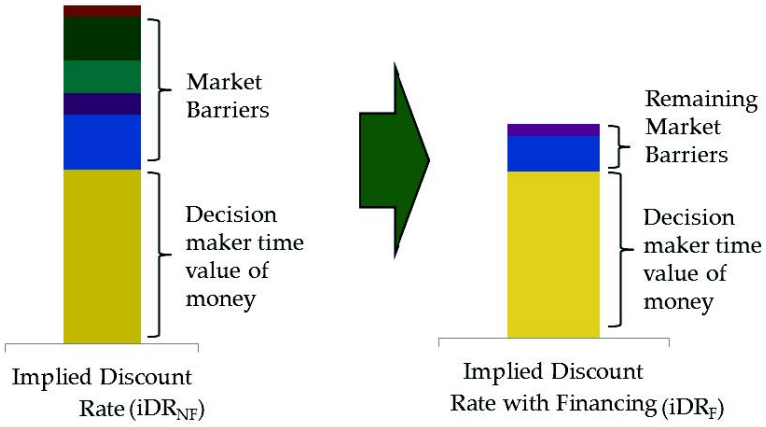

Figure 4: Reduction in iDR Resulting from Introduction of EE Financing (Navigant, 2014)

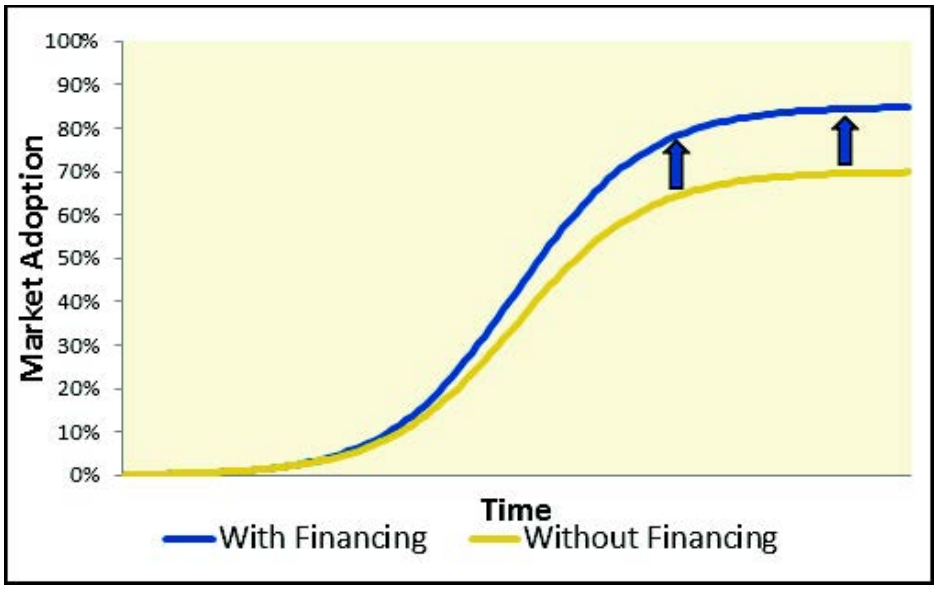

Figure 5: Effect of Introducing EE Financing on Market Adoption

[52] The study team modeled their financing assumptions off of the pilot on-bill repayment programs approved for the 2013-2014 program cycle. A September 2015 update to the potential study revised these assumptions based on findings from the Statewide Finance Baseline Residential Study. Using these updated assumptions, the team finds that financing leads to a 4.5 percent increase in potential savings in the residential sector and a 3 percent increase in commercial (electric only). See http://www.cpuc.ca.gov/NR/rdonlyres/0C4CF052-0E02-4776-A69A-88C619AC8DFB/0/2015andBeyondPotentialandGoalsStudyStage1FinalReport92515.pdf

Benefits of Achievable Potential Studies for Financing

There are several rationales for conducting an achievable potential assessment of energy efficiency financing:

- **Focusing on additional savings as the end result.** Other financing potential studies have tended to examine only how much capital can potentially be deployed in the energy efficiency market. An achievable potential assessment may focus on the level of additional savings potential that may occur if financing programs are offered by the administrator. This is an important question, particularly given the potential for utility customer-supported financing simply to replace private sector financing options, rather than expanding the total amount of energy efficiency activity by encouraging participation that would not otherwise have occurred.[53]
- **Treating financing as only one among a range of barriers.** Financing potential studies that focus only on market sizing may correlate market size estimates with the amount of program capital needed as an allocation toward financing programs. However, this perspective may overlook other key barriers that may limit the amount of capital that is actually likely to be deployed. Without incorporating the full range of barriers into an achievable estimate of financing potential, market-sizing analyses may lead to an overestimate of the amount of program capital actually needed.
- **Providing a benchmark for program planning and evaluation**. An achievable potential analysis may provide a reasonable starting estimate of achievable potential for purposes of program planning and budgets.
- **Setting a savings target for financing activities.** Achievable potential studies can help decision makers to understand the incremental savings that financing could produce and to set savings goals for financing programs using this benchmark.

Chapter 4: Cost-Effectiveness of Energy Efficiency Financing Programs

In this chapter, we discuss planning and performance metrics—benefit/cost screening tests and net program benefits—and their applicability to financing programs using illustrative examples. We also identify unique features of financing programs that pose challenges for administrators when conducting cost-effectiveness screening analyses. As part of a utility's resource planning or demand side management planning process, program administrators are typically required to screen proposed programs for cost-effectiveness using one or more benefit-cost tests. If efficiency financing programs become a more prominent element of the overall portfolio or are treated as distinct program offerings, then these efforts are likely to be subject to a state's policy guidelines and regulatory practices.

The primary tests used in assessing program cost effectiveness are described in Appendix A. In thinking about how these tests interact with energy efficiency financing programs, it may be helpful to distinguish between those tests that focus on costs and benefits from a utility or program administrator perspective (such as the PACT), and those that involve a broader comparison of costs and benefits (such as the total resource cost test (TRC) or the societal cost test (SCT)). The TRC test compares all of the direct costs that both utilities and customers pay with the regional benefits received from energy efficiency. The PACT assesses whether an efficiency program is cost-

[53] The Navigant study also focused specifically on savings that were generated by financing in addition to those that would have already occurred with rebates alone (p. 146).

effective from the program administrator's perspective. The PACT is particularly relevant because a key rationale offered by proponents of large-scale financing programs is that they can effectively leverage limited program funds, attract a large amount of private capital, and induce participants to bear most or all of the costs of efficiency measures.[54] (The sidebar "Financing Programs and Cost-Effectiveness Test Screening" explores this issue and others.) Such leveraging of utility customer dollars would, in theory, reduce program administration costs, though benefits could also potentially be reduced, leaving some uncertainty regarding ultimate bill impacts.

KEY TAKEAWAYS

- Several states that are implementing large-scale financing programs have begun to examine the unique features of financing strategies that may need to be addressed when screening these programs for cost-effectiveness.
- From a program administrator's perspective, the ratio of costs associated with financing programs may be modest compared to the benefits, leading to relatively high benefit/cost ratios.
    - However, if program administrators shift towards financing and the total level of savings attributable to a financing program are modest or are less than what occurred in traditional efficiency programs, then the total amount of net benefits achieved may be lower even while the benefit/cost ratio improves.
- State policymakers, regulators, and program administrators that are considering a shift toward financing as a core energy efficiency strategy should consider reviewing both total net benefits and benefit/cost ratios.

FINANCING PROGRAMS AND COST-EFFECTIVENESS TEST SCREENING

The potential for financing programs to lower program costs and improve cost-effectiveness is most relevant to the PACT. Costs borne by participants are not included in the PACT and thus finance programs may have higher benefit-cost ratios than a rebate program if program participants pay for a greater share of the costs of energy efficiency measures and the program is able to achieve comparable savings. However, in comparing a finance vs. a traditional rebate program, the relative impact on TRC or societal benefit-cost ratio results would be much less dramatic because those tests include administrator costs and net participant costs (which are based on incremental costs of efficiency measures).

Cost-Effectiveness Screening in a Finance Program as Substitute Scenario

In jurisdictions that are contemplating a shift away from traditional energy efficiency programs and toward financing as a core strategy, it may be important to consider both benefit-cost ratios as well as total net benefits achieved. One risk in assessing financing programs using benefit-cost ratios alone, particularly from a PACT perspective, is that it is possible that benefit-cost ratios could improve even as net benefits decrease and total energy savings actually decline. Table 3 provides a hypothetical example in which a finance program replaces a traditional rebate program in a market sector and aggregate gas and electric savings decrease significantly after

[54] Administrative costs can be built into interest rates or program fees; interest costs themselves are added costs that do not exist in rebate-only programs.

the program is implemented. From the program administrator's perspective, the benefit-cost ratio increases from 2 to 4 although net benefits decrease from $3 to $1.8 million. The decrease in net benefits is driven by the result that savings have decreased by 60 percent either because customer participation rates decreased or because the finance program primarily attracted customers that indicated that they would have utilized private financing if the program were not available. If net benefits decrease, the utility would likely have to procure energy from more expensive supply-side resources.

Table 3: Finance vs. Traditional Rebate Program Example if Aggregate Savings Decrease: Cost-Effectiveness Results

	Traditional Programs Scenario	Financing as Substitute Scenario
Total Net Savings (MMBtu)	1,000,000	400,000
Program Administrator Cost ($/MMBtu Saved)	$3.00	$1.50
Total Cost – EE Programs ($)	$3,000,000	$600,000
Benefits ($/MMBtu of Avoided Supply)	$6	$6
Total Benefits – EE Programs	$6,000,000	$2,400,000
PACT Benefit/Cost Ratio	2	4
Net Benefits (Total Benefits – Total Costs)	$3,000,000	$1,800,000
Loss of Net Benefits		$1,200,000

Given the large degree of uncertainty regarding total net savings potential under a shift toward financing as a core strategy, regulators may wish to monitor both benefit/cost ratio screening results as well as actual net benefits achieved.

Cost-Effectiveness Screening in a Financing Program as Complement Scenario

In jurisdictions where efficiency financing programs complement other energy efficiency strategies, it is also important for administrators and regulators to analyze cost effectiveness test results and actual net benefits achieved. Table 4 provides a hypothetical example where a program administrator offers a traditional rebate program and a financing program that leads to deeper savings in some efficiency projects as well as increased market penetration in certain market segments.

Table 4: Financing Programs as Complement to Traditional Rebate Program: Cost-Effectiveness Results

	Traditional Programs	Financing as Complement	Total Portfolio
Total Savings (MMBtu)	1,000,000	400,000	1,400,000
Program Administrator Cost ($/MMBtu Saved)	$3.00	$1.50	$2.57*
Total Cost – EE Programs	$3,000,000	$600,000	$3,600,000
Benefits ($/MMBtu of Avoided Supply)	$6	$6	$6
Total Benefits – EE Programs	$6,000,000	$2,400,000	$8,400,000
PACT Benefit/Cost Ratio	2	4	2.6*
Net Benefits (Total Benefits - Total Costs)	$3,000,000	$1,800,000	$4,800,000

** Savings-weighted averages*

In this example, the addition of the financing program increases the program administrator's benefit/cost test results *and* increases total net benefits by $1.8 million compared to the traditional rebate program.

By contrast, it is also possible that augmenting traditional programs with a financing program may actually increase the cost of saved energy for the overall efficiency portfolio. Table 5 provides a hypothetical example in which participants in a financing program also receive the full amount of incentives offered in other programs or incur additional administrative costs or added incentives, such as interest rate buy-downs.[55] Under such a scenario, adding a financing program would cause the PACT benefit-cost ratio to decline compared to the existing traditional programs (1.82 vs. 2), although net benefits would still increase. Despite the decline in the benefit-cost *ratio* relative to traditional programs, it should be noted that layering on financing still produces a better outcome by increasing *total* net benefits.

Table 5: Potential Impact of Adding Financing Costs onto an Existing Portfolio: Cost-Effectiveness Results

	Traditional Programs	Financing as a Complement	Total Portfolio
Total Savings (MMBtu)	1,000,000	400,000	1,400,000
Program Administrator Cost/MMBtu Saved	$3.00	$4.00	$3.29*
Total Cost – EE Programs	$3,000,000	$1,600,000	$4,600,000
Benefits/MMBtu of Avoided Supply	$6	$6	$6
Total Benefits	$6,000,000	$2,400,000	$8,400,000
PACT Benefit/Cost Ratio	2	1.5	1.82
Net Benefits (Total Benefits - Total Costs)	$3,000,000	$800,000	$3,800,000

* Savings-weighted averages

Applying Cost-Effectiveness Principles to Energy Efficiency Financing Programs

Certain aspects of applying cost-effectiveness principles to financing programs are more straightforward than others. In some cases, basic principles that have long been applied to traditional programs may be readily applicable to financing programs, but there may be challenges in practice with determining appropriate values to use. In other cases, there may be foundational questions regarding the proper way to account for some of the unique costs and benefits of energy efficiency financing programs. We highlight these issues in this section.

Basic Principles

Baselines and Incremental Savings

In traditional efficiency programs, savings from installed efficiency measures are typically estimated relative to an appropriate baseline condition. For example, if a measure is replaced at the end of its useful life, traditional programs generally count only the efficiency gains above either minimum efficiency standards at the time of replacement or observed efficiency specifications of similar equipment on the market. Given that the equipment likely would have been replaced at some point even without the program, some efficiency gains would tend to result simply from the market-driven or required improvements in the efficiency of new models over time. Under traditional regulatory regimes, this portion of the efficiency improvement, while realized by the program participant, cannot be attributed to the program.

[55] This type of situation has been observed in some programs.

Depending on regulatory oversight or policy guidelines, financing programs may not be required to estimate savings or account for program-attributable benefits using approaches that are common for traditional efficiency programs. One potential way to address this issue is to adopt the same methods and reference documents as traditional efficiency programs in order to account for the benefits of measures installed in a consistent fashion. In many jurisdictions, technical reference manuals provide either deemed savings values or deemed calculation methods that provide guidance on accounting for savings from installed measures.[56]

Net-to-Gross Issues

In screening programs for cost-effectiveness, program administrators typically estimate a net-to-gross (NTG) ratio that is used to adjust gross energy impacts to reflect those savings that are attributed to and are a direct result of the efficiency program. Net-to-gross adjustments often include and reflect estimates of free riders (i.e., customers that would have installed high-efficiency measures on their own but participated in the program), spillover effects (i.e., customers that adopt efficiency measures because they are influenced by information and marketing material provided by the administrator although they do not actually participate in a rebate program), market effects, and rebound/take-back effects.[57] The monetized value of these net savings is generally reflected in the benefits included in cost-effectiveness screening tests. Neither free ridership or spillover issues have been well explored to date in energy efficiency financing programs; see Chapter 5 for additional discussion of this issue.

Unique Features of Financing Programs That May Impact Cost-Effectiveness Screening

Unique features of energy efficiency financing programs may present challenges when conducting cost-effectiveness screening tests. Several states (e.g., California, New York and Maryland) are discussing cost-effectiveness screening issues. Stakeholders in California have begun to explore ways of applying cost-effectiveness principles to financing pilot programs (Dunksy, 2014).[58] However, additional work is needed to assess the most appropriate ways to tackle these issues. We highlight several of the more salient questions that have emerged from these discussions. Appendix B and the sidebar titled “The Objective Function” also explore one state’s approach to accounting for program costs and benefits.

[56] Technical Reference Manuals (TRMs) are used in planning, reporting and evaluating efficiency programs. TRMs include metrics and characteristics (e.g., energy savings and efficiency measure lives), engineering algorithms to calculate savings, and factors to apply to calculated savings (e.g., net-to-gross ratios). For more information, see SEE Action’s 2011 “National Energy Efficiency Evaluation, Measurement and Verification (EM&V) Standard: Scoping Study of Issues and Implementation Requirements” available online at https://www4.eere.energy.gov/seeaction/system/files/documents/emvstandard_scopingstudy.pdf.

[57] See the National Action Plan for Energy Efficiency’s “Understanding Cost-Effectiveness of Energy Efficiency Programs” (2008) for more information, especially pages 4-10, available online at http://www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf.

[58] The California Legislative Analyst Office (LAO) identified cost-effectiveness as a key priority for California’s financing pilots. The LAO recommended that the CPUC and program administrators be required to report on the financing pilots’ cost-effectiveness. Specifically, the LAO noted, “This evaluation should include information that allows the Legislature to compare the cost and effectiveness of each approach, including information on … the costs of these projects compared to their benefits” (California Legislative Analyst's Office, 2014, p. 47) .

THE OBJECTIVE FUNCTION

Connecticut is exploring a new cost effectiveness-like tool, called the Objective Function, originally developed by the Coalition for Green Capital. The Objective Function measures energy saved per dollar of public funds invested (and is similar to the reciprocal of the cost of saved energy metric). Conceptually, a larger value indicates more efficient use of public dollars. The formula for the Connecticut version of the Objective Function 1.0 is:

$$\frac{(Energy\ Generated\ or\ Saved{-}kWh\ or\ Btu){*}(1{\pm}\%\ Realized\ Savings)}{CGB\ Rebates{+}Program\ and\ Administrative\ Costs{+}Credit\ Enhancements{+}Amount\ of\ Financing{-}REC\ Revenue}$$

The numerator of the Objective Function counts the amount of clean energy generated by renewable resources and/or the amount of energy saved by energy efficiency projects, adjusted by a realization term that accounts for the difference between predicted and actual generation/energy savings. The denominator includes various costs such as Green Bank rebates (not utility rebates); Green Bank program and administrative costs; Green Bank credit enhancements including interest rate buy-downs, loan loss reserves and guarantees; principal funded by the Green Bank; and an adjustment for revenue from renewable energy credits (RECs) that the Green Bank retains and may sell. Other revenue from financing activities is not currently included.

Currently, the Connecticut Green Bank uses the Objective Function to provide information regarding the energy-related benefits of its programs and plans to eventually revise and enhance this metric. Because the Objective Function is a work in progress and does not account for all benefits and costs of energy efficiency programs (and other clean energy projects), it is important for policy makers to consider or develop other metrics in addition to assess the impacts of efficiency financing programs.

Measure Costs

For certain applications in traditional energy efficiency programs (e.g., equipment replacement upon burn-out at end of measure life), incremental measure costs and savings that are incremental to current codes/standards (or practice) are used in the TRC or SCT Tests. However, in the case of financing programs, loans generally cover the full cost of energy efficiency measures and may even cover non-energy measures (e.g., asbestos removal or rewiring). If program administrators incur costs from those loans (e.g., write-offs or payouts from a loan loss reserve), they may similarly tie back to the full cost of the measures installed (Dunksy, 2014). These represent real costs to the program and may need to be accounted for in the Program Administrator Test. However, from a TRC or SCT standpoint, one could argue that only those costs that tie back to the energy-related portion of the loan (e.g., in proportion to a percentage of the loan covering incremental energy efficiency costs) should be included as a cost in the screening analysis.

Write-Offs and Loss Reserve Payouts

Predicting loan performance over time is a basic challenge of accounting for financing costs when performing prospective cost-effectiveness analyses. This is particularly true in the case of financing pilot programs, which are often designed to demonstrate that loan performance may exceed expectations, reducing the gap between perceived and actual risk. Given this potential gap, regulators and program administrators may need to come up with a reasonable assumption for expected loan performance, which may impact the projected cost of write-offs and payouts from loan loss reserves when calculating PACT values. It is also possible that loss reserve payouts could be treated as transfer payments in the TRC or SCT perspectives. This is a topic worthy of further investigation.

Opportunity Costs

Opportunity costs, or the value of forgone alternatives, of capital dedicated to financing programs may need to be properly accounted for in cost-effectiveness tests. For example, programs that lend out utility customer capital at below-market rates arguably may be foregoing higher potential returns. Determining an appropriate rate of return that these funds could have generated may be a matter of discussion among stakeholders. Arguments can be made for assuming a market rate of return on similar lending activity (e.g., a utility rate of return on revenue collected from utility customers, or a societal rate of return on funds invested to achieve public policy goals). Alternatively, one could argue that there is no opportunity cost, just as there is no opportunity cost assumed for the investment of ratepayer funds in other types of energy efficiency programs. Similar questions arise when funds are invested in loan loss reserve accounts to cover potential write-offs. Funds in these types of accounts may also earn a small return. Questions may arise as to whether this gap should be treated as an opportunity cost. Accounting treatment of reserves set aside by financial institutions to cover potential lending risks may provide guidance on these questions for energy efficiency financing programs.

Chapter 5: Evaluating the Impact of Financing Programs

Evaluation, measurement, and verification (EM&V), and particularly impact evaluation, is the primary tool that program administrators and policy makers have used for the past several decades to assess savings created by energy efficiency programs. EM&V serves a number of important functions, including: (1) providing feedback to administrators, including recommendations for improving programs; (2) quantifying observed versus predicted or claimed savings; and (3) assessing the cost-effectiveness of a program ex post. In some jurisdictions, evaluation results also have a role in determining performance incentives for program administrators.[59]

While there are currently no standard protocols for evaluating financing programs, a few evaluations have been completed and commitments to evaluation of financing are in place in some jurisdictions. Evaluation may play an important role in helping program administrators quantify the level of incremental benefits (e.g., energy savings) that financing strategies produce. Traditionally, financing strategies have not been separately evaluated from other programmatic activities, primarily because financing has often been considered as a component of a broader program offering that targets a specific customer market segment.[60]

This trend is beginning to change for at least two reasons. First, in jurisdictions such as Massachusetts, financing activities—though still treated as complementary to other programs—have achieved a volume that has generated interest in better understanding both the costs and savings attributable to financing. Second, in jurisdictions considering large-scale shifts toward financing as a substitute for traditional programs, some stakeholders have called for evaluation activities in order to understand the likely (prospective) or actual (retrospective) effectiveness of such a shift.

[59] For a more complete discussion of EM&V for energy efficiency programs, see State and Local Energy Efficiency Action Network (2012). *Energy Efficiency Program Impact Evaluation Guide*. Prepared by Steven R. Schiller, Schiller Consulting, Inc., www.seeaction.energy.gov.

[60] During the 1980s and 1990s, several utilities conducted impact evaluations of weatherization programs that offered attractive financing to residential customers (e.g. zero-interest loan programs). See for example Hirst, E. "Evaluation of the BPA Residential Weatherization Pilot Program" (1983) http://www.osti.gov/scitech/biblio/6241133.

FINANCING PROGRAMS AND COST-EFFECTIVENESS TEST SCREENING

- Evaluation has been used for decades to verify the impacts and cost-effectiveness of energy efficiency programs. However, efficiency financing programs have typically not been evaluated as separate programs within ratepayer-funded portfolios. Thus, few formal impact evaluations have been conducted that assess the incremental savings contribution of financing to efficiency efforts.
- Evaluation is becoming increasingly important in jurisdictions where financing is gaining prominence; Illinois and Massachusetts recently evaluated their financing efforts.
- Impact evaluation can help state policy makers and program administrators assess whether savings are attributable to financing programs versus other programs offerings, offering insight on the impact of shifting resources to financing and away from other program options.
- Resource acquisition-focused evaluations should take into account the broad availability of alternative private financing options and should assess whether program financing was a critical factor for program participants deciding to invest and move forward with their project (i.e., did the program-supported financing generate incremental savings?).
- Market transformation-focused evaluations should seek to establish appropriate baselines (e.g., level of adoption of various efficiency technologies and the extent to which investments in these measures are supported through private financing mechanisms prior to the program), setting interim metrics and a timeline for measuring progress, and determining attribution of savings.
- Conventional evaluation methods can be adapted to assess financing programs, such as survey methods and various experimental and quasi-experimental approaches, including randomized control trials. However, further research is required on refining these approaches for financing programs and assessing which approaches are the most effective ways to assess savings and market transformation.

Assessments of Financing as a Complementary Program Strategy

Financing programs have typically not been separately evaluated in jurisdictions where it is a complementary strategy. However, in a few cases, regulators or program administrators have determined that a financing-specific evaluation is warranted, either because loan volume has reached high levels or for other policy reasons. Examples include:[61]

- In Massachusetts, the zero-percent interest residential HEAT Loan program has grown to roughly $100 million of loans originated annually, with interest-rate buy-downs in the range of $1,400 per loan.[62] The Massachusetts Energy Efficiency Advisory Council completed an evaluation to assess the relative importance of the HEAT loan compared to other incentives in encouraging participation. The evaluation focused on roughly 950 customers who had recently received an energy audit and recommendation to install various energy efficiency measures; evaluators also surveyed consumers who participated in other energy efficiency programs but not the HEAT loan. Evaluators utilized self-reported customer responses

[61] Efficiency Maine's financing programs and the California On-Bill Financing Pilots were also evaluated.
[62] Only approximately $15M of ratepayer funds were used to support total activity of $100M.

and data from program administrators to complete an analytical hierarchy process, a statistical model that estimates the relative influence of several factors, using pair-wise comparisons.

- HEAT loans were primarily used to finance equipment replacement (over 80 percent of loans by count), with only 10 percent of loans used for weatherization. Eighty-five percent of customers who used a HEAT loan reported that it allowed them to make improvements that they otherwise would have passed over. Evaluators found that only 9 percent of customers who received incentives also chose to use a HEAT loan; those who did use the loan reported that it was slightly more influential in their decision-making than incentives, which are generous, including an insulation incentive of up to 75 percent of project cost.[63,64] Among customers that did not take a HEAT loan, 21 percent of customers reported that upfront costs were a barrier (compared to 39 percent of HEAT loan participants) (The Cadmus Group, 2015a).

- One of the aims of Illinois' legislatively-mandated on-bill financing (OBF) pilot program is to provide greater access to energy efficiency for middle-income consumers. Each of Illinois's five investor owned utilities was authorized to make up to $2.5 million of loans beginning in 2011.[65] The legislation establishing the pilot required an evaluation of the program to inform the legislature and regulatory commission about whether the program should continue. The evaluation made use of data reviews, web-based customer self-report surveys, stakeholder interviews, and trade ally research to address program design, implementation, and impacts.

- At the time of the evaluation, $7.6 million of loans had been made (over 1600 loans), primarily to single-family residential customers. Most loans (nearly 90 percent) financed replacement or upgrades or furnaces or central air conditioning systems. Based on web surveys of 75 participants, the evaluation team estimated a free ridership rate of 13 percent (i.e., 87% of customer projects were attributable to the on-bill financing program, rather than rebates, which were also available to OBF participants). Participants were asked if they planned to complete a project prior to learning about the program; almost half (43 percent) of all participants reported that they were planning to complete the upgrade.[66] However, respondents were not asked to differentiate between plans to install a high efficiency unit versus a standard efficiency unit, so the evaluation team does not draw conclusions from this statistic.[67] The evaluation team also assessed the cost effectiveness of the on-bill financing program using the PACT and the TRC. All five utilities' programs were cost effective (PACT calculated results ranged from 1.27 to 3.13) from the program administrator perspective while the programs did not pass a TRC test (TRC results ranged from 0.81 to 0.84). The evaluation team found that administrative costs were the primary driver of this result and estimated that programs could become cost-effective from a TRC perspective if

[63] Of the 91 percent of customers who did not use a HEAT loan, over two thirds were aware of the loan's existence.
[64] Consumers receiving a HEAT loan are also eligible for rebate incentives.
[65] One utility which offers both electric and gas service had a cap of $5M of loans. Utilities did not provide loan capital; these funds came from a private capital partner. Utilities provide a guarantee to the capital provider in the event of any defaults and are responsible for on-bill payment collection and disconnection in the case of delinquency.
[66] This percentage varied by measure type; 76 percent of survey respondents who installed a new furnace had planned to do so before hearing of the program, but none of the respondents who installed insulation planned to do so prior to participating in the program.
[67] Survey respondents were asked if, in the absence of the program, they would have pursued the same project with alternative financing (13 out of 75 said yes and were considered free-riders) or would have installed a less efficient option (10 out of 75 said yes). While participants were asked hypothetical questions about what they would have done, partial participants' (customers who applied for the program but were denied or dropped out) behavior was actually observed: 37 percent of partial participants went on to install the same (high-efficiency) measure they had hoped to finance using OBF and paid for it using another funding source (primarily cash). Eight percent of partial participants went on to install a less efficient unit. Partial participants differ, demographically, from participants and thus are not an appropriate comparison group. Partial participants' behavior is not a perfect indicator of a "no OBF" counterfactual because partial participants were exposed to some program elements which may have led to selecting high efficiency measures. However, partial participants' behavior in future evaluations might be a useful addition to a self-reported free-ridership survey.

participation increased by 2.5 times (The Cadmus Group, 2015b). This evaluation provided useful information regarding the administrative costs, anticipated participation rates, and installed measures in a residential financing program, along with methods for estimating free-ridership issues in financing programs.

Evaluating Financing as a Resource Acquisition Strategy

Applying basic principles of evaluation to financing programs may help stakeholders better understand the additional benefits offered by financing programs, whether the programs focus on resource acquisition and/or market transformation objectives.[68] Evaluation of financing programs does require data collection, although it will not necessarily lead to overly burdensome data collection requirements on private financial institutions who partner with ratepayer-funded programs. The majority of information needed for evaluation (e.g., customer information, property information, measure information) is likely already collected by program administrators, contractors, or other parties. Some additional information may be required from consumers (e.g., the consumer survey completed in Massachusetts and Illinois evaluations). The California evaluation team identified only six data fields that would be reported by financial institutions (Opinion Dynamics, 2014, p. 4).

Establishing Baselines

Energy efficiency programs are often designed to encourage customers to purchase more efficient technology than they would have otherwise chosen. In some market segments, reactive purchases (e.g., end-of-life equipment replacement or emergency equipment purchases if equipment breaks or fails) far outstrip the volume of proactive energy efficiency upgrades (Krajsa, 2013). In these reactive scenarios, evaluators traditionally do not count the amount of savings relative to the old equipment, but rather the savings relative to the equipment that the customer would have chosen were it not for the program offering.

Regulators and program administrators may need to ensure that savings from financing programs are counted in a similar fashion. Proper accounting may be as simple as adopting EM&V methods that are used for similar measures in traditional programs in the same jurisdiction. In other cases, such as custom projects and whole-house retrofits, additional efforts may be needed to ensure that savings are properly estimated up front and verified. Leveraging the protocols of traditional programs, including engineering savings analysis methods, modeling software, and contractor eligibility and training requirements, can help ensure that claimed savings values are reliable.

Measuring Savings Attributable to an Efficiency Finance Program

In this context, we focus on the extent to which program financing strategies actually increase the total energy efficiency savings within a given jurisdiction above and beyond a naturally occurring baseline. This question may be more complex for efficiency financing programs compared to traditional efficiency programs for at least two reasons.

- First, program financing is often offered in markets in which private financing is also readily available. Thus, it may be more difficult to determine whether the project would have moved forward in the absence of a program offering (i.e., would other financing have been used?). This consideration makes financing somewhat unique from other types of program offerings. For example, in the case of rebates, there is typically only one counterfactual to consider: in the absence of a program rebate, there are no

[68] It should be noted that while organizing programs by these two objectives is fairly common, they are often interrelated and certainly not mutually exclusive objectives.

"private" rebates available. By contrast, in the case of program financing, there are often a wide variety of choices available to customers in the private market (e.g., using cash, credit cards, vendor financing, or home equity loans). Often, these options are more widely used than program financing products. As such, determining whether private financing would have worked equally well in generating the same level of savings may require a detailed and careful evaluation.

- Second, program financing is often promoted as an element or option in a broader program offering that may include other design components (e.g., technical assistance, rebates). Typical program evaluations generally do not parse out the specific impacts of particular program elements, focusing instead on the overall effectiveness of the program.

In jurisdictions exploring the possibility of using financing as a substitute for traditional programs, it may be important to evaluate the level of savings that program financing would likely have generated in the absence of other offerings. It may also be important to assess the ways in which combining offerings may produce enhanced results. In some cases, combining financing, incentives and other program elements may produce impacts that are disproportionately larger than might be expected by simply observing the effects of individual strategies (Kramer, 2014).

Figure 6 illustrates the multi-layered nature of the savings attribution question for energy efficiency programs that include and offer financing as part of their portfolio. Adjustment 1 can be thought of as analogous to a traditional counterfactual for efficiency programs in that it focuses on whether financing generated more savings than would have occurred otherwise. In this case, the question is framed as whether financing in general (of any type—program or private) helped generate additional savings relative to a baseline with no financing available.

The next two adjustments relate to the specific contextual factors noted above that are unique to financing as a particular type of program offering. Adjustment 2 considers whether financing offered through a given program generated additional savings beyond what would have occurred if a non-program financing option (or other payment option) were used by customers. Adjustment 3 accounts for the impact of other program offerings offered alongside financing, to help estimate what level of savings would have occurred in the absence of these other offerings. This last adjustment may be particularly important in jurisdictions that are contemplating the reduction or removal of these other offerings.

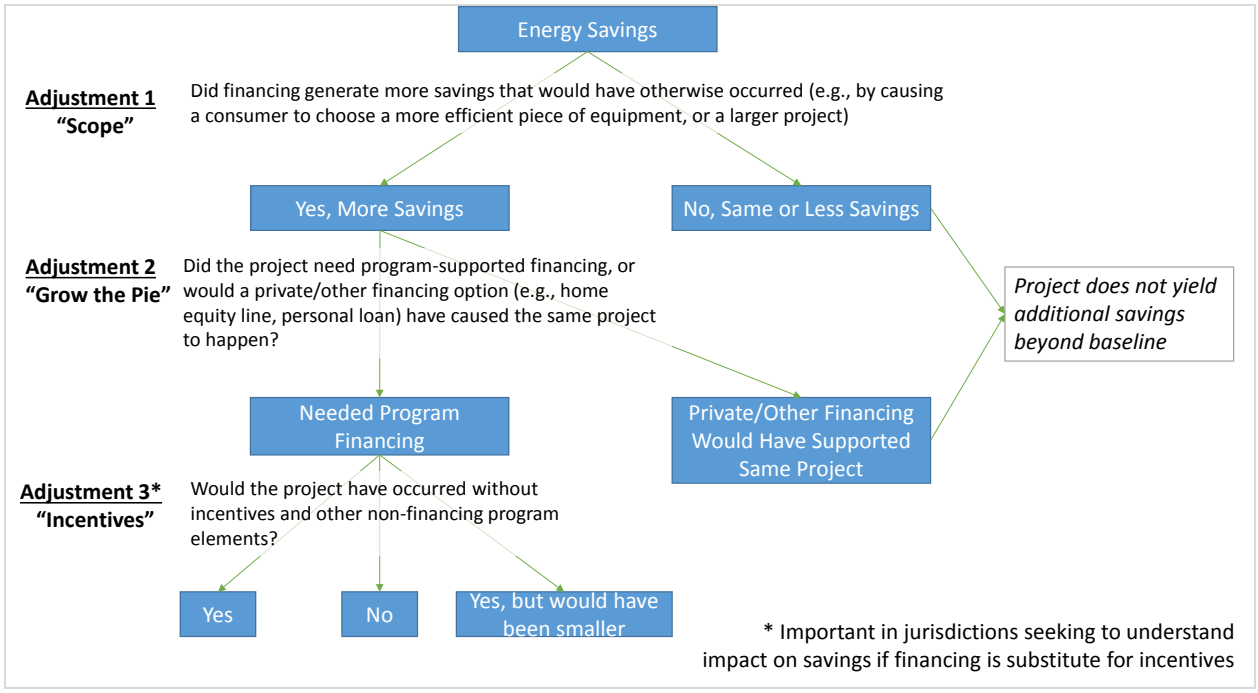

Figure 6: Savings Attribution in the Context of Energy Efficiency Financing[69]

By incorporating these elements into the evaluation process, evaluators will be able to provide stakeholders with a more complete picture of the incremental savings that program financing has added to baseline or naturally occurring energy efficiency, existing programs and traditional financing products. This information may be important in helping jurisdictions determine how best to allocate resources among financing and other strategies, as well as to assess the prospects for using financing as a primary program strategy in the future.

Evaluating Financing as a Market Transformation Strategy

Some proponents of efficiency financing have asserted that large-scale financing programs will fundamentally transform the energy efficiency marketplace away from utility customer-funded rebates/incentives and towards a partially or fully funded private sector model. For example, the NY Green Bank has been characterized as an integral part of a larger statewide market transformation effort designed to encourage greater adoption of energy efficiency technology through private market activity (NYSERDA, 2014a). Some financing proponents have also suggested that financing programs may transform the market by encouraging larger projects that generate more savings per project than currently achieved.

Others see financing as a vehicle for moving away from utility customer supported incentives of any form. For example, Figure 7 depicts the Connecticut Green Bank's long-term vision of its role in transitioning from the current program environment (with rebates/incentives for high-efficiency products) to a market for energy

[69] This figure is provided for illustrative purposes. It depicts savings attribution (adjustments) as a yes or no question when in reality each adjustment may result in partial yes answers. For example, financing had "some" influence or the financing resulted in the consumer investing in a larger efficiency project, but not whether to do efficiency or not.

efficiency products and services ultimately supported by "private sector financing only" (Clean Energy Finance and Investment Authority, 2014).

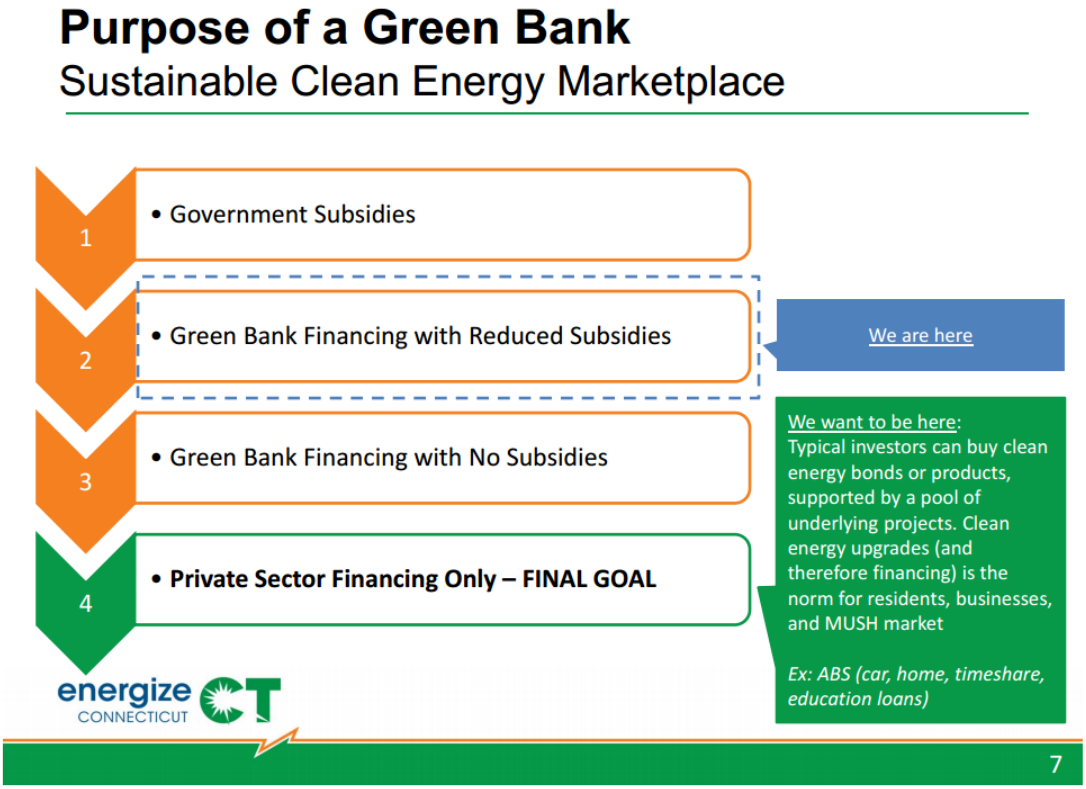

Figure 7: Role of the Connecticut Green Bank in Market Transformation

Given the importance of understanding the effectiveness of financing as a transformational strategy, regulators and program administrators may wish to establish clear direction regarding evaluation requirements for programs with market transformation objectives. Best practices for evaluating programs that have market transformation objectives include (NMR Group, 2013):

- Developing a logic model to illustrate the market transformation theory;
- Establishing baselines against which progress will be measured;
- Agreeing upon interim metrics to show progress;
- Committing to a timeline of progress indicators; and
- Measuring ultimate results attributable to the program over an extended period of time.

Each of these key elements is discussed in more detail below.

Developing a Logic Model

Program logic models are "graphic representations of the causal links between program activities, short-term responses to those activities among market actors and longer-term market effects" (Rosenberg & Hoefgen, 2009, p. 48). Logic models flow from decision makers' 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 (interim metrics) and help program administrators, policy makers, and stakeholders assess the likely timeframe within which the theorized transformation might be realized. Three high-level descriptions of logic models relevant to efficiency financing are presented in Table 6.

Table 6: Three High-Level Descriptions of Energy Efficiency-Focused Logic Models

Identified Barrier	Hypothesis	Intervention
Total Project Cost	Reducing total project cost with a direct incentive will induce more consumers to install high-efficiency measures and result in greater energy savings	Offer direct incentives, tax-credits, or rebates to consumers for targeted efficiency measures
Project Cash Flow / Timing of Payments versus Benefits	A financing option that results in a cash flow neutral or positive investment will induce more consumers to install high-efficiency measures and result in greater energy savings	Offer a subsidized financing option (e.g., below market rates or longer than typical repayments terms) for targeted efficiency measures; use ratepayer funds to make the loans or to fund credit enhancements that will induce private lenders to provide preferential terms (e.g., lower rates, longer repayment terms)
Lower than Desired Availability of Attractive Private Financing	If private sector lenders had additional information or experience with energy efficiency, they would provide more attractive financing, which would induce more consumers to install high-efficiency measures and result in greater energy savings	Work with private lenders to educate them on energy efficiency, collect and share relevant loan performance data, and support private investment with ratepayer-funded credit enhancements or direct investment until private sector lenders change their practices

To date, few program administrators have developed formal logic models that describe the potential for financing as a market transformation tool. However, the Connecticut Green Bank is exploring the third hypothesis described in Figure 8 using a version of a logic model originally developed for use in California. Neither state has adopted this model.

The logic model outlines the steps through which financing could increase savings from energy efficiency:

1. Programs provide rebates, incentives, and training to drive demand for financing projects. Market trends favoring efficiency may increase demand at the same time.
2. Programs may also provide credit enhancements to lower investors' perceived risks in energy efficiency projects. Over the longer term, as demand for financing increases, programs track loan performance data to increase investor confidence in energy efficiency investments and reduce the need for credit enhancements.
3. As the perceived risk of energy efficiency investments decreases, capital becomes more widely accessible with lower interest rates, more favorable terms, and more flexible underwriting criteria. Marketing by financing partners may also increase with the growth of energy efficiency lending as a line of business.
4. Attractive and available capital further increases demand for energy efficiency projects and the number and size of projects completed, leading to an increase in aggregate energy savings.

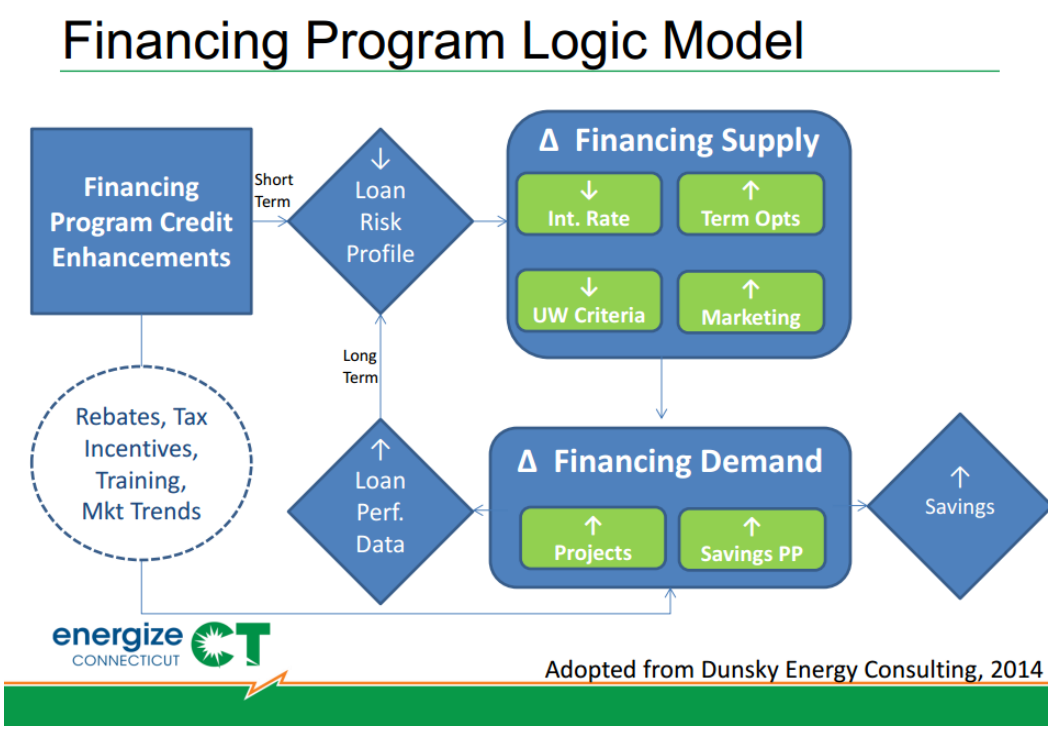

Figure 8: Potential Logic Model for Connecticut Green Bank (Not Currently Adopted)

This logic model in focuses on leveraging energy savings from existing programs and policies to increase both the number of projects (↑ Projects) and the level of savings per project (↑ Savings PP) and does not necessarily imply a reduction or elimination of other incentives (e.g., rebates).

Establishing Market Baselines

A market baseline estimate is a quantitative assessment of existing levels of market adoption and savings from a given set of energy efficiency technologies and services (Rosenberg & Hoefgen, 2009, p. 62). It differs from a qualitative market characterization in that it provides a specific benchmark against which to measure future progress. As shown in Figure 9, a baseline estimate is key to understanding what changes in the market, and hopefully incremental savings, are attributable to programmatic efforts. "If the ultimate objective of the evaluation is to estimate net product or service adoptions attributable to the program, then an estimate of sales or market share for a period close to program launch is required" (Rosenberg & Hoefgen, 2009, p. 62).

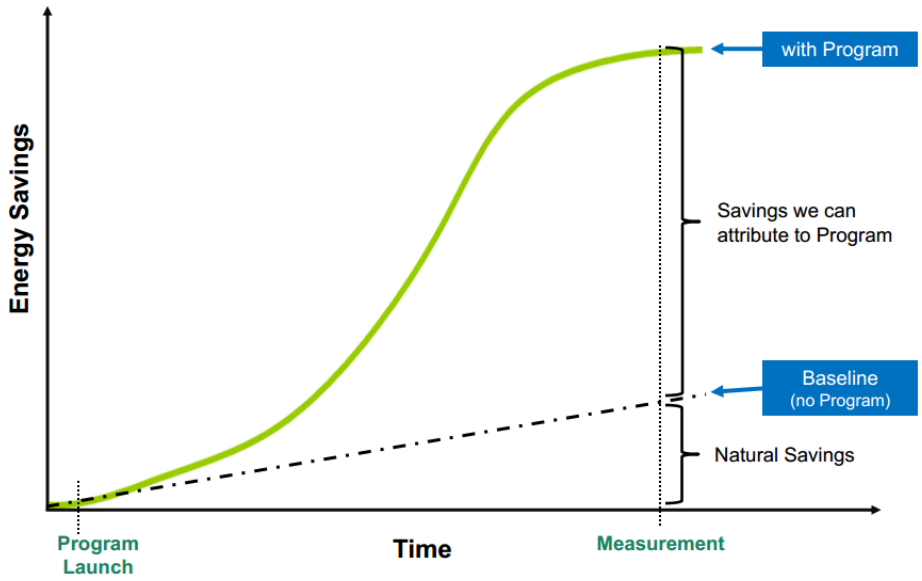

Figure 9: Measuring Savings from Market Effects Above Baseline (Peters, 2014)

To the extent that market transformation efforts aim to both (1) increase the use of financing generally to support energy efficiency measures, and (2) specifically increase the use of private financing to support energy efficiency, it may be necessary to establish a baseline that accounts for both program and private financing activity related to energy efficiency.

Agreeing Upon Interim Metrics

Establishing and tracking interim metrics is critical in assessing progress toward achieving market transformation goals. Examples of interim metrics include market share of high-efficiency equipment or products or market saturation of services/practices (e.g., commissioning). Data indicating changes in these metrics may be drawn from self-report surveys of customers or upstream market actors (e.g., manufacturers, distributors, and retailers), saturation surveys, periodic market baseline studies, and shipment or sales data (Peters, 2014). Other indicators of market effects (e.g., changes in awareness, attitudes, and product availability) may also be tracked, particularly in the earlier stages of a program intervention.

Potential indicators of market effects for financing programs might include the following:

- Early Indicators:
    - Availability and accessibility of financing options to customers
    - Customer awareness of and attitudes toward financing options
- Mid-Stage Indicators:
    - Changes in interest rates, terms, and underwriting criteria offered for energy efficiency financing
    - Changes in levels of credit enhancement needed to achieve given rates and terms (e.g., leverage, see sidebar “Volume and Leverage”)
    - Changes in incentive levels and other supports needed to drive financing participation

- Number of financial institutions that see efficiency financing as a viable business and begin offering efficiency-oriented loan products without assistance from utilities or government agencies

- Ultimate indicators:
  - Increased savings attributable to energy efficiency financing

VOLUME AND LEVERAGE

Volume—the total dollar amount of financing extended and number of loans—and leverage—the ratio of ratepayer dollars (e.g., rebates, credit enhancements, interest rate buy downs) to private dollars—are two straightforward metrics that have often been used to track the performance of energy financing programs. Administrators in the five states surveyed for this report track both volume and leverage. Volume and leverage metrics provide useful information on program performance, although these metrics are not sufficient to answer questions related to savings attributable to efficiency financing programs. For example, consider a program that works with private lenders to buy down interest rates offered to participants. This program may attract many participants who had access to attractive financing outside the program and had planned to complete similar projects even without program support. Volume (total number of loans) and the leverage ratio would be high, although savings attributable to the financing program might be negligible.

Program-supported financing is potentially available to support many types of energy efficiency projects and eligible technologies, ranging from single measure projects, to equipment replacements, to multi-measure whole home upgrades. For example, if significant market activity occurs as a result of "reactive improvements" (e.g. replacing broken water heaters), then it is important to ensure that additional efficiency gains occur as a result of replacing needed equipment. Moreover, certain products and equipment are highly visible, have attractive non-energy attributes, and are perceived to enhance property values (e.g., new windows and doors). These types of improvements may be more likely to occur in the absence of program support and should be screened to ensure that high-efficiency equipment is being selected and efficiency gains are beyond what would have occurred in the absence of program-supported financing. It is possible that volume and gross savings may appear large for a financing program that focuses on reactive improvements or desirable home upgrades. Baseline market penetration levels of efficient equipment may need to be estimated and compared with post-implementation evaluation results to determine whether the program has actually motivated more customers to choose efficient equipment than may already do so naturally.

Committing to a Timeline

Establishing a timeline for various performance metrics helps to ensure accountability; see Table 7 for an example of interim metrics that could be tracked over time to assess whether an efficiency financing program is making progress toward achieving its market transformation objectives.[70]

[70] This example builds off of the logic model in translating the steps into actual interim metrics that can be measured over time.

The first step is to establish a baseline (T_0) of efficiency project activity (and aggregate energy efficiency savings) in the target market (or market segment) and the percentage of projects supported by financing prior to the program. The baseline should account for both private market activity and existing program savings and financing activity.

Data on new financing program options should then be gathered (T_1) and an estimate of initial demand for these options should be established (T_2). From an evaluation standpoint, the time required for these tasks may depend on the timeline of program development and implementation. After initial program launch, an interim period may be needed to allow loans to "season" (generate performance history over time) and data to be gathered before robust loan information and project performance data (T_3) is available. In theory, several years of performance history could potentially be needed for this purpose. After this data was available to financial market investors, it would make sense to gather information on perceived risk (T_4) and any responses from capital providers, such as an increase in financing supply (T_5).

Such changes could potentially attract more demand for financed efficiency projects (T_6) if the supply changes corresponded with a positive response to more favorable loan terms, increased promotion of energy efficiency financing products, or increased access to capital (e.g., more loan options or less restrictive underwriting). From a policy standpoint, the most important metric would be changes in overall savings and net benefits attributable to this type of market transformation effort (T_7). It is important for evaluators to distinguish between an increase in observed financing activity and actual increases in net savings in order to determine whether the market transformation initiative had actually helped achieve policy-related goals.

Table 7: Possible Interim Metrics for Evaluation of Financing for Market Transformation

Time	Data Category	Metrics

T_0	Baseline data:
	-Private market
	-Existing programs
		- Private market:
		  - Naturally occurring EE savings
		  - Estimated % attributable to private financing
		- Existing programs:
		  - Net savings levels
		  - Estimated % attributable to program financing

T_1	Data on new program financing options	- Rates, terms, underwriting criteria - Credit enhancements - Other incentive levels
T_2	Initial data on financing demand	- Availability, awareness, knowledge, attitudes toward financing options -Promotion and uptake of EE financing
T_3	Data on loan and project performance[71]	- Delinquencies, defaults - Cash flows generated - Net savings achieved
T_4	Changes in perceived risk of EE financing	- Changes in credit enhancement and other incentive amounts needed to achieve desired terms and interest rates -Lender surveys
T_5	Changes in financing supply	- Number of lenders in the market - Changes in rates, terms, and underwriting criteria for EE projects
T_6	Updated data on financing demand	- Availability, awareness, knowledge, attitudes toward

[71] This information will also be useful to financial institutions, some of which have cited a lack of historical performance data on energy efficiency loans as a barrier to investing in this area.

		financing options -Response to more favorable loan terms and increased access to capital - Promotion and uptake of EE financing
T_7	Changes in overall savings levels and savings attributable to EE financing	- Additional savings achieved (market and program) and % attributable to financing

Our example illustrates that assessing the extent to which program interventions transform the market for financing energy efficiency is likely to be a long-term effort. However, it is possible to collect useful information in the nearer term that may provide insights.[72] By evaluating these near-term efforts, it may be possible to predict the ultimate outcome of improved and expanded financing offerings over the longer run resulting from reliance on performance history rather than credit enhancement.

Determining Ultimate Results Attributable to the Program

Determining the extent to which market effects are attributable to programmatic efforts is critical for market transformation initiatives. For example, the California PUC evaluation protocol states that "Causality should be examined to estimate net market effects. The goal of the activity is to estimate the proportion of market changes that can be attributed to program interventions (California Public Utilities Commission, 2006, p. 155).

The most direct method of assessing the impact of a market transformation initiative is to establish a baseline estimate of market adoption in the absence of a program and compare that baseline to adoption rates in the presence of program implementation.[73] Baselines that may be chosen include comparable jurisdictions without existing programs as well as experimental or quasi-experimental groups within a jurisdiction (Rosenberg & Hoefgen, 2009).[74] Baselines may also be established after program implementation using careful retrospective analysis, though establishing a baseline prior to implementation is preferable (NMR Group, 2013).[75]

In the case of financing programs, establishing an appropriate baseline may differ somewhat from other market transformation initiatives. Large-scale energy efficiency financing programs may aim to change the way in which energy efficiency investments are supported overall. As such, rather than estimating the adoption levels of a particular measure or practice in the absence of a program, a baseline estimate for a market effects evaluation focused on increasing the use of financing may need to estimate the extent to which, prior to launch of the financing program, energy efficiency investments are already supported through private or existing program financing offerings. Once this estimate has been established, subsequent observations can determine any changes in the percentage of market and program savings attributable to financing, as well as the total amount of additional net savings that new financing strategies have produced.

[72] For example, if a financing program seeks to reduce a lender's perceived risk in order to entice the lender to offer better loan terms, it may be possible to provide a shortcut using other forms of risk mitigation aside from establishing solid loan performance. Many financing programs partner with private lenders to offer credit enhancements that incentivize increased lending for energy efficiency, better loan terms, and less restrictive underwriting criteria.

[73] This approach has sometimes been referred to as a "cross-sectional" methodology, see (NMR Group, 2013).

[74] Experimental groups are randomly assigned, quasi-experimental groups "are not randomly identified but have collective characteristics that are similar to those of the program group" (NMR Group, 2013, p. 27).

[75] See NMR Group, 2013, p. 27: "While the approach could certainly benefit from data collection performed early during planning or early implementation stages, with careful model specification, evaluators have successfully developed such models well into program implementation."

Self-reporting approaches have also been used to assess market effects, in which data is gathered through surveys of program participants, non-participants, and potentially other market actors.[76] Self-reporting methods may be less expensive than direct observational comparisons, although they can be subject to various biases among survey participants. Retrospective self-reporting may be even more challenging for financing programs (e.g., likelihood that survey participants are able to recall and distinguish the influence of financing versus other offerings).[77]

Research Needs

At present, the most promising methods for assessing the impacts of energy efficiency financing are a matter of some discussion within the evaluation community; more research and field experience may be needed before best practices can be established. In particular, development of cost-effective methodologies for estimating savings that are attributable to financing efforts is needed. Data collection, including surveying methods, specific to efficiency financing need further definition as part of such methodologies as well as guidance on effective experimental and quasi-experimental study designs. More research is also needed on program logic models for efficiency financing programs that seek to transform markets and metrics that are appropriate for measuring progress.

Conclusion

As the role of energy efficiency financing continues to expand, several jurisdictions have begun to explore the possibility of making large-scale shifts toward financing and away from traditional energy efficiency programs. In some cases, states have made commitments or expressed public aspirations to move in this direction in the hopes of minimizing the use of ratepayer funds while continuing to achieve energy efficiency goals. The perception that financing programs must be flexible enough to attract private capital has led some jurisdictions to minimize regulatory reporting requirements. The combination of these trends has the potential to create situations in which financing is used as the primary mechanism to achieve energy efficiency goals, with less regulatory oversight than has been applied to traditional efficiency programs.

The risk in this type of scenario is that the ability of large-scale financing programs to achieve aggressive energy efficiency savings or market transformation objectives is still an open question. Achievable potential studies, such as those conducted in California, suggest that financing programs may increase electric and gas savings potential by three to five percent (Navigant, 2014). In New York, the number of residential home performance projects has remained relatively stable at about 0.1% participation annually, both before and after the introduction of various innovative financing products (Kramer, 2014). These examples suggest that there is some uncertainty regarding the ability of financing to drive energy efficiency to a new scale on its own, rather than as one component in a more comprehensive mix of programs and strategies.

Impact evaluations of existing large-scale financing programs that have achieved relatively high levels of loan volume may address other remaining issues. For example, in the residential sector, single measures like HVAC equipment and window replacements often far outstrip the number of comprehensive whole-house projects that are financed. HVAC equipment replacements and windows have relatively high naturally occurring demand; impact evaluations may help determine whether these types of projects would have moved forward in the absence of a program offering, assess the extent which high efficiency HVAC equipment and window measures are being installed, and assess whether private financing alternatives are available or could be used.

[76] This type of method is often used for determining net savings by assessing levels of free ridership and spillover (Rosenberg & Hoefgen, 2009).
[77] To some extent, it may be possible to cross-reference response with prospective, hypothetical surveys that provide options with and without specific offerings, but those approaches raise obvious questions regarding the reliability of responses.

Jurisdictions that are considering a shift toward financing as a primary strategy to achieve their energy efficiency objectives may want to consider implementing a regulatory framework that has adequate oversight and accountability as these strategic choices are pursued. Several key elements of a regulatory framework include:

- **Oversight and Governance**: Oversight by a regulatory or governing body that develops and applies performance and accountability requirements as robust as those applied to traditional efficiency programs.
- **Program Classification and Treatment**: Treatment of energy efficiency financing programs in ways likely to generate periodic and rigorous assessments of program performance. Examples include treating financing as a stand-alone program, classifying financing as a resource acquisition program, and linking evaluated performance to administrator performance incentives.

Jurisdictions may wish to consider utilizing planning and evaluation tools that can help provide information regarding the prospects and performance of energy efficiency financing programs. These include:

- **Achievable Potential Studies**: Achievable potential studies may help provide useful information regarding the level of incremental energy efficiency savings that program financing strategies can be expected to achieve over a defined time horizon.
    - *Avoiding Pitfalls*: It may be important to distinguish between studies of program-achievable potential and analyses of the total potential market size for financing. Market sizing may provide a larger theoretical number representing the total amount of capital that might be needed if all potential customers participated in a given financing program. By contrast, achievable potential studies focus on the actual level of participation that can realistically be expected for a given program.
- **Cost-Effectiveness Screening Analysis**: Examining the total costs and benefits produced by financing programs may help regulators and other stakeholders better understand the overall value of these programs.
    - *Avoiding Pitfalls:* Programs that are considering using financing as a substitute for traditional programs may want to consider both total net benefits as well as benefit/cost ratio.
- **Evaluation:** Evaluation of energy efficiency financing programs may provide a better understanding of the incremental savings that are attributable to financing programs.
    - *Avoiding Pitfalls*: Assessing savings that are attributable to financing programs may be more complex than for traditional programs because in the case of financing there are often readily available private alternatives. A robust evaluation may require an examination of (1) whether financing was needed to produce the savings (and overcome customer market barriers), (2) whether program financing was needed as opposed to private financing alternatives, and (3) whether the savings would have occurred in the absence of other program offerings, such as rebates and incentives.

The SEE Action Financing Solutions and Driving Ratepayer-Funded Efficiency through Regulatory Policies Working Groups commissioned this report as groundwork for a dialogue among regulators and stakeholders in the energy and financing sectors to explore regulatory mechanisms for ensuring that efficiency financing initiatives provide value for society and protection for consumers. In this study, we identify and explore many of the emerging regulatory and practical issues that jurisdictions will need to consider when contemplating an increased reliance on financing programs as a primary program strategy. Our review of several leading states that are implementing or considering these large-scale financing programs suggests that additional work on adapting planning, performance, and evaluation tools is warranted in order to assess the role of large-scale financing programs.

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Appendix A: Energy Efficiency Cost-Effectiveness Tests

Cost-effectiveness screening analysis is utilized by program administrators to assess the proposed costs and estimated benefits of a particular energy efficiency program or strategy, and in some cases to help evaluate program results. There are five standard cost-effectiveness tests that take varying stakeholder perspectives: the participant cost test (PCT), the utility/program administrator cost test (PACT), the ratepayer impact measure test (RIM), the total resource cost test (TRC), and the societal cost test (SCT). Many state PUCs have adopted policy guidelines or regulatory decisions that direct efficiency program administrators to use a primary test in screening programs or consider multiple tests in their planning process. Table A-1 summarizes the five cost-effectiveness tests, including stakeholder perspective, key questions that the test addresses and summary of benefit and costs that are included in each test.

Table A-1: The Five Principal Cost Effectiveness Tests[78]

Test	Perspective	Key Question Answered	Summary Approach
Participant cost test (PCT)	Program participants	Will program participants benefit over the measure life?	Compares the customer's benefits (e.g., bill reduction plus incentives) to their direct costs of implementing the efficiency project/measures
Program administrator cost test (PACT)	Program administrator	Will program administrator costs (and utility bills) increase or decrease?	Compares a utility's avoided supply costs (energy, generation and T&D capacity) based on net energy and load reductions to program administrator costs (administration costs plus incentives to participants)
Ratepayer impact measure test (RIM)	Non-participating ratepayer	Will utility rates increase?	Compares a utility's avoided supply costs to program administrator costs plus net lost utility revenues caused by reduced sales
Total resource cost test (TRC)	Stakeholders in service territory	Will the total costs of energy in the utility service territory increase or decrease (regardless of who pays the costs and how receives the benefits)?	Compares a utility's avoided supply costs plus other benefits (e.g., water savings, fuel oil savings) to program administrative costs plus net participant costs and tax benefits
Societal cost test (SCT)	General public	What are the overall benefits to the community of the energy efficiency program portfolio, including indirect benefits?	Compares utility's avoided supply costs, plus other benefits (e.g., externalities) to program administrative costs plus net participant costs

[78] Adapted from National Action Plan for Energy Efficiency (2007 and 2008). *Guide to Resource Planning with Energy Efficiency* (Table 5.2) and *Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers*. Energy and Environmental Economics, Inc. and Regulatory Assistance Project. www.epa.gov/eeactionplan.

Appendix B: The Objective Function

The Connecticut Green Bank (CGB) uses an alternative tool to account for some of the costs and benefits of its financing programs. This tool, called "the Objective Function," was originally developed by the Coalition for Green Capital.[79] The Objective Function measures energy saved per dollar of public funds invested. Conceptually, a larger value indicates more efficient use of public dollars. It is similar to the inverse of the cost of saved energy, though currently only Green Bank costs (not other utility costs) are included. Participant costs are also not included, making the metric more similar to a PACT or utility cost test (UCT) perspective than a TRC or societal one.

The formula for the Connecticut version of the Objective Function 1.0 is:

$$\frac{(Energy\ Generated\ or\ Saved{-}kWh\ or\ Btu){*}(1{\pm}\%\ Realized\ Savings)}{CGB\ Rebates{+}Program\ and\ Administrative\ Costs{+}Credit\ Enhancements{+}Amount\ of\ Financing{-}REC\ Revenue}$$

The numerator of the Objective Function counts the amount of clean energy generated by renewable resources and/or the amount of energy saved by energy efficiency projects, adjusted by a realization term that accounts for the difference between predicted and actual generation/energy savings. The denominator includes various costs such as Green Bank rebates; Green Bank program and administrative costs; Green Bank credit enhancements including interest rate buy-downs, loan loss reserves and guarantees; principal funded by the Green Bank; and an adjustment for revenue from renewable energy credits (RECs) that the Green Bank retains and may sell. Other revenue from financing activities is not currently included.

Benefits

As compared with traditional cost-effectiveness tests, some of the benefits included in the Objective Function may be overvalued; on the other hand, certain other benefits that are typically included in traditional benefit-cost tests may not be included. Overvaluation may occur if savings are included that are not incremental (above baseline) or attributable to financing. Currently the Green Bank calculates some savings relative to the old equipment that was previously installed, rather than as compared to an assumed baseline that would be installed were it not for the program. It also does not explicitly assess whether savings are directly attributable to its programs. However, other benefits may be understated because the Objective Function does not estimate avoided capacity savings or avoided transmission and distribution benefits, which are typically included in cost-effectiveness analyses.

Costs

Some costs included in the Objective Function may be underrepresented while other costs may be overstated. For example, the Green Bank does not currently calculate administrative costs, though there is a placeholder for them in the equation. Utility and participant costs are also not included, which are included in TRC and societal cost-effectiveness tests.

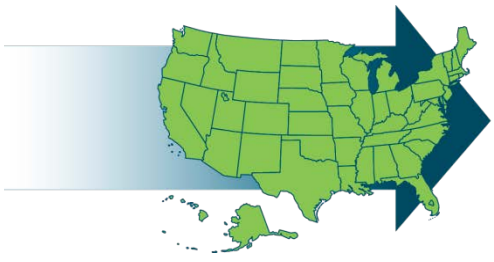
On the other hand, some costs may be overvalued. Currently financing costs are valued based on dollars invested, even though those dollars may be recycled or not immediately expended. For example, direct lending costs are valued as the dollars of capital invested in this activity, rather than the expected write-offs that may occur.

[79] The Objective Function Protocol (Version 1.0) can be found at http://www.ctcleanenergy.com/documents/5a_Objective%20Function%20Protocol_Version%201.0_Memo_061314.pdf

Similarly, loan loss reserve costs are based on dollars invested in a reserve, rather than on expected payouts as losses occur.

Observations

The Connecticut Green Bank has stated that the Objective Function is a work in progress and does not account for all benefits and costs of energy efficiency programs (and other clean energy projects). Currently, the Green Bank uses the Objective Function to provide information regarding the energy-related benefits of its programs and plans to eventually revise and enhance this metric. Given its current limitations, it is important for policy makers to consider or develop other metrics in addition to assess the impacts of efficiency financing programs. Connecticut and the Coalition for Green Capital have committed to developing a new version of the Objective Function at some point.



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STATE & LOCAL ENERGY EFFICIENCY ACTION NETWORK

Green Investment Banks

POLICY PERSPECTIVES

OECD
BETTER POLICIES FOR BETTER LIVES

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Cities around the world face pressing needs for greater investment in infrastructure. Meeting those needs will require new financial tools that cities can use to invest in smart policies, including energy-efficiency measures and renewable-energy initiatives. That's why green investment banks and funds with similar missions are so important, and they will play a critical role in creating the low-carbon cities of the future.

Michael R. Bloomberg, United Nations Secretary-General's Special Envoy for Cities and Climate Change

To achieve zero net greenhouse emissions globally by the end of this century, governments need to make full use of their capacity to leverage and unlock much larger flows of private investment in low-carbon infrastructure. Public green investment banks can help accelerate the shift to low-carbon investment at the national and sub-national levels.

Angel Gurría, OECD Secretary-General

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December 2015

Green Investment Banks

Leveraging innovative public finance to scale up low-carbon investment

This Policy Perspectives describes the relatively new phenomenon of publicly-capitalised green investment banks and examines why they are being created and how they are mobilising private investment. It draws on the forthcoming OECD report ***Green Investment Banks: Scaling up Private Investment in Low-carbon, Climate -resilient Infrastructure***.

KEY MESSAGES

- Investment is growing in renewable energy and energy efficiency, but not quickly enough to get the world on track to achieve zero net greenhouse gas emissions globally by the end of this century. Mobilising investment from the private sector will be essential to meet climate change goals. Governments can find ways to make efficient use of available public funding to mobilise much larger pools of private capital.
- To leverage the impact of relatively limited public resources, 13 national and sub-national governments have created public green investment banks (GIBs) and GIB-like entities (as of December 2015).
- A GIB is a public entity established specifically to facilitate private investment into domestic low-carbon, climate-resilient (LCR) infrastructure. Using innovative transaction structures, risk-reduction and transaction-enabling techniques, and local and market expertise, GIBs are channelling private investment, including from institutional investors, into low-carbon projects. GIBs are facilitating investment in such areas as commercial and residential energy efficiency retrofits, rooftop solar photovoltaic systems and municipal-level, energy-efficient street lighting.
- Many of the investments GIBs mobilise are undertaken in urban areas where 54% of the world's population lived in 2014 and where 66% is projected to live by 2050.
- GIBs are typically established in countries that do not have national development banks or other entities that are actively promoting private investment in domestic LCR infrastructure. To mobilise more investment, governments can consider establishing a GIB or can "mainstream" green investment objectives in existing national development banks.
- Governments tailor their GIBs based on their unique national and local contexts. GIBs and GIB-like entities have diverse rationales and goals including meeting ambitious emissions targets, supporting local community development, lowering energy costs, developing green technology markets, creating jobs and lowering the cost of capital.
- Using a range of metrics, GIBs are measuring and tracking their performance. These metrics generally focus on emissions saved, job creation, leverage ratios (i.e. private investment mobilised per unit of GIB public spending) and – for those GIBs that are required to be profitable – rate of return.
- The creation of a GIB can send a signal to the marketplace and other countries that a country or region is seeking to become a leader in scaling up private low-carbon investments.

1 The problem: Climate change and the need to shift to low-carbon investment

At COP15 in Copenhagen in 2009, major economies agreed to achieve the peaking of global and national GHG emissions as soon as possible. Nations also recognised that to achieve the ultimate objective of the UNFCCC – to "stabilise greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" – we must limit global average temperature rise to below 2 degrees Celsius (2°C) above pre-industrial levels. But even if this objective is achieved, significant risks and costs will be borne by citizens, businesses, investors and governments around the world.

93 trillion...
needed in infrastructure investments over the next 15 years

4.5%...
incremental costs relative to business-as-usual for infrastructure to be "low-carbon"

8-fold...
the amount energy efficiency investments will need to increase compared with 2013 levels

Two-thirds...
cost reduction for new utility-scale solar PV, from 2010-15

The opportunity: Clean energy is increasingly cost competitive and energy efficiency retrofits are increasingly attractive

The good news is that electricity generated by renewable energy sources is becoming more cost-competitive every month. The International Energy Agency (IEA) estimates that from 2010 to 2015, average costs for new onshore wind plants fell by 30% and average costs for new utility-scale solar photovoltaic (PV) installations declined by two-thirds (IEA, 2015). As of December 2015, contracted prices for PV-generated electricity were as low as USD 58/MWh[1] in the United Arab Emirates (UAE) (IEA, 2015) and USD 38.70/MWh[2] (escalating 3% per year) in Nevada, United States (PVTech, 2015).[3] While prices vary significantly across regions and delivered project costs may differ from contracted costs, the IEA notes that the UAE deal and recent bid and auction prices for solar PV and offshore wind in South Africa and Brazil "signal a step change in generation costs where deployment is starting to ramp up quickly" (IEA, 2015).

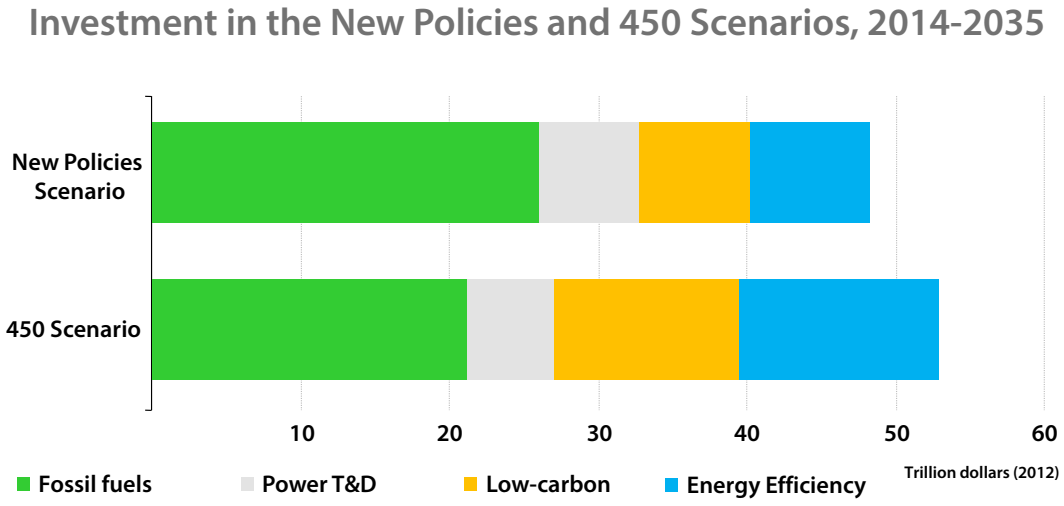
In addition to cost reductions for clean energy, new approaches for improving energy efficiency in commercial and residential buildings and municipal street lighting are gaining traction and realising energy savings.

Infrastructure investment needs are massive, but the incremental costs of "going low-carbon" are low

An estimated USD 93 trillion in infrastructure investment across transport, energy and water systems, much of it in cities, will be needed in the next 15 years to meet global infrastructure needs, while ensuring the transition to a low-carbon economy (Global Commission on the Economy and Climate, 2014). The Global Commission's *New Climate Economy* report estimated that making these infrastructure investments "low-carbon" will impose incremental costs of only 4.5% relative to business-as-usual, while yielding benefits (including better health, improved energy security and reduced traffic congestion) that by far outweigh these incremental costs. The IEA also estimates that incremental costs are relatively low. To get the world onto a 2°C emissions path, cumulative energy investment will need to reach USD 53 trillion by 2035, which is just 10% higher than under current policies (and those under discussion), and would result in significant energy savings (Figure 1) (IEA, 2014a).

Some low-carbon private investment is occurring but it needs to be scaled up faster. For example, in IEA's "450" (i.e. 2°C) scenario, investments in energy efficiency will need to increase eight-fold by 2035 compared with 2013 levels. Investments in "low-carbon power generation" (including renewable energy, nuclear energy, and carbon capture and storage) will need to increase threefold (IEA, 2014a).

FIGURE 1. **A NEW ENERGY INVESTMENT LANDSCAPE FOR A 2°C WORLD**



Source: IEA, 2014a.

What needs to be done?

1) Shift private investment away from fossil fuels and towards a low-carbon economy

- Because infrastructure investments typically fund projects and facilities with long lifespans, decisions made today about such investments have the potential to "lock-in" future emission levels. For instance, any new investments in fossil-fuel based infrastructure have implications for the remaining "carbon budget", which is of the order of 1000 billion tonnes for CO_2 emissions. We are currently emitting some 38 billion tonnes of CO_2 per year. As the carbon budget shrinks and temperatures rise, such investments will eventually force a choice between stranding high-carbon assets "or stranding the planet" (Gurría, 2013).
- There is no shortage of available capital. The challenge for governments is to ensure that public policies and investment conditions facilitate a re-allocation of investment from high-carbon to low-carbon and climate-resilient (LCR) options. It is only by such a re-allocation that we can get on a global emissions trajectory to meet the 2°C target.
- To promote the re-allocation and scaling up of investment in LCR infrastructure, governments can make efficient use of available public capital to mobilise much larger pools of private capital.

2) Scale up private investment in LCR infrastructure

- Flows of climate finance – i.e. finance that specifically targets low-carbon or climate-resilient development – are predominantly domestic. Total domestic climate finance flows – public and private flows combined – are more than double the size of cross-border flows (CPI, 2013; Hašcic et al., 2015). Private climate finance in particular is strongly oriented toward domestic investment. Ninety percent of private climate finance investments remained in their country of origin (CPI, 2014).
- Given the importance of domestic climate finance and the broader need to scale up all low-carbon investment flows, governments need to provide the right policy framework to increase both domestic and international private investment in their domestic LCR infrastructure (Box 3). As discussed in this Policy Perspectives, countries can also catalyse low-carbon investment by establishing institutions like GIBs which address investment barriers through innovative interventions.
- Because international flows of private investment will need to grow significantly to meet global LCR investment needs, domestic policies also need to avoid imposing harmful barriers to international investment (OECD, 2015a; OECD, 2015b).
- In countries with less-developed financial markets, public climate finance can play a particularly important role in scaling up private climate finance. The provision of public climate finance from domestic, bilateral and multilateral sources (Box 9) has a positive and significant mobilisation effect on volumes of private finance globally, but appears to play a relatively more important role in developing than developed countries on the initial decision for a private investor whether to invest at all (Hašcic et al., 2015).

2 What are green investment banks and why do governments create them?

To mobilise private investment in domestic LCR infrastructure and leverage the impact of available public resources, 13 national and sub-national governments have created public green investment banks (GIBs) and GIB-like entities (as of December 2015).

A GIB is a public entity established specifically to facilitate private investment into domestic LCR infrastructure through different activities and interventions. While GIBs differ in name, scope and approaches, they generally share the following core characteristics:

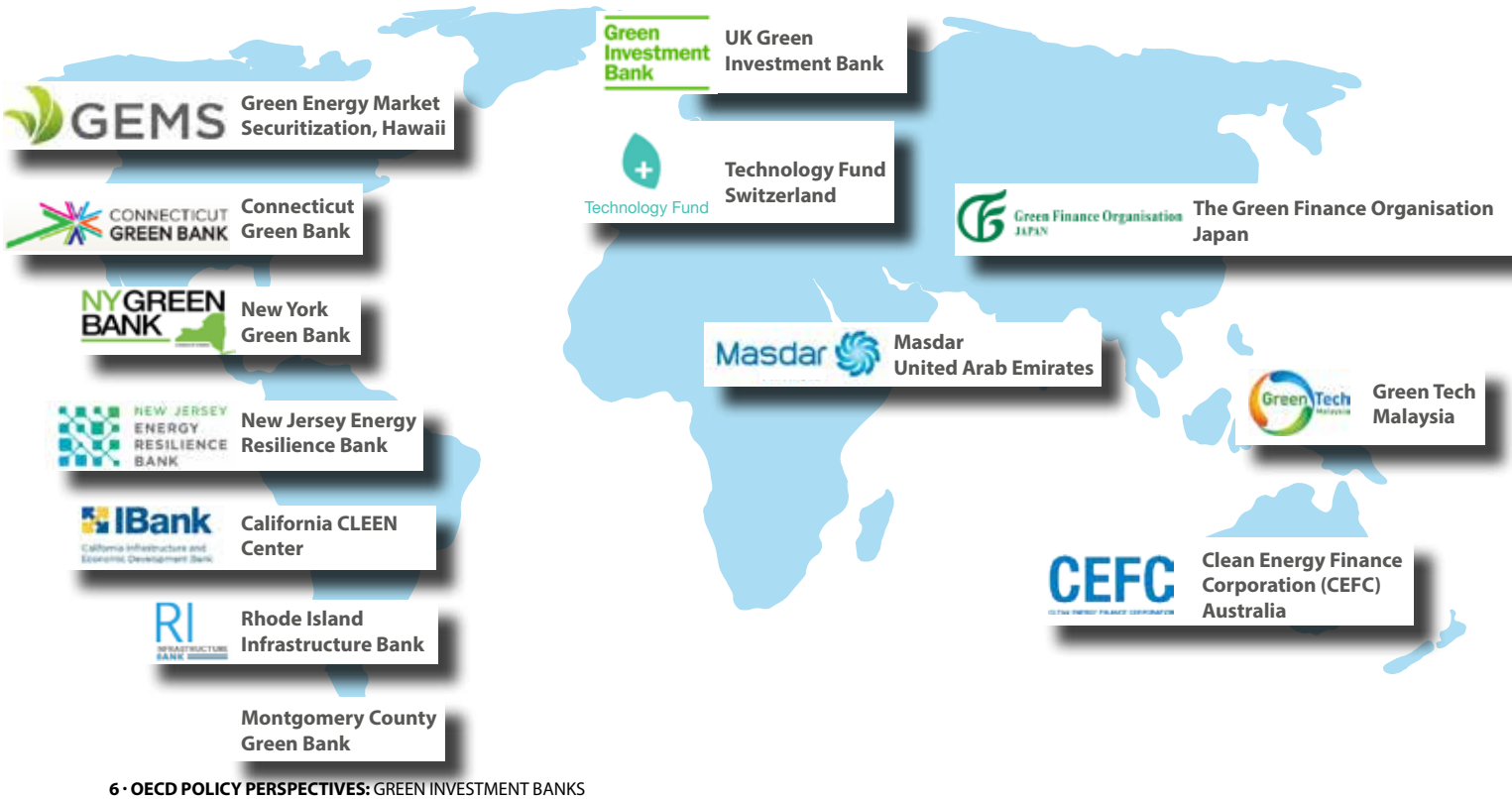
- A narrow mandate focusing mainly on mobilising private LCR investment using interventions to mitigate risks and enable transactions;
- Independent authority and a degree of latitude to design and implement interventions;
- A focus on cost-effectiveness and performance reporting.

"GIB-like entities" refers to organisations that have a mandate to leverage private finance for domestic LCR infrastructure investment, but which may not possess all core characteristics of GIBs, and may pursue other activities or use other approaches (e.g. grants).

GIBs are mobilising private investment to meet domestic targets for renewable energy deployment, energy efficiency and GHG emission reductions. GIBs channel private investment to e.g. commercial and residential energy efficiency retrofits, rooftop solar photovoltaic installation and municipal-level, energy-efficient street lighting through innovative investment structures which minimise upfront payments.

GIBs come in different shapes and sizes. GIBs and GIB-like entities have been established at the national level (Australia, Japan, Malaysia, Switzerland, United Kingdom), the state level (California, Connecticut, Hawaii, New Jersey, New York and Rhode Island in the United States), the county-level (Montgomery County, Maryland, United States) and the city-level (Masdar, United Arab Emirates).

FIGURE 2. **GREEN INVESTMENT BANKS AROUND THE WORLD**

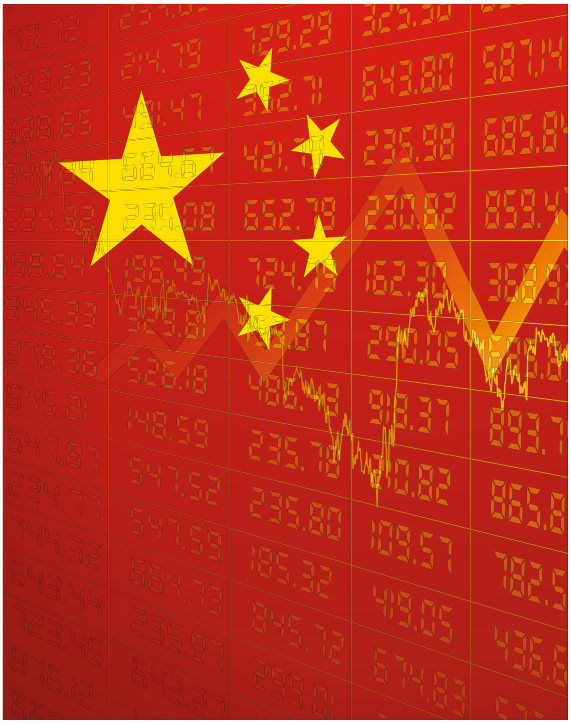


As of December 2015, the latest green banks to be established are the Rhode Island Infrastructure Bank, which will administer new programmes on commercial and residential energy efficiency in addition to existing water and wastewater programmes, and the Montgomery County Green Bank. The People's Republic of China is considering the creation of a National Green Development Fund that could dwarf other GIBs (Box 1).

BOX 1. A NATIONAL GREEN BANK IN CHINA?

The China Council for International Cooperation on Environment and Development (CCICED) has recommended the creation of a National Green Development Fund. If implemented as proposed, the Fund would have a capitalisation target of approximately RMB 300 billion (USD 47 billion) and could raise more private capital as required. The proposed Fund would focus on providing equity investments to facilitate access to other financing including bank loans. It would operate on a commercially sustainable basis and seek to pool capital from investors with differing risk and return requirements. Sources of capital for the Fund could include "fiscal funds from the central government, development finance, and other interested financial institutions and private investors." Its focus would be on investments in "resource efficiency, renewable energy, industrial pollution control and advanced vehicle technologies."

Clean energy investment needs in China are significant (USD 1 trillion of cumulative investment in wind and solar PV from 2014-35), and investments could be accelerated by a national green bank and broader policies for green finance reform and green transformation recommended by CCICED, including policies to develop the domestic green bond market.



Sources: CCICED, 2015; IEA, 2014a.

Green investment banks are designed to address local market and policy failures

The core objective of GIBs is to increase private sector investment in domestic LCR infrastructure using limited public capital. However, governments tailor their GIBs and GIB-like entities based on their unique national and local contexts, and have diverse rationales and goals:

- In the United Kingdom, the Green Investment Bank was conceived as a means to meet ambitious emissions targets.
- In Japan, The Green Finance Organisation aims to support local community development to address the impacts of slow economic growth and an ageing society.
- The Connecticut Green Bank prioritises reducing carbon emissions and lowering energy costs while creating local jobs through clean energy investment.
- Switzerland's Technology Fund focuses on scaling up innovative environmental and low-carbon technologies that face a deployment gap.
- The Malaysia Green Technology Corporation's (GreenTech Malaysia) objective is to develop sustainable and widespread green technology markets and strengthen the local green technology industry.
- The goals of the Rhode Island Infrastructure Bank's clean energy programmes are to reduce consumers' and businesses' energy prices and stimulate employment opportunities.
- Other goals pursued by GIBs include improving capital market efficiency, lowering the cost of capital and meeting other (non-climate-related) environmental objectives.

How are GIBs different from government programmes?

GIBs adopt a different approach from that of many grant-making public institutions and follow strict mandates to mobilise investment using limited public capital. Some GIBs are also required to be profitable. For example, the UK Green Investment Bank must meet a minimum 3.5% annual nominal return on total investments, after operating costs but before tax (UK GIB, 2015a). Australia's Clean Energy Finance Corporation (CEFC) is required to compare its financial performance with a portfolio benchmark return (CEFC, 2014a). GIBs also tend to operate as independent or semi-independent entities. This provides more flexibility and agility to respond to the needs of the market.

Are GIBs the only institutions that can mobilise investment in domestic LCR infrastructure?

Green investment banks and GIB-like entities are typically established in countries that do not have national development banks or other entities that are actively promoting private investment in domestic green infrastructure. To mobilise more private investment, governments can consider establishing a GIB or can "mainstream" green investment objectives in existing national development banks (Box 2).

BOX 2. GREENING EXISTING INSTITUTIONS VERSUS ESTABLISHING NEW ONES

To mobilise private investment in domestic green infrastructure, "greening" existing institutions may be preferable to creating new institutions when the necessary institutional and political support exists. For example, many countries have National Development Banks (NDBs) (or public investment, infrastructure or industrial development banks) which focus on domestic investment. While many NDBs are less focused on mobilising green investment than GIBs, some NDBs have been providing financing for low-carbon projects for many years. For example, Germany's KfW has been investing in environmental protection domestically and internationally since the 1980s, and invested approximately USD 58 billion in domestic low-carbon projects in 2010-12. Some factors to consider when evaluating the need for a new GIB include:

- **Costs**

  Establishing a new institution likely involves more time and costs than greening an existing institution, and may be viewed as expanding bureaucracy or creating duplicative government services.

- **Independence**

  Creating a new GIB with an independent status can provide flexibility to experiment, innovate and adapt to market developments. It can also facilitate a focus on targeted objectives. In the case of the UK GIB, a separate bank structure was preferred to signify independence from the government that would shield the institution from day-to-day political interference. This was deemed essential to attract long-term capital from institutional investors.

- **Mandate and culture**

  Many NDBs lack a clear mandate to promote national climate change mitigation. NDBs may support renewable energy projects while also financing fossil fuel projects in parallel. In contrast, GIBs are exclusively focused on green investment and face fewer competing agendas.

- **Financing approaches**

  The International Development Financial Club (IDFC), which brings together over 20 NDBs and sub-regional development banks from around the world, estimates that members made new commitments representing USD 99 billion in green finance in 2013 alone. Among IDFC members, 78% of financing in 2013 was in the form of concessional loans, followed by non-concessional loans (17%) and grants (3%). Other financial instruments such as equity and guarantees accounted for only 1% of investment. GIBs tend to be more oriented toward accelerating risk-taking by investors, through demonstration, co-investment and sharing risks with investors using guarantees and other risk mitigants. However, there are exceptions. Some NDBs, such as KfW, as well as Multi-lateral Development Banks like the European Investment Bank and others, also increasingly develop and use innovative tools to scale up private finance from multiple investor classes. Some GIB-like entities (e.g. GreenTech Malaysia) make extensive use of concessional loans while GIBs like CEFC and Connecticut Green Bank use them only on a limited, targeted basis.

Sources: Cochran et al., 2014; UK House of Commons, 2011; Smallridge et al., 2013; IDFC, 2014.

3 What types of investments do GIBs mobilise?

The majority of GIBs focus on promoting investment in clean energy and energy efficiency. However, some entities target broader areas such as promoting innovation, resilience or sustainable cities.

TABLE 1. **TARGET SECTORS FOR GIBs AND GIB-LIKE ENTITIES**

Entity	Target Sectors and Sub-sectors
California CLEEN Center (California, United States)	• Municipal clean energy projects • Clean electricity generation, distribution, transmission and storage • Energy conservation, environmental mitigation and water treatment
Clean Energy Finance Corporation (Australia)	• Renewable energy (wind, solar PV, thermal and CSP, biomass, geothermal, tidal and other renewable energy [50%]) • "Low emissions" (CEFC 2014a) and energy efficiency [50%]
Connecticut Green Bank (Connecticut, United States)	• Energy efficiency • Renewable energy • Other clean technologies, including combined heat and power (CHP), anaerobic digestion, fuel cells, alternative fuel vehicles and infrastructure, storage and others
Green Energy Market Securitization (Hawaii Green Infrastructure Authority) (Hawaii, United States)	• Low and moderate-income homeowners, renters and non-profits • Distributed solar PV (initial phase) • Clean energy and energy efficiency (deployed in phases)
The Green Finance Organisation (Japan)	• Low-carbon projects (e.g. wind, solar, small-scale hydro, biomass, waste management, geothermal, hot springs, renewals of mid-sized hydro)
Malaysian Green Technology Corporation (GreenTech Malaysia) (Malaysia)	• Energy (renewable energy) • Water and waste management • Building (energy and water efficiency, indoor air quality)
Masdar (United Arab Emirates)	• Clean energy • Energy efficiency • Carbon capture and storage
New Jersey Energy Resilience Bank (New Jersey, United States)	• CHP, fuel cells and solar-tied storage at water and wastewater treatment facilities
NY Green Bank (New York, United States)	• Energy efficiency • Renewable energy • Other clean technologies, including CHP, electric vehicle infrastructure, fuel cells and offshore wind
Technology Fund (Switzerland)	• GHG reduction technologies • Energy efficiency • Renewable energy • Natural resource conservation technologies
UK Green Investment Bank (United Kingdom)	Priority areas: • Offshore wind • Waste recycling & bioenergy • Energy efficiency • Small-scale renewables Other: • Biofuels for transport, biomass power, carbon capture and storage, marine energy, renewable heat

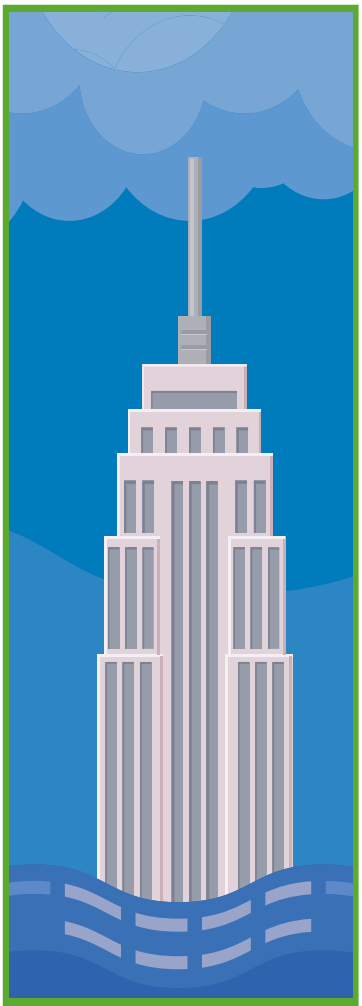
Note: The Rhode Island Infrastructure Bank and the Montgomery County Green Bank are not included in Table 1 as they were still relatively new as of December 2015.

A focus on both mature and less-mature technologies

GIBs typically have a mandate to avoid "crowding-out" private investment and to catalyse investment that is additional to what would have otherwise occurred. This implies they must shift into new technologies with less attractive risk-return profiles when their interventions are no longer needed to attract investment. To date, GIBs have focused mainly on proven commercial technologies, while retaining flexibility to invest in new technologies that are on the cusp of commercial viability. For example, NY Green Bank seeks to invest where there is a financing gap and focuses on "clean energy projects that are economically viable but not currently financeable" (NY Green Bank, 2013).

While they rarely support research or early-stage technological development, some GIBs are already targeting less commercial technologies such as offshore wind energy, for which the global average levelised cost of electricity (LCOE) is USD 174/MWh (as of October 2015), compared to USD 122/MWh for crystalline silicon PV solar energy and USD 83/MWh for onshore wind energy (Solarserver.com, 2015). (LCOEs vary significantly by region.) The UK Green Investment Bank has created the world's first offshore wind fund (UK GIB, 2015b). NY Green Bank's mission is to "transform financing markets" and its list of potential target technologies for investment is broad and includes ocean and tidal power, fuel cells and electric vehicle infrastructure (NY Green Bank, 2015). Switzerland's Technology Fund targets companies that "market an innovative product or process which has a good chance of market success" (Technology Fund, 2015).

Moving forward, GIBs will face the challenge of building a track record of success and cost-effectiveness in mobilising investment in less commercial technologies. To date, GIBs in Connecticut, the UK and Australia have pursued a mix of investments with relatively lower financial returns (e.g. smaller projects or technologies requiring the use of concessional financing) combined with investments with higher returns to meet financial performance objectives as well as operational mandates.



We must keep global atmospheric concentrations of **CO_2 below ~450PPM**

BOX 3. GIBs COMPLEMENT (BUT CANNOT REPLACE) CORE CLIMATE AND INVESTMENT POLICIES

GIBs can be an effective component of efforts to provide coherent and consistent signals to investors to incentivise investments in domestic green infrastructure and provide predictability. If core climate policies are absent or weak, institutions like GIBs will not maximise their potential for mobilising private investment. The OECD has developed guidance for governments to integrate climate and investment policy considerations and establish strong enabling conditions for LCR infrastructure investment. Elements of a "green investment policy framework" include removing fossil fuel subsidies, pricing carbon, setting clear, long-term policy goals, and providing time-bound, tailored incentives for renewable energy investment which correct for market failures. When governments make enabling LCR investment a priority, they provide a supportive environment for GIBs to mobilise private investment. Econometric analysis confirms that renewable-energy incentive policies play an important role in encouraging investment.

GIBs are a tool to mobilise private investment that can complement policies but cannot act as a substitute for a supportive policy framework and enabling environment. Policy makers establishing a GIB should consider how the institution can be integrated with existing public policies and investment promotion initiatives.

Sources: OECD, 2015a; Corfee-Morlot, J., et al., 2012; Haščič et al., 2015.

BOX 4. GREEN INVESTMENT BANKS MOBILISING GREEN INVESTMENT IN CITIES

Many of the investments GIBs mobilise are undertaken in urban areas, where 54% of the world's population lived in 2014 and where 66% is projected to live by 2050. For example, Australia's GIB, the Clean Energy Finance Corporation, is providing finance to help the City of Melbourne undertake an AUD 30 million programme of clean energy initiatives to help it reach its goal of zero net emissions by 2020. GIBs' energy efficiency activities focus particularly on buildings, which account for 19% of global GHG emissions.

Sources: UN DESA, 2014; CEFC, 2015a; IPCC, 2014.

What investment channels and risk-mitigating interventions are used by GIBs?

GIBs directly invest in LCR infrastructure using a range of instruments and funds including senior and subordinate loans, bond-based financing and equity.

GIBs also employ risk mitigants, which are targeted interventions aimed at reducing, re-assigning or re-apportioning different investment risks. Risk mitigants increase the attractiveness and acceptability of investments by providing coverage for risks which are new and are not currently covered by financial actors, or are simply too costly for investors. These **risk mitigants** include:

- **Loan loss reserves**, in which capital is set aside to cover potential losses from borrower defaults, helping to reduce loan repayment risk.
- **Guarantees**, a credit enhancement tool used to mitigate perceived or actual risks to improve the attractiveness of investments, often debt instruments.
- **Insurance**, another credit enhancement tool used to protect investments against a range of risks such as construction, operational or market risks.
- **Debt subordination**, in which particular classes of lenders are given priority to claims on assets and cash flows. By offering repayment priority to certain holders of 'senior' debt, a project can attract financing from this source.

Transaction enablers increase the flow of capital by bundling small-scale projects to achieve scale and reduce transaction costs. GIBs use transaction enablers such as:

- **Warehousing**, an aggregation technique used to reduce transaction costs and facilitate investment. Small projects are bundled together to reach a scale where they become attractive for on-sale to large investors or for securitisation through bond issuances.
- **Securitisation**, a technique whereby non-traded or small-scale assets, such as cash flows from solar leases or power-purchase agreements, are transformed into a standardised, tradable asset.
- **Co-investing**, a form of direct (project-level) investing whereby investors lacking sufficient scale or expertise partner up with other specialised and expert investors to invest in a project.
- **On-bill financing**, which allows borrowers to repay clean energy or energy efficiency loans through an additional charge on their existing utility bill.
- **Leasing**, which enables customers to make use of certain assets such as rooftop solar PV systems without purchasing them, thereby lowering costs and overcoming investment barriers.

HOW ARE GIBS FUNDED?

Funding sources for GIBs are diverse:

- Appropriations (Australia)
- Carbon tax revenue (Japan)
- Reallocation of funds from existing programmes (New York)
- Emissions trading schemes revenue (Connecticut, New York)
- Utility bill surcharges, Renewable Portfolio Standards, Energy Efficiency Resource Standards (Connecticut, New York)
- Loans (Connecticut)
- Bond issuance (Hawaii)
- National government funding (UK, New Jersey)

What scale of investment and types of investors are targeted by green investment banks?

Green investment banks work with a range of private investors, including large institutional investors, community banks and local contractors. The types of co-investors that GIBs target vary based on the types of market gaps and barriers being addressed, and on whether GIBs are pursuing a "wholesale" or "retail" strategy.

A wholesale strategy aims to attract relatively large amounts of private capital to combine with public capital for on-lending or investing in funds. Co-investment with investment banks and institutional investors is a common wholesale approach (e.g. the UK Green Investment Bank's offshore wind fund). A retail strategy, in contrast, involves delivery of funds to the project developer or individual (e.g. energy efficiency retrofits, residential rooftop solar PV). Wholesale lending can move large volumes of investment, while retail lending can be useful for jump-starting activity in new markets. Partnerships, outreach and co-investment with local banks, contractors and even individuals are typical elements of a retail strategy. Under either type of strategy, a GIB may help investors bring their investments to secondary markets through bond issuances, securitisation or private placement.

Did you know? The UK Green Investment Bank created the world's first offshore wind fund

BOX 5. THE ECONOMIC CASE FOR GREEN INVESTMENT BANKS

In addition to the profitability or financial sustainability of some GIBs, they have several other characteristics which provide an economic case for GIBs, including the following:

- **Focus on overcoming investment barriers:** GIBs typically have a specific mandate to overcome barriers to scaling up LCR infrastructure investment. They use targeted approaches and tailored financial structuring to address the lack of suitable LCR investments with attributes sought by private investors (e.g. through aggregation of small-scale investments like residential rooftop solar PV investments or energy efficiency retrofits in commercial buildings). They also address a shortage of objective information, data and skills to assess transactions and underlying risks. GIBs work with market participants to increase the supply of and demand for profitable low-carbon investments by decreasing risks, increasing market transparency, and improving investors' (including lenders') understanding of low-carbon investments.
- **Building confidence by reducing risk:** Mainstream lenders and investors can be slow to gain confidence in new technologies. GIBs accelerate the process by reducing real and perceived risk and increasing the number of transactions in markets for new technologies.
- **Local expertise:** GIBs hire financial professionals with local and national expertise in low-carbon technologies, projects and investments, and an understanding of the specific risk-return appetites of local financial institutions and other investors such as institutional investors. This local expertise provides informational advantages that can be leveraged to overcome investment barriers, which are often location-specific.
- **Market transformation role:** GIBs typically aim to demonstrate the profitability of low-carbon investments to accelerate market development and then move on to other investments where they can improve the risk-return profile and attract private investment. GIBs are better placed to play this role than traditional government programmes, which may be less flexible and less familiar with markets, and private companies, which face competitive pressures.
- **Impact on local financing costs:** By dispersing information, sharing expertise and demonstrating that investments are profitable, GIBs help accelerate reductions in financing costs.

Source: OECD, 2016 (forthcoming), personal communication with Douglass Sims, Natural Resources Defense Council, October 2015.

GIBs measure and report their benefits

Since GIBs are created with public capital, accountability to taxpayers is a priority. GIBs measure their performance using a range of metrics, which generally focus on investment and economic results or climate-related outcomes.[4] Self-reported achievements of GIBs and GIB-like entities include:

Leverage / mobilisation

- For every GBP 1 of public investment it has made since its inception, the UK Green Investment Bank has mobilised an estimated GBP 3 of private capital (UK GIB, 2015a).
- The Connecticut Green Bank attracted USD 10 in private investment for every USD 1 of public capital spent in 2013 (Connecticut Green Bank, 2013). In 2014 the ratio was USD 3 of private investment for every USD 1 of private capital spent (Connecticut Green Bank, 2015a).
- In 2014-15, CEFC reported AUD 1.8 private dollars mobilised for each AUD 1 in CEFC investment (CEFC, 2015b, 2015c). CEFC's reported a leverage ratio (i.e. private investment mobilised per unit of public spending) of 2.2:1 in 2013-14 (CEFC, 2014a).

Co-investors

- Since inception, the UK Green Investment Bank has worked with over 70 co-investors (UK GIB, 2015a).

Rate of return

- The UK Green Investment Bank has a minimum target return of 3.5% (annual nominal return on total investments, after operating costs but before tax). The UK GIB turned profitable in the second half of the 2014-15 year, and projects that once its current portfolio of investments is fully operational, it will generate an overall return of 9% (UK GIB, 2015a).
- In 2014, CEFC achieved a 4.15% return (net of operating costs) on an expected deployed capital of AUD 931 million, exceeding the portfolio benchmark return of 3.14% (CEFC, 2014a). The current portfolio of investments in 2015 is projected to generate an annual yield of 6.1% once fully deployed (CEFC, 2015c).[5]

Emissions saved

- Once constructed and in operation, the projects in which Australia's CEFC is investing are estimated to achieve annual emissions abatement of 4.2 million tonnes CO_2-equivalent (tCO_2e), with a net financial return to the CEFC (inclusive of government borrowing costs and operating costs) of approximately AUD 10 million (i.e. emission reductions are achieved at a "cost" of negative AUD 2.40 per tonne) (CEFC, 2014a, 2015b).[6]

BOX 6. INSTITUTIONAL INVESTORS

Institutional investors such as insurance companies, pension funds, investment funds, public pension reserve funds, foundations and endowments are an important potential source of alternative capital for domestic LCR infrastructure investment. In OECD countries alone, these investors held USD 93 trillion of assets in 2013. They often seek long-term and low-risk investments, and allocate significant amounts of capital domestically.

Institutional investors are typically reluctant to take on construction risk or be the first movers into a new market; as such, green investment banks can create attractive opportunities for institutional investors to collaborate with the public sector to finance low-carbon and climate-resilient infrastructure. The UK Green Investment Bank, the CEFC and NY Green Bank are all targeting institutional investors. The OECD report ***Mapping Channels to Mobilise Institutional Investment in Sustainable Energy*** highlights the barriers that specifically limit institutional investment in sustainable energy projects.

Sources: OECD, 2015c.

- Since 2010, the Green Technology Financing Scheme operated by GreenTech Malaysia has funded 165 projects which have avoided close to 2.4 million tCO_2e (GreenTech Malaysia, 2015).
- Since its inception, the Connecticut Green Bank has enabled the reduction of an estimated 1.4 million tonnes of CO_2 emissions over the life of these projects (Connecticut Green Bank, 2015b).
- In 2014-15, the UK Green Investment Bank's estimated average annual GHG emission reduction reached 4.2 million tonnes of CO_2 emitted, equivalent to taking 1.9 million cars of the road for the year (UK GIB, 2015a). The UK GIB's estimate of the average annual renewable power generation associated with the projects it funds reached 16.3 TWh, enough to power the domestic electricity of 3.9 million homes (UK GIB, 2015a).

Job creation

- As of June 2015, Connecticut Green Bank made investments that generated 3 094 direct jobs and over 5 200 indirect and induced jobs (Connecticut Green Bank, 2015b).
- The CEFC has financed projects for businesses that employ over 35 000 Australians (CEFC, 2015b).
- Since 2010, the 165 projects funded by the Green Technology Financing Scheme have created 2 491 jobs (GreenTech Malaysia, 2015).

Waste

- UK GIB investments are projected to avoid 2.1 million tonnes of waste from landfill each year, the equivalent of the waste of 2.1 million homes (UK GIB, 2015a).

BOX 7. GIBs CREATE FUNDS TO ATTRACT INSTITUTIONAL INVESTORS: UK AND AUSTRALIA

UK Green Investment Bank creates world's first dedicated offshore wind fund

In April 2015, the UK Green Investment Bank reached a first close of GBP 463 million for a fund to support offshore wind development (the Operating Offshore Wind Fund), for which it intends to provide 20% of capital when it reaches its full size of GBP 1 billion. The UK Green Investment Bank has secured investment from UK pension funds and a sovereign wealth fund, and is seeking further private, ideally institutional, co-investors. The fund intends to purchase already-operating offshore wind farms from utilities to allow them to recapitalise and invest in further offshore wind farm development.

Green Investment Bank

CEFC

CLEAN ENERGY FINANCE CORPORATION

CEFC's CFS Infrastructure Fund mobilises capital from institutional investors

In July 2014, Australia's CEFC agreed to provide the cornerstone stake in a new unlisted clean energy infrastructure fund, the CFS Australian Clean Energy Infrastructure Fund, alongside a large institutional investor, Colonial First State Global Asset Management (CFSGAM). The fund is the first unlisted infrastructure investment fund to focus on clean energy investment in Australia. CEFC is providing an AUD 80 million equity investment; CFSGAM will raise AUD 300 to 500 million for the fund over the next three to five years. The fund will invest in commercial-scale solar leases, large-scale utility renewable projects and other large-scale clean energy projects, including commercial and industrial energy efficiency. As noted by the CEFC, these kinds of projects are typically financed by commercial banks, financial intermediaries and utilities. The new fund will create a new long-term investment opportunity for institutional capital.

Sources: UK GIB, 2014b; UK GIB, 2015; Morales, 2014; CEFC, 2014a.

4 Focus on energy efficiency

Along with renewable energy, energy efficiency is a primary focus of GIBs' interventions to mobilise private investment. Energy efficiency investments are a central part of national greenhouse gas (GHG) emissions mitigation strategies and energy planning, as they reduce energy consumption, lower GHG emissions and reduce the need to expand generation capacity and invest in additional transmission and distribution. They also provide multiple benefits beyond GHG reductions such as reduced air pollution and improved energy security (Box 8). Nevertheless markets have tended to underinvest in energy efficiency due to a range of financial and non-financial barriers. GIBs can therefore play an important role in attracting private investment into this under-invested area.

Green investment banks can address multiple barriers to energy efficiency investment, including:

- Small average investment size, relatively high transaction costs and the corresponding need to aggregate projects.
- The need to structure investments for retail and commercial energy efficiency to allow energy savings to offset loan repayments.
- Local lenders often do not account for estimated energy savings from energy efficiency projects during the underwriting process, and instead focus only on the borrower's credit rating.
- Lack of familiarity with energy efficiency investments among private investors.

Green investment banks can identify and address investment barriers at the city and national level that are not currently being addressed by other entities (e.g. national and multilateral development banks, and public and private Energy Service Companies (ESCOs)). They use a range of tools, including credit-enhancing and direct investment mechanisms to deploy public capital and leverage private investment in energy efficiency, such as:

BOX 8. THE MULTIPLE BENEFITS OF ENERGY EFFICIENCY

Improving energy efficiency can provide a range of benefits to different stakeholders. The IEA study ***Capturing the Multiple Benefits of Energy Efficiency*** identifies 15 distinct benefits of energy efficiency. These include:

- Macroeconomic development can be encouraged through energy efficiency investment that can increase employment and economic activity.
- Reduced strain on public budgets through reduced government expenditures on fuel for heating, cooling and lighting.
- Improved health and well-being as a result of energy efficiency retrofits and weatherisation programmes that can reduce respiratory and cardiovascular and allergy risks and stress.
- Greater industrial productivity through energy efficiency can enhance competitiveness, increase productivity and improve working environments.
- Improved energy delivery though reduced energy generation, transmission and distribution costs, greater system reliability, and less volatility in wholesale markets.

Governments can employ a range of measures and policies to stimulate demand for energy efficiency investments. For example, GIBs can serve as a key element of a country's (or sub-national jurisdiction's) policy framework for energy efficiency investment. At the international level, there is increasing recognition of the importance of domestic policies to support energy efficiency investment. In October 2015, G20 Energy Ministers welcomed the Voluntary Energy Efficiency Investment Principles for G20 participating countries.

Source: IEA, 2012; IEA, 2014c; UNEP FI, 2015.

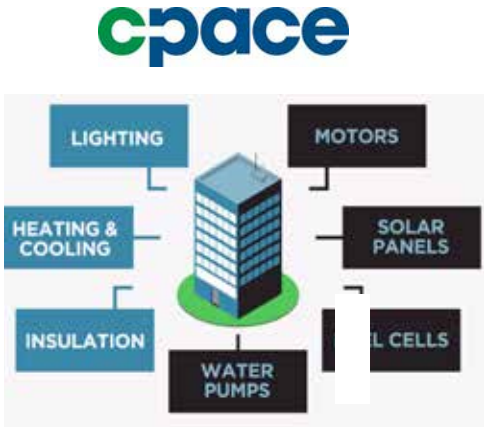
- On-bill financing and linking energy efficiency loan repayment to property tax payments through tax liens (e.g. "Property Assessed Clean Energy" in the United States) are structures that overcome investment barriers while increasing chances of repayment and adding security for the lender.
- Green investment banks are developing efficiency-focused funds and providing direct lending and leasing offerings to fill gaps in the efficiency lending marketplace.
- Green investment banks can attract large institutional investors by warehousing smaller efficiency loans and then selling those loans at scale through securitisation.

Did you know?
Energy efficiency has been coined the world's "first fuel" as energy efficiency improvements satisfy more energy demand than any single fossil fuel (IEA, 2014b)

Energy efficiency case studies

C-PACE: Connecticut Green Bank's Energy-Efficiency Programme

The Connecticut Green Bank has implemented one of the most successful commercial building energy efficiency programmes in the United States, using the property-assessed clean energy (PACE) structure. Through this structure, building owners can receive long-term financing (up to 20 years) to perform energy upgrades on buildings and pay the loan back as a new tax lien on the property. Linking the lien to the property increases lending security and enables a much longer payback term; default rates on tax payments are typically lower than for debt repayments. The lien structure also makes it easier to buy and sell property with an outstanding efficiency loan (Connecticut Green Bank, 2015).



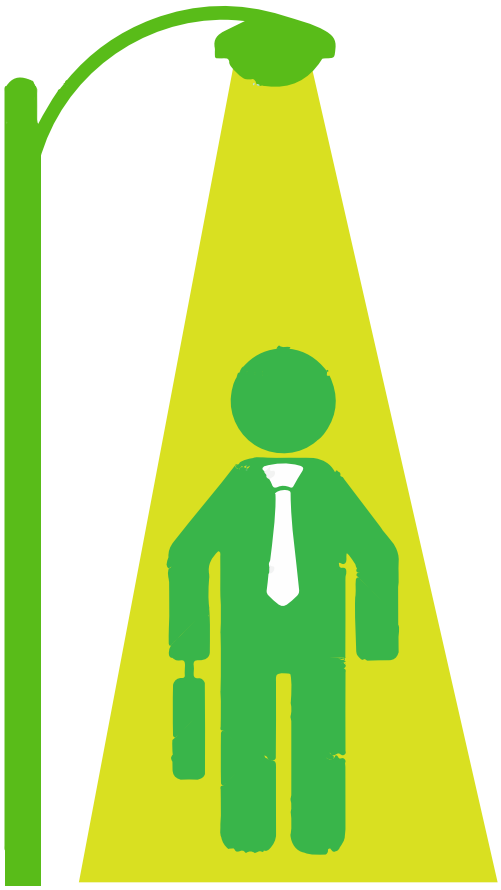
PACE programmes can be difficult to structure, as they require legal authorisation and close co-ordination between lenders, local governments, programme administrators and contractors. In many US states this complexity has hindered market growth. The Connecticut Green Bank, however, has overcome these challenges by centrally administering and financing a state-wide commercial energy efficiency program. Its "C-PACE" programme co-ordinates all commercial PACE activity in the state, originating loans with public capital and then selling the portfolio of loans to private investors (PACE Now, n.d.; Lombardi, 2014).

The programme was launched in early 2013 and in less than two years the Green Bank has financed nearly USD 54 million in energy upgrades for 89 buildings. This accounts for about one-third of the commercial PACE market in the United States. More recently, the Green Bank has established a programme to facilitate private platforms to provide PACE financing, with the Green Bank retaining its central administration role. Other US states such as Rhode Island are exploring the use of a GIB to facilitate similar commercial PACE programmes (PACE Now, 2015).

UK GIB's innovative Green Loan helps municipalities switch to energy-efficient street lighting

There are over seven million street lights in the United Kingdom which generate over GBP 300 million in electricity costs. The electricity needed to power street lights produces 1.3 million tonnes of CO2 annually, equivalent to the emissions of 330 000 cars on the road or 674 000 households. Despite the financial and environmental case for improved energy efficiency, fewer than one million street lamps are energy efficient (UK GIB, 2014).

To help municipalities make the switch to low-energy lighting, the UK Green Investment Bank created an innovative "Green Loan" for municipalities which is specifically tailored to help cities upgrade their street lighting to more energy efficient light emitting diodes (LEDs). The efficient lighting technology produces energy savings that exceed the cost of the loan payment, allowing borrowers to be cash-flow-positive throughout the period of the loan. With fixed rates and terms designed to match the payback period, municipalities are able to save 80% of their lighting costs by switching to LEDs (UK GIB, 2014).



Did you know?
Connecticut Green Bank's C-PACE programme has financed nearly USD 54 million in energy upgrades for 89 buildings

BOX 9. THE ROLE OF INTERNATIONAL PUBLIC CLIMATE FINANCE

International public finance institutions, which include both multilateral development banks (MDBs) and bilateral finance institutions, provide long-term financing in line with policy-oriented objectives, including green investment. MDBs reported that they provided over USD 28 billion in climate finance (18% of which was adaptation finance) in 2014. In the specific context of the commitment made by developed countries under the UNFCCC to mobilise 100 billion per year by 2020 for climate action in developing countries, the OECD estimates volumes of public and private climate finance mobilised at USD 61.8 billion in 2014, up from USD 52.2 billion in 2013, with an average of USD 57.0 billion.

Sources: AfDB et al., 2015; OECD, 2015e.

GREEN INVESTMENT BANKS AS A MEANS FOR GOVERNMENTS TO ACHIEVE AMBITIOUS CLIMATE OBJECTIVES

- The creation of a GIB can send a signal to the marketplace and other countries that a country or region is seeking to become a leader in scaling up private, low-carbon investments.
- GIBs can bring attention to a fundamental, yet under-appreciated, element of a country's GHG mitigation strategy and commitments – the need for a cost-effective approach to mobilise investment in LCR infrastructure.
- GIBs are developing valuable expertise in implementing effective public interventions to overcome investment barriers and mobilise private investment in infrastructure. GIB experiences and lessons can inform countries' mitigation and adaptation planning and targets, including those made in advance of and following COP 21 in Paris in December 2015.
- GIBs are relevant for both developed countries and emerging economies as a tool in their domestic climate policy framework to help meet emissions, technology and infrastructure deployment and green investment targets.
- GIB experiences are also relevant for international climate finance as the tools they use and innovative approaches to mobilise private investment are often applicable or adaptable to various contexts. In emerging economies, GIBs may be able to work alongside multilateral development banks and other sources of public climate finance to de-risk LCR infrastructure projects to enable private investment capital to flow.
- COP 21 is shining a spotlight on the role of "non-state actors" (which are referred to in the UNFCCC context as "non-Party stakeholders") in the climate negotiations. GIBs at the sub-national level, such as those in the United States, are demonstrating how one category of non-Party stakeholders is contributing to GHG emission reductions and actively promoting and scaling up investment.
- GIBs in some jurisdictions have mandates to deliver a positive financial return or achieve financial sustainability. Achieving such goals can increase political support for dedicating public resources to mobilise private investment in climate change mitigation, adaptation and resilience.

"#COP21 should send clear directional signals that countries as well as non-state actors must, can and will create their own pathways to a zero net carbon future. This requires the full engagement of all the major economies of the world, both developed and developing."

- Angel Gurría, OECD Secretary-General, 2015 Climate Lecture

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ENDNOTES

1. For a 25-year Power Purchase Agreement (PPA) for electricity to be delivered by a 200 MW solar PV plant in 2017.

2. For a 20-year PPA for electricity to be delivered by a 100 MW solar PV plant by December 2016.

3. The levelised cost of electricity (LCOE) for the Nevada project is USD 48.61/MWh, which includes the Business Energy Investment Tax Credit and network upgrade costs (Public Utilities Commission of Nevada, 2015; personal communication with Heymi Behar, IEA).

4. Figures in this section derive from green investment banks. Metrics are not harmonised across GIBs and methodologies for calculating performance metrics may differ. Only a sample of GIB results is provided.

5. In 2015 CEFC had a mid-year change in both its statutory benchmark rate and the method of calculation (see (CEFC, 2015c) for more information).

6. The CEFC notes that it does not claim that this abatement occurs independently of complementary policy such as the Australian Government's Renewable Energy Target.

FOR MORE INFORMATION:

www.oecd.org/environment/cc/financing.htm

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December 2015

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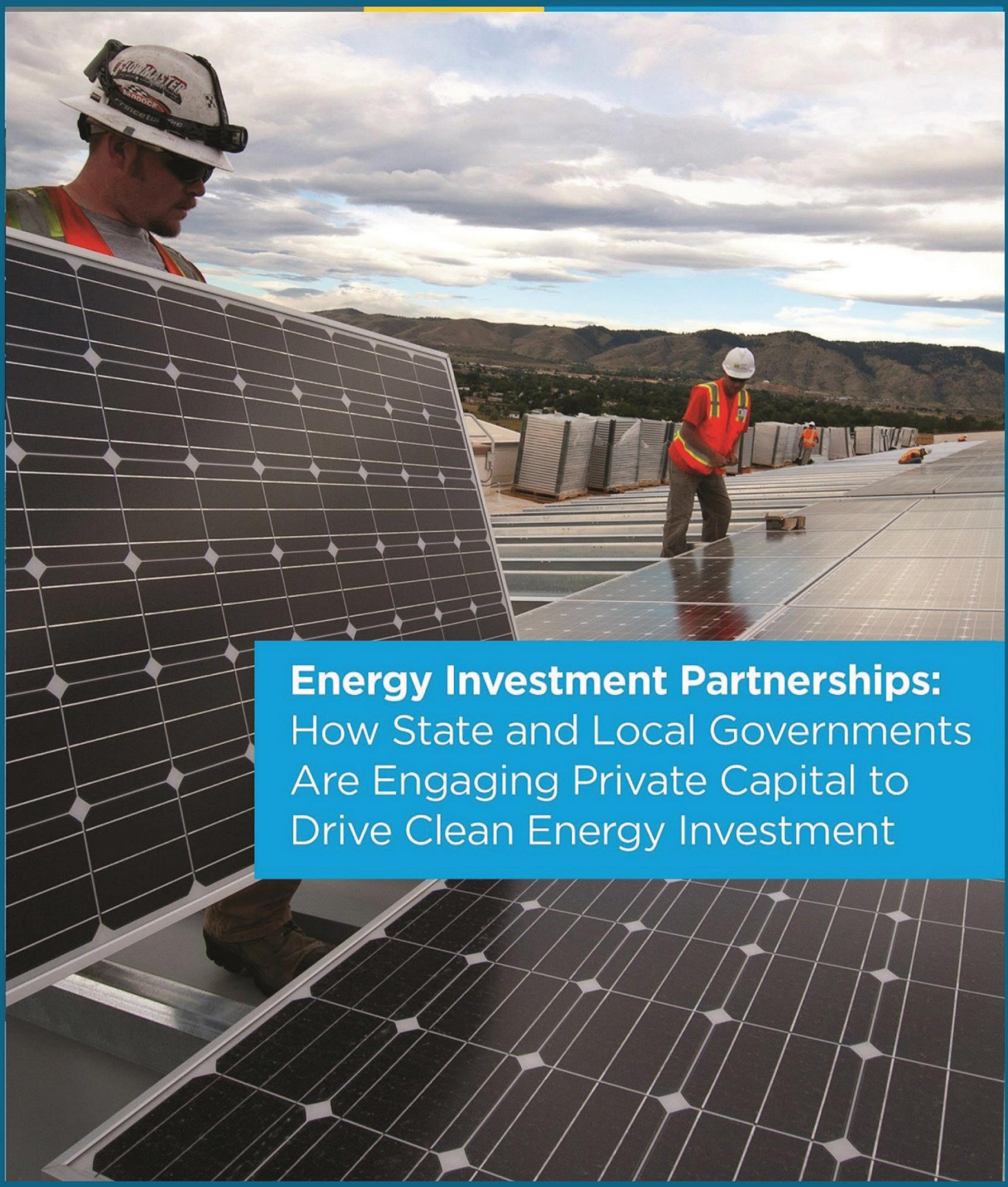

Energy Investment Partnerships:
How State and Local Governments Are Engaging Private Capital to Drive Clean Energy Investment

December 2015

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1. INTRODUCTION

State and local governments across the nation are continuing to spur investments in energy efficiency and renewable energy—from the State of California, to the City of Toledo, Ohio, to the State of New York. The fact that state and local governments are choosing to develop and grow their clean energy markets, despite the ongoing pressure to reduce government spending, underlines the significance of these investments.

Over the last five years, many states and local jurisdictions have seen the largest infusion of capital into energy efficiency and renewable energy projects fostered by the vast resources provided by the American Recovery and Reinvestment Act of 2009 (ARRA). While many of these programs advanced clean energy in their respective markets through grants, a few government jurisdictions used their limited state or municipal dollars to leverage significant amounts of private capital.

How are governments paying for these investments in energy efficiency and renewable energy in a time of limited budgets? By developing public-private partnerships and bringing the right mix of partners, authorities, and strategies to the table, each state, region, municipality, and market can create a unique—but effective—vehicle to support clean energy finance and deployment. The implementation of these entities, described as "Energy Investment Partnerships (EIPs)," and sometimes referred to as "Green Banks," is typically a result of carefully structured public-private partnerships, cooperative political environments, legislative mandates, and access to credit enhancement tools.

An EIP can accomplish its primary goal of attracting private capital to clean energy projects in many ways, including through the traditional development-finance tools it has at its disposal. Some of these traditional methods include issuing bonds, co-lending with banks, and insuring or credit enhancing private loans. Each tool enables state and local governments to use their limited sources of funding to leverage larger amounts of private capital to support renewable energy and energy efficiency investments.

By leveraging private dollars, EIPs generate an impact well beyond what would be possible with public funds alone. Programs across the country are showing how these lending programs can leverage public dollars to increase investment in clean energy. Through issuing bonds, authorities in Connecticut and New York have sold clean energy loan portfolios on the secondary market. Florida's nonprofit Solar and Energy Loan Fund (SELF) in St. Lucie County has leveraged private dollars into clean energy loans for low and moderate income (LMI) individuals by working with private banks' Community Reinvestment Act (CRA) divisions and the Community Development Finance Institution (CDFI). Other EIPs have provided credit enhancements to private lenders, who in turn have financed clean energy projects directly. Finally, the issuance of securities has emerged as a mechanism through which EIPs can tap into private capital to support clean energy investments.

Creating and using public-private financing is not new to supporting energy infrastructure development. Infrastructure development, frequently including oil, gas, and coal energy facilities, has a long history of accessing both public and private capital. Tax-exempt bonds are the traditional tool for this development, although loans, tax increment, and tax credits are other common programs in this area. EIPs are expanding the legacy of financing infrastructure and economic development to clean energy deployment. Rather than simply offering generous tax credits and grants, these new partnerships focus

on facilitating financing through bonds, loans, credit enhancement, and other proven development finance tools.

The diversity in structure, markets, and execution across EIPs is a testament to the leaders and participants of these partnerships, and more generally to the determination and innovation of both public and private sectors. Qualified leadership and staff, with a combination of policy, financial, and technological experience surrounding investments in clean energy, are critical components to success.

Strategic partnerships with public, private, and nonprofit entities are also key means for an EIP to expand its capacity to market, analyze, and service investments in clean energy projects. EIPs can achieve long-term viability by combining initial public or foundation-based capitalization with loan repayments, fees, and other sources of revenue to recapitalize programs and cover administrative costs.

EIPs represent unprecedented community and statewide collaboration and creativity within the clean energy industry. Sections 2–9 highlight the partnerships and programs operating in eight states, with details about the creation, purpose, structure, and financing terms. To contextualize these descriptions, background information about development finance tools and programs is available for reference in Section 10.

The EIPs showcased present a diversity of innovative models that communities throughout the nation can replicate. These examples are primarily meant as inspiration, as the form of the EIP is immaterial. State and local leaders can structure their own EIP in the form that will best work to advance their own renewable energy and energy efficiency investment goals.

This trend is continuing to spread across the nation as additional state and local governments prioritize investments in clean energy. For example, in 2015, the State of Rhode Island passed legislation for the Rhode Island Infrastructure Bank, and Montgomery County, Maryland, also passed legislation for a "Green Bank"—both entities are now moving forward in their development. Other states and counties are following suit and are paving a path forward in the creation of EIPs. Due to the success and growth of these kinds of programs, there is much anticipation that additional state and local EIPs will emerge in the coming years.

1.1. Summary Table of Energy Investment Partnerships and Programs

State	Entity	Programs (in report)	Legal Structure	Capitalization	Market Sectors
CA	CA Alternative Energy & Advanced Transportation Financing Authority	PACE Loss Reserve; CA Hub for Energy Efficiency Financing	State agency	State allocation + CA Public Utility Commission allocation	Residential & commercial; efficiency & renewables
CA	CA Infrastructure and Economic Development Bank	CA Lending for Energy and Environmental Needs Center	State agency	Self-capitalized	State and local govt.; efficiency, renewable, water conservation, & distribution
CT	CT Green Bank	CT Solar Lease; Energize Connecticut Smart E-Loan; Commercial PACE; CT Solar Loan	State agency	Systems Benefits Charge + Regional Greenhouse Gas Initiative funds + U.S. Dept. of Energy grant + private investments + fees	Residential & commercial; efficiency & renewables
FL	Solar & Energy Loan Fund	Clean Energy Loan Fund	Nonprofit, CDFI	U.S. Dept. of Energy grant + private investments	Residential & commercial; efficiency & renewables
HI	Hawaii Green Infrastructure Authority	Green Energy Market Securitization	State agency	Bonds + utility fees	Resident & commercial; efficiency & renewables
NJ	NJ Board of Public Utilities	NJ Clean Energy	State agency	Self-capitalized	Residential & commercial; efficiency & renewables
	NJ Energy Resilience Bank	Wastewater and Water Treatment Plant Funding	State agency	U.S. Dept. of Housing & Urban Development grant	Utilities; renewables
NY	NY State Energy Research & Development Authority	Green Jobs – Green NY	State agency	Systems Benefits Charge + Regional Greenhouse Gas Initiative funds + U.S. Dept. of Energy grant + Qualified Energy Conservation Bonds	Residential & commercial; efficiency
	NY Green Bank	Clean energy financial products and advisory services	Division of a state agency, NYSERDA	Allocation of uncommitted Efficiency & Renewable Portfolio Standard & System Benefits Charge funds	Residential & commercial; efficiency & renewables
OH	Toledo-Lucas County Port Authority	BetterBuildings Northwest OH	Local agency	Fees + U.S. Dept. of Energy grant + tax levy	Residential & commercial; efficiency & renewables
	Greater Cincinnati Energy Alliance	Greater Cincinnati Home Energy Loan; Building Communities Loan	Nonprofit	U.S. Dept. of Energy grant + private impact investment + fees	Residential & nonprofit; efficiency & renewables
	Port of Greater Cincinnati Development Authority	Greater Cincinnati PACE	Local agency	Fees + county & city allocation	Commercial; efficiency & renewables
OR	Energy Trust of OR	General efficiency incentives	Nonprofit	System Benefits Charge	Residential & commercial;

				efficiency
Enhabit	General efficiency incentives	Nonprofit	Fees + U.S. Dept. of Energy grant	Residential; renewables
Craft3	Home Energy Efficiency Loan	Nonprofit, CDFI	Private investments + private contributions + grants	Residential; efficiency

2. CALIFORNIA [1]

2.1 Overview

California is a national leader in clean energy investment. The state's history with clean energy financing dates to the passage of the Warren-Alquist Act of 1974, which formed the California Energy Commission to decrease "wasteful, uneconomical, and unnecessary uses of energy in order to reduce the rate of growth of energy consumption and prudently conserve energy resources (Taylor 2012).” In 2006, the California Legislature passed the California Global Warming Solutions Act (California Assembly Bill 32, (AB32)) affirming California’s support for climate change mitigation. AB32 established California’s goals to reduce its greenhouse gas (GHG) emissions to 1990 levels by 2020. On April 29, 2015, Governor Edmund G. Brown Jr. issued Executive Order B-30-15 to establish a new interim California GHG emission reduction target to reduce GHG emissions to 40% below 1990 levels by 2030 to ensure the state meets its target of reducing GHG emissions to 80% below 1990 levels by 2050 (GHG reduction goals).

Today, California maintains over a dozen major programs at the state level intended to support investment in renewable energy and energy efficiency developments. These programs reside in several different offices and branches of the state government, making coordination a challenge. In a recent report from the California Legislative Affairs Office, the state recognized the lack of one centralized agency and outlined a number of challenges, opportunities, and recommendations (Taylor 2012). Additionally, California presents a size challenge in terms of sheer geographic territory and population. These issues require an extremely large allocation of funds to make impactful investments.

Among state departments, the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) is one of the aggregators of state resources and clean energy financing programs. CAEATFA, housed in the State Treasurer’s Office, works with a variety of partners to support clean energy investments, including local governments, public and investor-owned utilities (IOUs), the California Public Utilities Commission (CPUC) and California Energy Commission, private sector clean energy developers, commercial lenders, private financial institutions, and state bond-financing agencies. In its energy efficiency-financing programs, CAEATFA has designed quality assurance measures to reflect utility energy assessments and leverage existing structures/requirements, which streamline the technical requirements for qualified loans.

The California Infrastructure and Economic Development Bank (IBank) is uniquely suited to help the state meet the GHG reduction goals by offering practical and sustainable solutions via leveraged, risk-adjusted, financial assistance for public clean energy, water, and environmental projects throughout California. IBank is governed by a five-member Board of Directors and is within the Governor's Office of Business and Economic Development.

Led by the growth of Residential PACE, enabled by local governments across the state, around 40,000 clean energy building upgrade projects have been financed to date, with overall value (financed plus leveraged capital) of over **$1.6 billion**. Table 2.1 shows the details.

[1] Information for the California section was provided by the California Alternative Energy & Advanced Transportation Financing Authority, The California Infrastructure and Economic Development Bank and the California Energy Commission

2.1 Overview of Privately Funded or Leveraged EE and/or Solar Financing Programs Operational in California (as of 8/2015)

Program Type	Program Administrator	Program Name	Geographic coverage	Eligible sectors	Loan size limits	Max loan period/ rate	Loan qualification terms	# of trans-actions made	Trans-actions $ value	Private Funds leveraged
Residential PACE	Renew Financial CaliforniaFIRST, Ygrene, WRCOG HERO, CaliforniaFirst, Mpower, Counterpointe Energy Solutions, Sonoma & Placer County, Alliance NRG, Chula Vista, Green Finance SF, LA County, Clean Energy CV Upgrade	Various; Home Energy Renovation Opportunity, Ygrene Works, Alliance NRG, Energy Independence Program, etc.	Participating cities and counties (most major population centers)	Single-family residential	$2500 to 15% of property value, Not to exceed $200k($250k for LA County residents)	5 to 25 years / 5.75% - 8.39%	Owner's equity amount, property value, mortgage and tax payment history, improvement amount requested	37,384	786,700,000	710,300,000
Commercial PACE	Renew Financial, LA Co Nonresidential PACE DSRF, CaliforniaFIRST, WRCOG HERO Figtree PACE, Sonoma & Placer County Counterpointe Energy Solutions, Varies by jurisdiction (commonly Clean Energy "government name")	Various; LA County, Statewide, Various cities/counties statewide, Alliance NRG, Mpower, Home Energy Renovation Opportunity, etc.	Commercial, Industrial, Large Multi-family	Private Sector	Typically > $250k, Minimum $50k, Minimum $50k and not to exceed 20% total property value	Up to 20 years, market rates (vary)	5-year tax payment history, mortgage payment, bankruptcy history, upgrades subject to permitting inspections	114	37,430,000	16,130,000

2.1 Overview of Privately Funded or Leveraged EE and/or Solar Financing Programs Operational in California (as of 8/2015)

Program Type	Program Type	Program Type	Program Type	Program Type	Program Type	Program Type	Program Type	Program Type	Program Type	Program Type
On Bill Repayment	City of Hayward & Bayren, Marin Clean Energy CCA	On Bill Repayment, PAYS	MCE service area	Single-Family Residential, multi-family Residential & Small Commercial	$2.5k-$30K, $10k-$265k	5-10 years/ fixed: 6.5% plus fees; 5% interest fixed		248	560,000	20,000
Other	CAEATFA, Santa Barbara County, CRHMFA, SoCalREN	CHEEF, Empower, CHF, Permit Compliance Pilot	IOU territories, Santa Barbara, San Luis Obispo and Ventura Counties, LA County & San Diego County, other counties	Single-Family Residential, multi-family Residential & Small Commercial	$1k-$25k, and up to $50k	5year-15 years, 2%-6.5%	At least 70% loan must be used for eligible energy efficiency measures; min FICO scores; income verification if FICO between 580-640; min/max DTI ratios	2,084	42,818,314	21,489,134
Source: California Energy Commission and California Public Utilities Commission							**Total**	**39,830**	**867,508,314**	**747,939,134**

2.2 California Alternative Energy and Advanced Transportation Financing Authority

Organization Name:	California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)
Address:	915 Capitol Mall, Room 457 | Sacramento, CA 95814
Phone:	916-651-8157
Website:	http://www.treasurer.ca.gov/caeatfa/
Legal Structure:	Government agency
Year Established:	Established in the 1980s, CAEATFA relaunched in 2010 to administer tax exclusion.
Enabling Legislation:	Division 16, Section 26000, of the Public Resources Code
Capitalization:	CAEFTA receives capital from a state budget allocation, fees from users, and loans and bonds, as specific to programs.

CAEATFA provides financial assistance for the development and commercialization of advanced transportation and alternative energy technologies with a goal of reducing air pollution, conserving energy, and promoting economic development through job creation. The Office of the State Treasurer established CAEATFA to provide more affordable financing and to leverage private capital, both of which fall within the Treasury's core functions. After CAEATFA relaunched in 2010 to administer a sales and use tax exclusion for state and local manufacturing, it developed its focus on clean energy.

CAEATFA is unique among California state agency clean energy participants, as it does not have the burdens of energy regulation functions and is able to be proactive and innovative with its financing approaches. CAEATFA collaborates with a variety of public and private partners to optimize energy reduction per state dollar expenditure. CAEATFA has administered several clean energy-related programs over its life, including Qualified Energy Conservation and Clean Renewable Energy Bonds; a state sales and use tax exclusion for manufacturers of alternative sources, advanced transportation, and advanced manufacturing projects; and a loan loss reserve (LLR) program for residential energy efficiency retrofits. This report will focus on two elements: (1) a new Property Assessed Clean Energy (PACE) Loss Reserve Program, focused on supporting the unique challenges faced by residential PACE programs throughout the state, and (2) the California Hub for Energy Efficiency Financing (CHEEF) pilot programs, which are currently under development and the Legislature is considering for budgetary approval.

2.2.1 Property Assessed Clean Energy Loss Reserve Program

Program Name:	Property Assessed Clean Energy (PACE) Loss Reserve Program
Contact Information:	Deana Carrillo, dcarrillo@treasurer.ca.gov
Year Established:	2014
Borrower Profile:	Residential PACE programs
Projects Financed:	The PACE Loss Reserve Program finances renewable energy and energy efficiency projects.
Financing Range:	There is no limit on participants, $10 million sits in one fund, under CAEATFA's control, and the necessary amount can be drawn down as needed to make lenders whole.
Term of Financing:	Determined by local PACE program.
Cost of Financing:	There is no cost of financing.

In September of 2013, the State of California authorized CAEATFA to establish a PACE Loss Reserve Program. CAEATFA established the program as a solution to the Federal Housing Finance Agency (FHFA) argument that first-priority PACE liens place the first-mortgage holder at risk of loss in the event of default. CAEATFA identified two situations under which a PACE lien on the property would potentially expose private mortgage lenders to a financial loss—foreclosures and forced sales. In a foreclosure situation, the mortgage lender may take possession of a property and be liable for property tax payments, including any PACE assessment. Additionally, because of PACE's first-priority lien status under California law, in a forced sale, first-mortgage lenders may experience losses resulting from delinquent PACE assessments being paid before the outstanding mortgage balance.

With the PACE Loss Reserve Program, first-mortgage holders can receive risk mitigation for foreclosures and forced sales. More specifically, the program seeks to address FHFA's concerns with a reserve fund that would reimburse first-mortgage lenders for direct losses in the event of a foreclosure or forced sale. The reserve fund provides a cushion against the FHFA's identified risks to mortgage holders. In addition, the PACE Loss Reserve Program may assist California's local PACE programs in securitizing their portfolios. As of June 2015, the PACE Loss Reserve was supporting over 36,720 enrolled projects totaling over $810 million. To date, there has not been a claim on the fund.

2.2.2 California Hub for Energy Efficiency Financing

Program Name:	California Hub for Energy Efficiency Financing (CHEEF)
Contact Information:	Deana Carrillo, dcarrillo@treasurer.ca.gov
Year Established:	2013
Borrower Profile:	Residential, Multifamily and Commercial
Projects Financed:	CHEEF finances energy efficiency.
Financing Range:	Credit Enhancement; financing range is to be determined since the program is in its pilot phase.
Term of Financing:	The term of financing is to be determined since the program is in its pilot phase.
Cost of Financing:	The cost of financing is to be determined since the program is in its pilot phase.

In September 2013, CPUC allocated $65.9 million toward a series of pilot programs testing a variety of financing structures through the state's IOUs.[2] The suite of programs applies a diversity of credit enhancements, including on-bill repayment (OBR) and loss reserves, to several borrower profiles. Through its decision, CPUC created a new administrative body to oversee the pilot programs, California Hub for Energy Efficiency Financing (CHEEF). CPUC recommended that CHEEF reside within CAEATFA to complement and expand existing clean energy programming within the agency. The pilots provide an open marketplace, encouraging a variety of lenders and financial institutions to participate and enter into the energy efficiency market.

CAEATFA's administrative responsibilities as the director of CHEEF are as follows:

[2] Content in this section is adapted from the CPUC's *Decision Implementing 2013–2014 Energy Efficiency Financing Pilot Programs* (see References for more information).

- Management of the flow of funds and data collection
- Creation of simple, streamlined structures to allow stakeholders to participate
- Administration of an "open market" for energy efficiency in the state
- Program development, implementation, and reporting to CPUC
- Development of a statewide database that provides project, energy, and financial data.

CHEEF pilots are being developed in coordination with the four IOUs throughout the state, leveraging existing, private-sector knowledge of energy efficiency and use patterns to ensure robust data collection. Pacific Gas and Electric Company (PG&E) and Southern California Gas Company will administer separate project elements under CHEEF. CHEEF includes pilots for residential and non-residential energy efficiency projects.

Residential Pilots

CHEEF will direct three residential pilot programs, which will target Low & Moderate Income (LMI) households. To protect individuals participating in the pilot program, the program prohibits the disconnection of power for nonpayment of residential financial obligations. CPUC allocated a total of $28.9 million to residential programs, with $26 million targeting improvements to single-family homes.

Primarily, CHEEF's intention is to attract a greater amount of private capital to the energy efficiency retrofit market by reducing risk to lenders, broaden the availability of lower-cost financing to individuals who might not have been able to access it otherwise, and address the upfront cost barrier to energy efficiency retrofit projects.

More detailed descriptions of the residential programs are below.

Residential Energy Efficiency Loan (REEL) Assistance Program – $25 Million Allocation

REEL will provide a LLR available to direct and indirect loan providers to support single-family home improvements. The stated objective of the program is twofold: (1) incentivize private lenders to provide lower costs and broader access to financing, and (2) to build energy efficiency loan volume, which produces data and optimizes successful loan terms. OBR is not a requirement of the program.

Credit enhancements available under this pilot are not to exceed 20% of eligible loan value, and the lender's loss recovery under REEL cannot exceed 90% of the original loan value. The total incentive available to a given financial institution is capped by the total available in the financial institution's loss reserve portfolio. This program also includes a target to LMI homeowners as defined by the California Department of Housing and Community Development.

Energy Financing Line Item Charge (EFLIC) – $1 Million Allocation

EFLIC is a sub-pilot designed to test OBR in the residential space. EFLIC's intention is to drive residential demand for energy efficiency projects while improving repayment and reducing lender-servicing costs. This sub-pilot will be available to borrowers participating in REEL who wish to use OBR. EFLIC will not feature transferability of debt obligations upon the sale of the improved property. PG&E, an IOU with a similar program currently active within a limited geographical area, will implement EFLIC. The expectation is that using PG&E's existing infrastructure will greatly reduce the cost of implementing EFLIC.

Master-Metered Multifamily Financing Program (MMMFP) with OBR – $2.9 Million Allocation
MMMFP is CHEEF's only pilot addressing the LMI multifamily residential market. Property owners repay MMMFP obligations through their master utility bill without the risk of service disconnection in the event of nonpayment. Under current conditions, the risk of rising utility bills for master-metered multifamily properties falls on the owners of the property, placing an incentive to adopt energy efficiency measures. Improvements provide a tangible benefit to LMI renters in these properties as well. However, access to capital is a significant barrier to investments in energy efficiency for this sector. This is due to its complex capitalization structures, which often involve funding from private sources as well as federal, state, and local governments. The MMMFP includes a credit enhancement to reduce financial risk and incentivize lenders to develop loan products for this market sector.

This pilot is under development, and as originally envisioned would use a debt service reserve fund to cover any monthly shortfall to lenders, which may occur as a result of late or missed payments. MMMFP will target 5,000 units through properties of at least 20 units each. Participating utilities are responsible for applying all applicable rebates and incentives toward the program, reducing the principal amount of the loan eligible for credit enhancement through the reserve account. Southern California Gas Company will administer the early implementation of this pilot, without credit enhancement, to address strong, early demand for this program.

Nonresidential Pilots
The primary goal of CHEEF's nonresidential pilots is to build the deal flow necessary to test the value of OBR as a bridge to overcome traditional lending barriers in commercial markets. These pilots will assess OBR as a standalone incentive and in tandem with traditional credit enhancements, gauging OBR's value to private lenders. Two of CHEEF's nonresidential pilots target small businesses, while a third is available to businesses of all sizes.

OBR for Small Business with Credit Enhancement – $14 Million Allocation
Eligible borrowers for the OBR pilot include small business owners as defined by the U.S. Small Business Administration. The program targets commercial property owners, and its design is less structured than the residential programs due to the phase of program development. CPUC or CHEEF have yet to determine specific levels and structures of credit enhancement, though CPUC currently prefers a limited LLR account with a cap of $200,000 per financial institution.

Small Business Sector Lease Providers: Sub-Pilot with Credit Enhancement
This sub-pilot concentrates on the expansion of energy efficiency equipment lease financing in the small business sector. The sub-pilot allows for OBR, as well as traditional, off-bill payment methods. Financing products and services allowable under this pilot will be subject to competitive proposals and, as of yet, the structure of the pilot has not been fully determined. As with the REEL pilot, a LLR is currently the CPUC's preferred credit enhancement mechanism for the lease sub-pilot.

Nonresidential OBR without Credit Enhancement – $0 Allocated
The nonresidential OBR pilot without credit enhancements will be available to all sizes of nonresidential utility customers. The CPUC determined in its proceeding that there was no clear need for credit enhancements to spur activity in this sector, so there are no allocated credit-

enhancement funds for this pilot. Consent-based transferability of debt obligations upon the sale of the property applies to this pilot, and payments are collected through the borrower's utility bill. The goal of the OBR pilot is to test the merit of OBR as a standalone feature, without additional credit enhancement, and to expand access to financing for a wider range of energy efficiency projects.

2.3 California Infrastructure and Economic Development Bank

Organization Name:	California Infrastructure and Economic Development Bank (IBank)
Address:	1325 J. Street, Suite 1823, Sacramento, CA 95814
Phone:	916-341-6600
Website:	http://ibank.ca.gov/Default.htm
Legal Structure:	State agency
Year Established:	1994
Enabling Legislation:	Bergeson-Peace Infrastructure and Economic Development Bank Act
Capitalization:	IBank receives capital through self-capitalization as well as tax-exempt and taxable revenue bonds.

In 1994, IBank was established pursuant to the Bergeson-Peace Infrastructure and Economic Development Bank Act contained in the California Government Code Sections 63000 et seq. (IBank Act). IBank's mission is to finance public infrastructure and private economic development that promote economic growth, protect and sustain the environment, support clean energy and efficiency, revitalize communities, and enhance the quality of life for the citizens of California. The IBank Act bestowed broad statutory authority on IBank to issue bonds and incur other indebtedness, to make financings, and to provide guarantees and other credit enhancements for a wide variety of projects and borrowers to achieve its mission.

IBank has exercised its broad statutory authority to approve (1) direct financings to state and local governmental entities and public-benefit, tax-exempt, nonprofit entities for infrastructure projects; (2) conduit bond financings for manufacturing businesses, nonprofit entities, and public entities; and (3) other financing transactions important to the state of California. IBank has gained experience in infrastructure financing and investment; has developed relationships with private investors; and has collaborated with the State Treasurer's Office, the California Energy Commission, additional state energy agencies, environmental advocates, and other stakeholders. IBank has experienced staff and understands that public and nonprofit entities face tight operating budgets and constitutional and regulatory limits of financings. It has established policies and procedures to evaluate projects and borrowers. In sum, IBank is well positioned to provide financial assistance to help California meet its GHG reduction goals.

2.3.1 California Lending for Energy and Environmental Needs

Program Name:	California Lending for Energy and Environmental Needs (CLEEN) Center
Contact Information:	Teveia Barnes, Executive Director; teveia.barnes@ibank.ca.gov
Year Established:	2014
Website:	http://ibank.ca.gov/clean_energy.htm
Borrower Profile:	State and local governments, universities, schools, and hospitals
Projects Financed:	CLEEN Center finances clean energy, water, and environmental projects.

Financing Range:	The financing range is $500,000 to $30,000,000 although the Board may approve larger projects.
Term of Financing:	The term may not exceed the lesser of the project's useful life or 30 years.
Capitalization:	CLEEN Center receives capital through self-capitalization and tax-exempt Green Bonds.

IBank established in 2014 a new Clean Energy Finance Center (the Center) and created the Statewide Energy Efficiency Program (SWEEP), which operates under the Center. In 2015, the Center was renamed the California Lending for Energy and Environmental Needs Center, or CLEEN Center. Through the CLEEN Center's programs, IBank encourages and supports the protection of the environment and California's vast natural resources. It also helps the state achieve its GHG reduction goals by offering financing to various state and local governmental subdivisions and certain nonprofit entities for projects that reduce carbon/pollution or result in other environmental benefits within California. IBank provides financing through the CLEEN Center to help enhance the quality of life of the citizens of California by promoting and stimulating economic growth, creating clean energy jobs, protecting and caring for the environment, and revitalizing communities.

Pursuant to the IBank Act, financial assistance may be provided for designing, acquiring, planning, permitting, entitling, constructing, improving, extending, restoring, financing, and generally developing an eligible facility. An eligible facility is any real and personal property, structures, buildings, equipment, and supporting components thereof that are used to provide industrial, recreational, research, commercial, utility or service enterprise facilities, or community, educational, cultural, or social welfare facilities, and any parts or combinations thereof, and all facilities or infrastructure necessary or desirable in connection therewith, excluding housing facilities. Thus, projects having the foregoing characteristics and employing any of the technologies listed below under 2.3.2. to the extent that the proposed technology is commercially proven, are eligible projects under the CLEEN Center's programs.

Key strategies of the CLEEN Center are as follows:

1. Target projects such as generation, distribution, transmission, and storage of electrical energy, energy conservations measures, environmental mitigation measures, and water treatment and distribution.
2. Provide affordable financings to municipalities, universities, schools, and hospitals, for projects that reduce energy and water usage (conservation), provide clean energy additions, and achieve energy savings.
3. Offer established and innovative financing structures that control risks and maximize attainment of California's GHG reduction goals.

Applicants

Eligible applicants under the CLEEN Center Programs include any subdivision of a local or state government, such as departments, agencies, commissions, cities, counties, nonprofit corporations formed on behalf of an applicant, enhanced infrastructure-financing districts, special districts, assessment districts, joint powers authorities within the state, or any combination of these subdivisions; as well as schools and hospitals that apply to IBank for financial assistance in connection with a CLEEN project.

Applicants must demonstrate reasonable ability to repay the proposed financing obligation and all other outstanding debt as well as the ability to maintain ongoing operations. Each applicant organization must authorize its local electric and gas utilities to provide at least 12 months (or a longer period as IBank may require) of past and ongoing usage and billing records to IBank. Direct financing of all CLEEN Projects will be subject to IBank's Credit Underwriting Guidelines and Procedures.

Amount
CLEEN Projects may receive financings in amounts ranging from $500,000 to $30 million. The IBank Board may approve larger financing amounts depending on the availability of funding for the applicable CLEEN Center program and other factors including collateral and credit quality/review.

Term
The financing term cannot exceed the lesser of the CLEEN Project's useful life or 30 years. However, applicants may choose shorter maturities. Repayment of a direct financing will be targeted to begin within one year of financing origination. As required, interest payments can be made from capitalized interest included in the financing amount or other sources identified by the applicant as documented in the applicable financing agreements. Direct financings will generally be amortized on a level repayment basis, but IBank may require or approve other amortization structures, as appropriate in a given case.

2.3.2 Statewide Energy Efficiency Program (SWEEP) under CLEEN Center

SWEEP is a CLEEN Center program for small-, medium-, and large-scale energy efficiency upgrades and projects for California's municipality, university, school, and hospital borrowers. The SWEEP Projects include comprehensive clean energy improvements to new and existing facilities that save energy.

IBank has identified the following clean energy and related water projects (SWEEP Projects)[3] as eligible projects for the CLEEN Center:

1. **Energy Efficiency**
    a. Advanced metering systems to support conversion of master-metered buildings to sub-metering
    b. Data center, information technology, communications energy efficiency
    c. Energy management and/or control systems, including continuous commissioning
    d. Demand response programs
    e. Water conservation, wastewater management, pipeline, mining/extraction, and similar end-use processes, facilities, buildings, and infrastructure
    f. Lighting and control systems
    g. Heating, ventilation, and air conditioning systems
    h. Building envelope improvements
    i. Occupant plug load management systems
    j. Other electrical load reduction

[3] Based on New York Green Bank – Illustrative Guidelines for Eligible Investments.

k. Thermal and electric energy storage

2. Renewable Energy Sector

a. Solar photovoltaic
b. Distribution technologies
c. Solar thermal
d. Geothermal
e. Thermal storage systems
f. Onshore and offshore wind

3. Energy Storage

a. Fuel cells (continuous duty)–natural gas fuel or hydrogen
b. Advanced hydrological pump storage
c. Other storage technologies

4. Water Sector

a. Small hydroelectric/hydropower
b. Waste heat recovery systems
c. New low-impact run of facility

5. Alternative Technologies

a. Biomass
b. Biomass direct combustion
c. Combined heat and power (CHP)
d. Co-fire with existing fossil fuel (only biomass feedstock portion is eligible)
e. Biothermal energy
f. Biomass conversion technologies
g. Biogas
h. Landfill gas (methane)
i. Sewage gas (methane)
j. Manure digestion
k. Anaerobic digestion
l. Liquid biofuels

6. Alternative Fuels

a. Biodiesel
b. Methanol
c. Bio-oil
d. Biomass feedstock

7. **Transportation**

    a. Refueling stations for alternative fuel vehicles
    b. Electric vehicles
    c. Hybrid electric vehicles
    d. Alternative fuel vehicles

IBank may consider project technologies not listed above if they demonstrate the potential to increase energy efficiency or renewable energy and/or decrease GHG and/or produce other environmental benefits while maintaining low technology risk within the state.

2.3.3 Light-Emitting Diode (LED) Street Lighting Program

The LED Street Lighting Program is a CLEEN Center Program for the installation of LED street lights for municipality, university, school, and hospital borrowers as another energy efficiency strategy for California. LED street light projects are deemed SWEEP Projects. IBank requires investment-grade, commercially proven technology and may require that selected equipment comply with street light technology guidelines. IBank requires commercially reasonable equipment and labor warranties on all lighting projects, and it requires that installers demonstrate the ability to fulfill warranty obligations.

3. CONNECTICUT [4]

3.1 Overview

Connecticut faces the burden of having the highest electric prices in the lower 48 states, aged and inefficient building stock, and major storms that increasingly threaten electric reliability. Faced with growing concern over delivering cheaper, cleaner, and more reliable sources of energy, political leadership in Connecticut has made attracting private investment in clean energy a priority for the state. Connecticut has implemented a renewable portfolio standard (RPS) requiring electric suppliers to source a minimum of 20% of their energy from renewables by the year 2020.[5] A favorable bipartisan political climate, combined with tangible economic incentives associated with a transition to clean energy, has enabled Connecticut to form one of the strongest, most innovative EIPs in the nation.[6]

The Connecticut Clean Energy Fund (CCEF) gave birth to the Connecticut Green Bank (CGB) in 2011 to expand Connecticut's direct financing programs and increase private sector investment in clean energy. Connecticut houses the majority of state-level clean energy financing activities in one, centralized quasi-public agency, though active participation at the community level bolsters the administration of many of CGB's programs. CGB leads the state's financing efforts in energy efficiency and renewable energy improvement projects for residents, businesses, and institutions and has the following goals:

- Attracting and deploying private capital to finance the clean energy goals of the state.
- Developing and implementing strategies to bring down the cost of clean energy in order to make it more accessible and affordable to consumers.
- Reducing the market reliance on grants, rebates, and other subsidies and moving it toward innovative, low-cost financing of clean energy deployment.

3.2 Connecticut Green Bank

Organization Name:	Connecticut Green Bank (CGB)
Address:	845 Brook Street | Rocky Hill, CT 06067
Phone:	860-563-0015
Website:	http://www.ctcleanenergy.com/
Legal Structure:	Quasi-public organization
Year Established:	2011
Enabling Legislation:	Public Act 11-80; Section 16-245 of the Connecticut General Statutes
Mission:	CGB's mission is to support the Governor's and state legislature's strategies to

[4] Information for the Connecticut section was provided by the Connecticut Green Bank

[5] State of Connecticut, Department of Energy & Environmental Protection, Public Utilities Regulatory Authority. "Connecticut Renewable Portfolio Standards Overview." Retrieved from: http://www.ct.gov/pura/cwp/view.asp?a=3354&q=415186

[6] *"The Connecticut Green Bank was established in 2011 to develop programs that will leverage private sector capital to create long-term, sustainable financing for energy efficiency and clean energy to support residential, commercial, and industrial section implementation of energy efficiency and clean energy measures."* - Governor Dannel P. Malloy

	achieve cleaner, cheaper, and more reliable sources of energy while creating jobs and supporting local economic development by leveraging public funds to attract private capital investment in clean energy.
Capitalization:	CGB's programs receive funding from a variety of sources, including a system benefit charge on residential and commercial electric bills, Regional Greenhouse Gas Initiative allowance proceeds, federal funds and grants, private capital from investors, financial returns from project loans and investments, and other sources.

CGB traces its roots back to the 1998 establishment of the CCEF, a suite of direct incentive programs housed within the state's quasi-public venture capital division—Connecticut Innovations. Upon its establishment in 2011, CGB inherited and subsequently phased out many of CCEF's programs, while shifting the state's focus from a subsidy model to a financing model; leveraging the limited ratepayer and taxpayer resources, it has to attract multiples of private capital investment in clean energy deployment in the state. CGB seeks to lower the cost of energy efficiency and renewable energy financing for commercial, industrial, institutional, nonprofit, government, and affordable housing sectors. CGB co-administers a website for end users, http://www.energizect.com/, which provides comprehensive details to consumers and contractors seeking information about the organization's and state's diverse programs.

CGB currently houses an array of clean energy financing programs and initiatives, having phased out the support of early-stage clean energy technology innovation, workforce development, education, and the majority of subsidy programs in the process of transitioning to its new mandate. A sampling of CGB's most significant programs and pilots include the following:

Solarize Connecticut
Through a partnership with SmartPower, CGB offers a bulk solar-purchasing program to individual communities—the more households that sign up for solar installations, the deeper the group discounts that become available.

Residential Solar Investment Programs
CGB offers declining performance-based or upfront incentives, along with a suite of financing products, to make solar photovoltaics (PV) more accessible and affordable to consumers.

Dominion Bridgeport Fuel Cell Park[7]
Working with Dominion Energy Resources and Fuel Cell Energy, CGB contributed $7.35 million ($1.55 million grant from the CCEF, $5.8 million loan from CGB) in financing toward the development of a 14.9 megawatt (MW) fuel cell park in the City of Bridgeport, Connecticut—the second-largest fuel cell park in the world.[8]

[7] Goddard, K. (2013, December 27). "Fuel Cell Energy Completes 14.9 Megawatt Fuel Cell Park on Schedule for Dominion, the Project Owner." *GlobeNewswire*. Retrieved from: http://globenewswire.com/news-release/2013/12/27/599333/10062543/en/FuelCell-Energy-Completes-14-9-Megawatt-Fuel-Cell-Park-on-Schedule-for-Dominion-the-Project-Owner.html

[8] Clean Energy Finance and Investment Authority. "Board of Directors of the Clean Energy Finance and Investment Authority" (Agenda Item #1, Call to Order, November 30, 2012). Retrieved from: http://www.ctcleanenergy.com/Portals/0/board-materials/CGB_BOD_113012.pdf

The Solar Lease, Solar Loan, Smart-E Loan, and Commercial Property Assessed Clean Energy (C-PACE) programs, as well as the recent sale of the C-PACE portfolio, and CGB's developing crowdfunding initiative illustrates the diversity of financing models created to leverage private capital and lower the cost of renewable energy and energy efficiency improvements for Connecticut residents and businesses. Information on additional CGB's financing programs and pilots can be found online at www.ctgreenbank.com

Figure 1. U.S. Environmental Protection Agency Administrator Gina McCarthy speaking about the importance of clean energy on environmental protection and economic development at the Dominion Bridgeport Fuel Cell Park

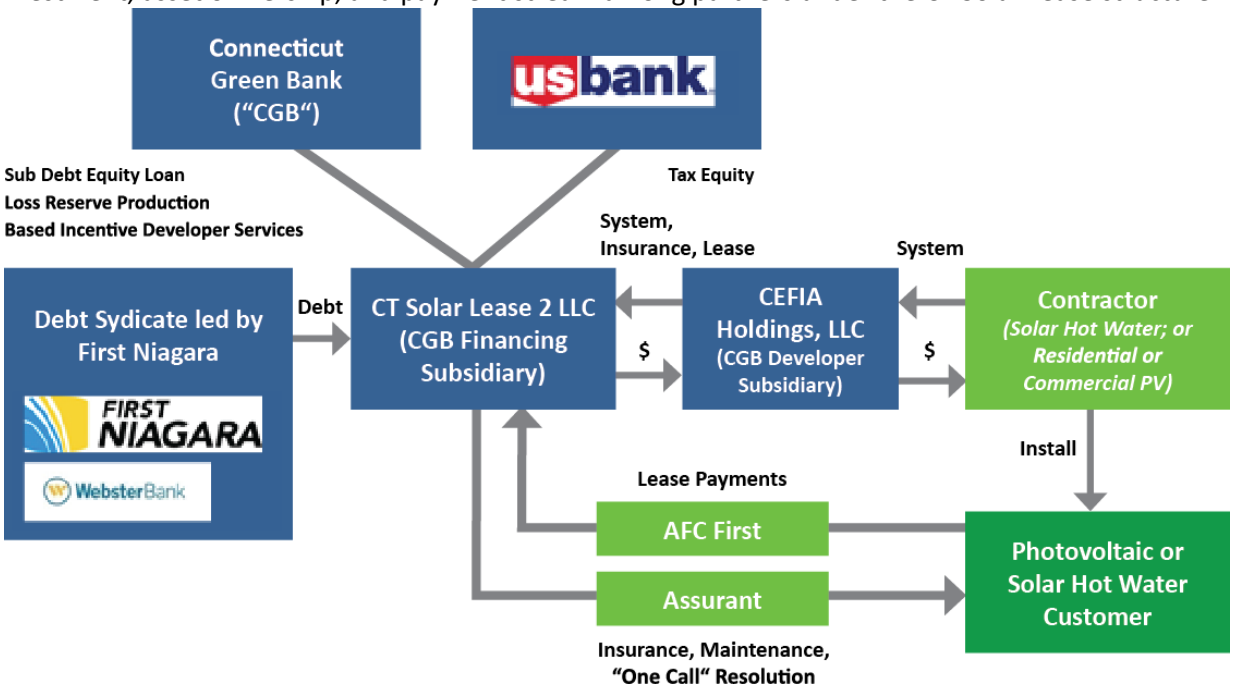
3.2.1 CT Solar Lease

Program Name:	CT Solar Lease
Contact Information:	Ben Healey/benjamin.healey@ctcleanenergy.com
Year Established:	September 2013
Borrower Profile:	Residential, single-family, and commercial (for-profit, nonprofit, and municipal)
Projects Financed:	CT Solar Lease has financed renewable energy projects, including solar PV and solar hot water.
Financing Range:	The financing range for residential properties is up to 10 kilowatts (kW) ($45,000), and for commercial properties, it is up to 350 kW (~$1.25 million).
Term of Financing:	The term of financing is 20 years with intermediate purchase options after five years.
Cost of Financing:	The cost of financing is approximately 6.50%–10.00%, depending on project structure.

CGB's CT Solar Lease program is the second iteration of a pilot residential solar lease program (2008–2011), designed to provide energy consumers an alternative to purchasing solar PV and solar hot water systems for their homes or solar PV for municipal entities, nonprofits, or for-profit businesses. The revised lease structure lowers direct state investment and dramatically increases the total private capital available to invest in projects ($60 million fund). Partnering with private banks, insurers, a tax equity investor, and servicer AFC First, CGB oversees a complex network of legal and cash flow relationships among public and private entities to ensure that system and installation costs remain affordable for lease customers. After five years of successful repayment, lessees receive an annual opportunity to purchase the system.

In almost all CT Solar Lease installations, there is no requirement for solar PV or solar hot water system lessees to make down payments, and monthly payments fall below traditional utility charges. The program can also work under a C-PACE structure, allowing non-investment grade businesses, which are normally not considered creditworthy for these kinds of long-term, third-party agreements, to access solar power.

Debt providers, including First Niagara Bank, Webster Bank, Liberty Bank, Peoples United Bank, and tax equity investor U.S. Bank, invested over $50 million in private capital for the purchase of solar PV and solar hot water equipment for the CT Solar Lease program.[9] Assurant Inc. provides a comprehensive insurance and warranty management package, providing a vital measure of security to private investors and end users. AFC First services lease payments, and CGB ensures that the payment stream from CT Solar Lease projects flow back to the lenders and investors. The diagram below illustrates the flow of investment, asset ownership, and payment stream among partners under the CT Solar Lease structure.



[9] Connecticut Green Bank. *Connecticut Green Bank Press Release*. Retrieved from: http://www.greentechmedia.com/articles/read/connecticuts-green-bank-a-model-for-public-private-renewables-partnerships

Figure 2. Legal structure of the CT Solar Lease
Source: CGB

The CT Solar Lease yields an appropriate rate of return to the capital providers commensurate with the risks they are taking. It also provides local contractors with an important sales tool and gives customers access to affordable no-money-down financing and peace of mind for clean energy.

As of June 2015, a year after the program's implementation, CT Solar Lease had received over 1,349 applications from 21 solar installers.[10] Additionally, 689 leases had closed for a total of $25.0 million and 5,478 kilowatts (kW), with another 660 projects approved in the pipeline for $23 million and 5,197 kW. At the same time, over 3 MW in commercial-scale projects had been approved with a pipeline of an additional 4 MW.

CGB's $9.5 million investment in the CT Solar Lease program has attracted $50 million in private capital from debt providers and a tax equity partner, yielding an approximate 1:5 leverage ratio.[11] With the expected investment return to CGB from the CT Solar Lease, the reinvestment of ratepayer dollars into new projects in the future can occur, thereby limiting the need for ongoing ratepayer subsidies.[12] Through an innovative, multifaceted structure, CGB leverages substantial private capital to supply solar energy to Connecticut residents, businesses, municipalities, and organizations unable or unwilling to purchase or commit 100% of the upfront costs for PV or solar hot water systems.

Thanks to the success of the CT Solar Lease and the growth of the private market for lease financing, after the CT Solar Lease fund was fully committed, CGB transitioned to a privately funded product. CGB has partnered with Sunnova to offer an attractive lease option to Connecticut residents to complement the numerous other lease products that have entered the market since the introduction of the CT Solar Lease.

3.2.2 Energize Connecticut Smart-E Loan Program

Program Name:	Energize Connecticut Smart-E Loan Program
Contact Information:	Kerry O'Neill, kerry.oneill@ctcleanenergy.com
Year Established:	May 2013
Borrower Profile:	Residential, owner-occupied, one-to-four units
Projects Financed:	The program finances energy efficiency and renewable energy projects, fuel conversions, and healthy homes measures.
Financing Range:	The financing range is $500–$25,000+. (The maximum varies by lender but must be at least $25,000.)
Term of Financing:	The term of financing is 5–12 years.
Cost of Financing:	The cost of financing is 4.49%–6.99%, depending on the term (maximum rates).

[10] Information provided by CGB
[11] Press Release (note #11) Retrieved from: http://www.ctcleanenergy.com/Portals/0/board-materials/CEFIA_Due%20Diligence%20Package_Programmatic_Solar_Lease_2REVISED.pdf
[12] Farnen slides (note #12)

The Energize Connecticut Smart-E Loan Program provides an excellent example of how to incentivize private lenders to provide clean energy loans through the use of credit enhancements. Smart-E Loans are private loans offering low-cost, long-term financing for energy efficiency and renewable energy improvement projects—including up to 20% of the value of the project to support healthy home measures (i.e., asbestos remediation, lead abatement, knob and tube wiring, etc.). CGB has structured the parameters of the program through agreements with participating lenders, who must adhere to a set of predetermined guidelines, including maximum interest rates and terms. Loans are unsecured, and prepayment carries no penalty to homeowners. Thirteen banks and credit unions currently participate in the Smart-E Loan program.[13]

To incentivize bank adoption of the loan program, CGB sets guidelines for Smart-E projects. Such guidelines include insurance and licensing requirements and inspection protocol for eligible technologies and qualified contractors. As further incentive, CGB has provided a LLR (importantly, a "second loss" reserve after the lender to ensure effective credit underwriting on the part of CGB's partner banks) to participating lenders in the event of default. Federal grant dollars from ARRA capitalized this reserve fund, rather than state ratepayer capital, further reducing Connecticut's direct investment in these projects.[14]

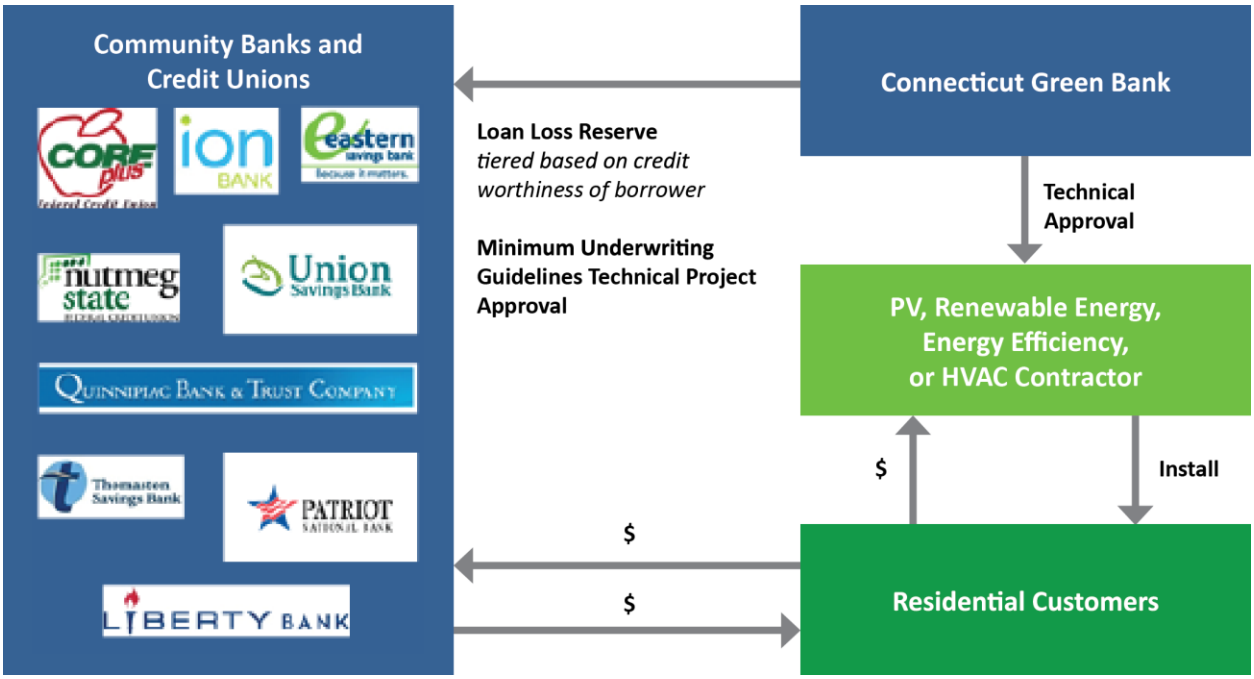


Figure 3. Legal structure of the Smart-E Loan
Source: CGB

To support contractors participating in the Smart-E Loan program, CGB has designed the program to provide a progress payment to contractors. To further mitigate contractor credit concerns by offering

[13] Energize Connecticut. "Programs: Smart-E Loans" (click on the "LENDERS" tab). Retrieved from: http://energizect.com/residents/programs/smarte
[14] Energize Connecticut. "About Energize Connecticut's Smart-E Loans." Retrieved from: http://ctcleanenergy.com/Portals/0/1%20%20Smart-E%20Contractors%20Info%20Sheet%20V10022013.docx

financing to their customers, CGB partnered with Webster Bank to provide working capital lines of credit secured by cash flow, project finance, and accounts receivable.

Through a relatively small state investment, CGB's Smart-E Loan Program addresses the needs of all participants in clean energy projects:

- Homeowners have access to low-cost, unsecured financing for energy efficiency and renewable energy projects. CGB's eligibility requirements for qualified contractors and technologies, which are consistent with the implementation of Connecticut's Comprehensive Energy Strategy, mitigate concerns about technology performance.
- Community banks and credit unions can mitigate default risk through access to a LLR fund. Technology risk is mitigated through qualified contractor and equipment eligibility requirements issued through CGB that are consistent with the policy of the state.
- Eligible contractors can increase their client base by targeting Smart-E consumers. Working capital for Smart-E projects is available through progress payments and specialized loan products administered by CGB and operated through partnering financial institutions.

As of June 2015, Smart-E had received 534 applications from 111 contractors for energy efficiency and renewable energy improvement projects, and approximately $9.4 million had been approved or funded.[15] Additionally, 230 contractors had received training, broadening the pool of eligible partners for the loan product. CGB continues to focus on driving demand for Smart-E through improvements to its Energize Connecticut website, lender campaigns, media campaigns, and continued outreach and training for Smart-E contractors.

3.2.3 Commercial Property Assessed Clean Energy Program

Program Name:	Commercial PACE (C-PACE)
Contact Information:	Genevieve Sherman, genevieve.sherman@ctcleanenergy.com
Year Established:	January 2013
Borrower Profile:	Commercial, industrial, and multifamily (five or more units) property owners
Projects Financed:	C-PACE finances energy efficiency and renewable energy projects.
Financing Range:	Existing projects are in the range of$80,000–$2,500,000; CGB targets $150,000 and above.
Term of Financing:	The term of financing is 10–20 years.
Cost of Financing:	The cost of financing is 5.00%–6.00%, depending on the length of the term (January 2014).

Like many EIPs, CGB administers a C-PACE throughout its service area—the entire State of Connecticut. C-PACE is a structure through which commercial property owners can finance energy efficiency and renewable energy improvements through a loan repaid by a voluntary benefit assessment on their property tax bill.[16] A tax lien, or benefit assessment, is placed on the improved property as security for the loan, and CGB requires lender consent from existing-mortgage holders prior to approving a C-PACE

[15] Information provided by CGB
[16] http://www.cpace.com/about-c-pace

project. CGB maintains a warehouse of capital from which it finances C-PACE transactions and sells to capital markets upon completion.

Prior to the establishment of C-PACE in a given municipality, its legislative body must pass a resolution enabling the municipality to enter into agreement with CGB and to assess, collect, remit, and assign tax assessments against C-PACE borrowers' liabilities.[17] CGB reimburses municipalities for costs incurred in the servicing of C-PACE loans, encouraging the adoption of the program. Municipalities are responsible solely for collecting and remitting C-PACE payments, with no liability for delinquency. CGB takes assignment of the lien, and in the event of delinquency, it enforces collection on the building owner.

Connecticut's C-PACE program allows for the transfer of the obligation and its associated tax lien to the next building owner in the event of a property sale. In the event of a default or foreclosure, the succeeding property owner must make all delinquent payments current. Because of this feature, financed improvements must be permanently fixed to the property—eligible "fixed" improvements include insulation, mechanicals, solar rooftop installations, fuel cells, and underground natural gas piping.[18] CGB also requires a savings-to-investment ratio of greater than one over the life of the project improvements.

CGB specifies minimum underwriting criteria for C-PACE borrowers, while enabling private lenders to customize the terms and conditions of individual loans. Borrowers utilizing CGB's warehouse line of credit must have the following:[19]

- Positive operating profit and net income in each of the last two fiscal years
- Positive cash from operations in each of the last two fiscal years
- Earnings before interest, taxes, depreciation, and amortization/debt service (including the proposed C-PACE assessment after considering savings expected to result from the financing) of at least 1.25x for the last fiscal year
- Current ratio of at least 1.25:1.00
- Total liabilities /tangible net worth not in excess of 2.00:1.00
- Interim statements that disclose no material adverse change in financial condition.

As of June 2015, 109 towns (of 169 statewide) had opted into CGB's C-PACE program, giving over 88% of the commercial and industrial properties in the state access to C-PACE financing. Over 200 contractors had received training for participation in the program, and 16 capital providers had received approval. Additionally, over $57 million in C-PACE assessment advances had been approved. Interest in the C-PACE program has been high among Connecticut businesses, with a significant pipeline of businesses lined up to take advantage of the program in 2014–2015.[20]

Clean Fund, a CGB C-PACE capital provider, purchased an initial portfolio of $30 million comprising 32 energy efficiency and solar PV projects across a dozen municipalities in March 2014. Using an auction

[17] Clean Energy Finance and Investment Authority. September 2013. "C-PACE Program Guidelines, Version 3." Retrieved from: http://s3.honestbuildings.com/client/c-pace/Program_Guidelines_v3_0_FINAL-1.pdf
[18] Ibid.
[19] Ibid., p. 10.
[20] Information provided by CGB

process, CGB solicited bids for the portfolio across all of its capital providers. CGB encouraged bidders to offer various structures and pricing, with or without credit enhancement, and to bid for one or more projects. The selected structure has Wisconsin's Public Finance Authority use proceeds from Clean Fund (in return for a single class of senior "A" bonds) to fund 80% of the portfolio purchase price. To credit enhance the transaction, CGB has taken back, in equal measure, subordinated "B" and "C" bonds. The structure is, in effect, a "private securitization" of the underlying portfolio.[21]

3.2.4 CT Solar Loan

Program Name:	CT Solar Loan
Contact Information:	Ben Healey, benjamin.healey@ctcleanenergy.com
Year Established:	March 2013
Borrower Profile:	Residential, owner-occupied, one-to-four units
Projects Financed:	CT Solar Loan finances renewable energy—solar PV—projects.
Financing Range:	The financing range is up to $55,000.
Term of Financing:	The term of financing is 15 years.
Cost of Financing:	The cost of financing is approximately 6.49% (including 0.25% Automated Clearing House payment benefit).

CGB partnered with Mosaic Inc., an emergent online crowdfunding platform specializing in solar installations, to tap into their growing capital base. Crowdfunding involves soliciting capital from a number of small, individual investors and aggregating the investments into an equity or loan investment in a specific project or pool of projects. Sungage Financial, another partner in the project, designed the underlying loan product along with CGB and provided a marketing, origination, and servicing platform for homeowner loan applications, underwriting, and ongoing cash flow management.

CGB provided $5 million in warehouse financing for the crowdfunding initiative, directed toward initial loan origination via Sungage.[22] Mosaic joined with CGB in the project, committing to invest $4 million in a pool of fully funded consumer loans.[23] The expectation is that the majority of the purchasers of these investments on Mosaic's platform will come from qualified private investors with an interest in funding clean energy projects. As the U.S. Securities and Exchange Commission refines its rules regarding crowdfunding investments, Mosaic will accept investments only from individuals meeting the "Accredited Investor" qualifications determined by Regulation D of the U.S. Securities Act of 1933.[24] According to Mosaic, California and New York permit unaccredited investors because state legislators

[21] Information provided by CGB

[22] Puttre, Michael (2014, February 6). "Mosaic And Connecticut Team Up On Crowd Funding Of Residential Solar." *Solar Industry*. Retrieved from: http://www.solarindustrymag.com/e107_plugins/content/content.php?content.13778

[23] Clean Energy Finance and Investment Authority (2014, February 6). "Sungage Financial, CEFIA, and Mosaic Announce $5 Million Deal to Offer New, Crowdsourced Residential Solar Loans." *BusinessWire*. Retrieved from: http://www.businesswire.com/news/home/20140206005031/en/Sungage-Financial-CEFIA-Mosaic-Announce-5-Million

[24] Investopedia. "Accredited Investor." Retrieved from: http://www.investopedia.com/terms/a/accreditedinvestor.asp

have approved broader investment criteria for Mosaic projects.[25] As a result of the successful CT Solar Loan pilot, the Green Bank helped position Sungage Financial to attract a $100 million commitment from Digital Federal Credit Union. Now no longer requiring CGB support, Sungage Financial has fully transitioned over to a private capital partner with Digital Federal Credit Union and will offer its new financing product in Massachusetts, New Jersey, and New York—alongside Connecticut.[26]

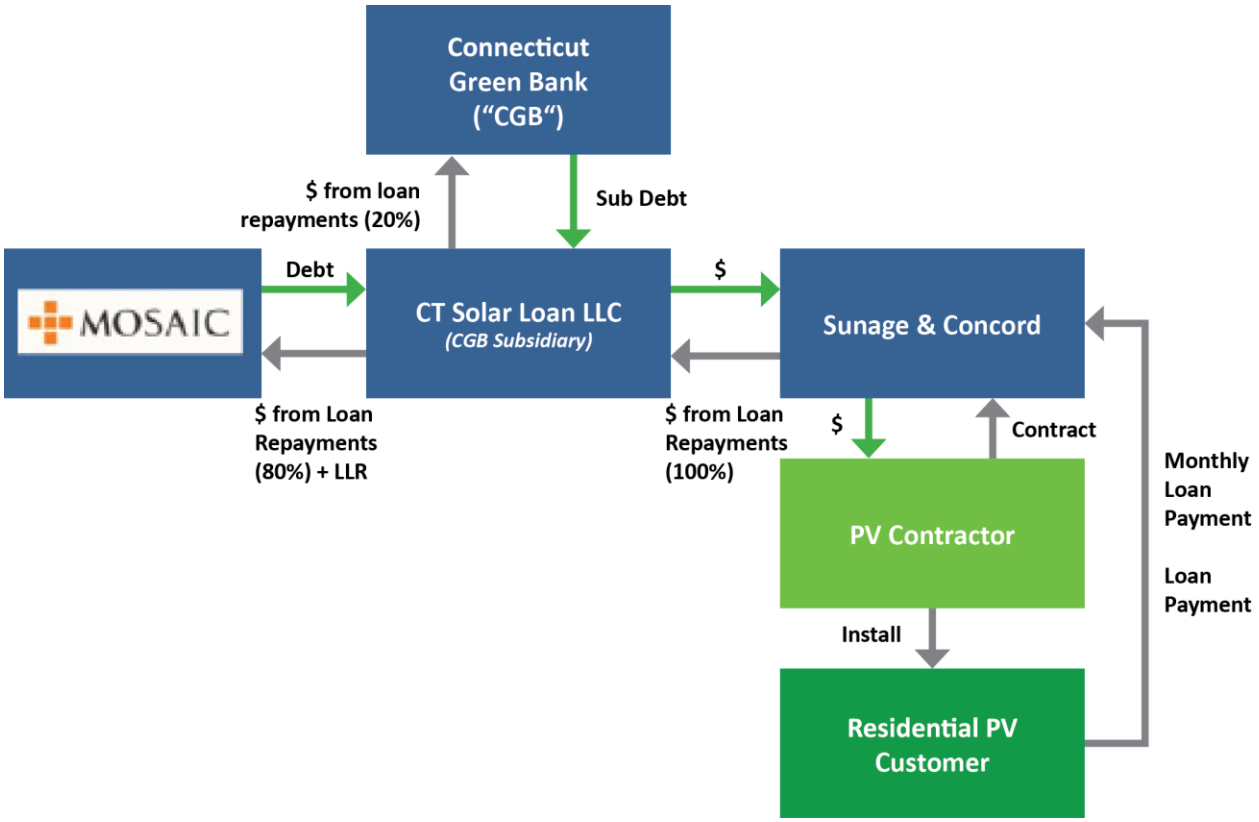


Figure 4. Legal structure of the CT Solar Loan
Source: CGB

The CT Solar Loan yields an appropriate rate of return to the capital providers commensurate with the risks they are taking, provides local contractors with an important sales tool, and gives customers the ability to own solar PV through low-interest and long-term financing along with access to the federal investment tax credit.

CGB structured its crowdfunding program as a pool into which individuals can invest, rather than a series of individual projects. Sungage contributes underwriting expertise to ensure that each borrower within the pool is of strong credit. To enhance the investment opportunity for senior investors Mosaic/

[25] Curtis, Lisa (2012, January 21). "Solar Energy Projects Get Investment Boost through Crowdfunding." *Mother Earth News*. Retrieved from: http://www.motherearthnews.com/renewable-energy/clean-energy-investing-zw01301zpit.aspx

[26] Wesoff, Eric (2014, October 20). "$200 Million More Flows to Residential Solar Loans Through Sungage and Mosaic." *Greentech Media*. Retrieved from: http://www.greentechmedia.com/articles/read/200-Million-More-Flows-to-Residential-Solar-Loans-Through-Sungage-and-Mosa

CGB accepted the first risk of loss for the crowdfunding program by remaining in the permanent capital stack over the life of these loans, ensuring that the debt service coverage ratio remains above 1.25x for these investors. Additionally, CGB contributed $300,000 in ARRA State Energy Program grant funds to a LLR as a credit enhancement for the pool of crowdfunded projects.

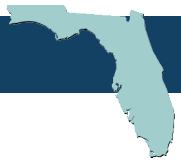
The crowdfunded projects generally cost homeowners 6.49% in annual interest, with a 5% expected return to investors annually. Homeowners have the option to use proceeds from the federal investment tax credit to re-amortize their loans. The program requires contractors to stand behind each solar PV system's performance, providing borrowers and investors an additional incentive to participate in the program. Collateral on the loans consists solely of a Uniform Commercial Code-1 (UCC-1) filing on the installed solar system. In the event of a default on a loan from the portfolio, CGB or Mosaic, acting on behalf of its investors, has the right to reclaim project equipment and either liquidate or redeploy the solar system to a new borrower.

Through credit enhancement and direct investment, CGB lowers the barriers to Connecticut homeowners seeking to install solar installations, working in partnership with Sungage and Connecticut's base of local installers to originate loans and to encourage the participation of private investors.

As of June 2015, CT Solar Loan had received 279 applications from 19 solar installers.[27] Two hundred seventy-nine loans have closed for a total of $6.0 million and 2,186 kW.

[27] Information provided by CGB

4. FLORIDA [28]



4.1 Overview

The recession and housing market collapse significantly affected Florida, which continues to struggle economically, with new home construction down, tourism reduced, and the citrus industry in decline. In 2012, the foreclosure rate in Florida was among the highest in the nation, and unemployment throughout much of the state was above the national average.[29] LMI communities have traditionally lacked access to emerging clean energy technologies and typically do not have the disposable income or equity available to afford the high upfront costs of energy retrofits and renewable energy alternatives.

Florida spends approximately $58 billion per year purchasing carbon-based fuels from other states and nations (the seventh-highest such expenditure in the nation), and electricity costs have been steadily increasing statewide by an average of 4.7% per year.[30] Florida's aging energy infrastructure relies heavily on fossil fuels. Despite its nickname of the Sunshine State, Florida lags behind the nation in solar power production (below 3%), and few state programs exist to promote energy efficiency and renewable energy alternatives.

A report prepared by Navigant Consulting for the Florida Public Service Commission, the Florida Governor's Energy Office, and Lawrence Berkeley National Laboratory found solar technologies to have the largest renewable energy potential in the state.[31] Despite these findings, an insignificant portion of the state's energy portfolio is currently invested in solar.[32] Due to the lack of a robust rebate program or a state policy agenda toward catalyzing investment in clean energy, Florida's limited clean energy development activities have created opportunities for a bottom-up strategy by local and regional entities targeting solar PV.

In 2010, the U.S. Department of Energy's (DOE's) Energy Efficiency and Conservation Block Grant program (EECBG) selected a St. Lucie County-based CDFI, the Solar and Energy Loan Fund (SELF), as one of 20 programs in America to receive funding. SELF began operations in February 2011, providing education, energy audits, and affordable financing to help property owners identify and make cost-effective energy efficiency and renewable energy upgrades.

[28] Information for the Florida section was provided by the Solar and Energy Loan Fund
[29] Solar and Energy Loan Fund. "SELF Overview." Retrieved from: http://cleanenergyloanprogram.org/solar_energy_loan/SELF_Overview_October%202013.pdf
[30] Ibid.
[31] Florida Public Service Commission. December 2008. "Florida Renewable Energy Potential Assessment." Retrieved from: http://www.psc.state.fl.us/utilities/electricgas/RenewableEnergy/FL_Final_Report_2008_12_29.pdf
[32] Coward, D. and Andrade, D. (2014, February 19). Telephone Interview between Council of Development Finance Agencies and Solar and Energy Loan Fund - Department of Energy, Energy Investment Partnership Publication.

4.2 Solar and Energy Loan Fund

Organization Name:	Solar and Energy Loan Fund (SELF)
Address:	2400 Rhode Island Ave | Fort Pierce, FL 34950-4852
Phone:	772-468-1818
Website:	www.SolarEnergyLoanFund.org
Legal Structure:	501(c)(3) nonprofit organization – Certified CDFI as per U.S. Treasury CDFI
Year Established:	2010
Enabling Legislation:	N/A
Mission:	SELF's mission is to provide energy expertise and favorable financing to underserved residents, small businesses, and communities in order to yield sustainable community development, local employment and economic development opportunities, enhanced quality of life, greater efficiencies, clean energy alternatives, and energy independence.
Capitalization:	DOE's EECBG program, banks, and faith-based organizations currently capitalize SELF.

SELF, a 501(c)(3) nonprofit organization headquartered in St. Lucie County, Florida, operates throughout Florida. Founded in 2010, SELF helps low-income residents face the steadily rising cost of utilities, addresses a need for greater energy independence, and increases access to capital and clean energy solutions in the Sunshine State.

SELF is a certified CDFI, as recognized by the U.S. Department of the Treasury, and provides energy expertise, affordable financing, and project management to enable LMI homeowners to identify and install cost-effective energy improvements in their homes and businesses.

SELF is the only CDFI in Florida that targets clean energy investments. SELF provides financing for two dozen different types of energy efficiency and renewable energy products. SELF's product research committee, a panel of specialized employees, board members, and external experts, performs research to evaluate clean energy technologies prior to approving them for inclusion in financing projects.

Initially capitalized by DOE's EECBG program, SELF has leveraged the initial EECBG grant with an additional $4 million in grants and non-governmental loan capital from banks, faith-based investors, impact investors, and worldwide crowdfunding. SELF persists to actively seek diversification of its capital sources for continued growth. SELF initially struggled to attract investment from private lenders, especially the banking CRA investments, but that situation has improved now that SELF has nearly five years of demonstrated loan repayment data, as well as four years of clean financial audits. The ability to tap into grants and private loans provides more flexibility and allows for longer financing terms, increasing the organization's investment capacity to sustain its operations and finance longer-term investments.

SELF operates the Green CDFI and serves as the administrator for St. Lucie County's C-PACE program. This report will focus on the SELF CDFI loan program. SELF aims to address the high upfront cost of energy efficiency improvements and renewable energy alternatives, such as PV solar panel systems, specifically in underserved markets. The ability to attract investment from private lenders will allow SELF to expand its services into new products and markets. Readers can review the full range of SELF's

financial services and products by accessing its website at www.cleanenergyloanprogram.org.

4.2.1 Clean Energy Loan Fund Program

Program Name:	Empowering and Rebuilding Underserved Communities
Contact Information:	Doug Coward, dougc@solarenergyloanfund.org
Year Established:	2011
Borrower Profile:	Residential
Projects Financed:	SELF finances energy efficiency and renewable energy projects.
Financing Range:	The financing range is $1,000–$50,000, depending on the category of borrower and improvement
Term of Financing:	The term of financing is 3–5 years, depending on the category of borrower and improvement
Cost of Financing:	The cost of financing is 5.00%–9.5%, depending on the category of borrower and improvement

SELF is a microloan program established in 2011. Definitions of microloans vary from source to source. The Small Business Administration Microloan Program offers loans with a maximum principal value of $50,000 and an average size of $13,000 (U.S. Small Business Administration 2014). Microloans are a financing mechanism intended to improve access to capital for small or underserved borrowers. SELF's dedication to underserved markets coincides with the strength of microloan strategies and has proven to be highly successful.

CRA Investments: A Path to Leverage Private Capital

CDFIs initiate relationships with private lenders to access flexible, long-term capital to expand financial products and extend loan terms to borrowers. This relationship has proven to be mutually beneficial, as banks are able to satisfy requirements of CRA by investing in CDFI activities. CDFIs benefit from enhanced liquidity, leverage, financial advice and expertise, and the mutual interest in serving LMI borrowers. The activities of CDFIs align with many CRA-qualified objectives, such as lending to LMI individuals, promoting economic development opportunities for small businesses, supporting activities that "revitalize or stabilize" an LMI geography, and expanding potential markets and borrower pools. SELF's borrower profile is highly attractive to banks seeking to meet CRA requirements.

CDFIs should follow these steps before approaching a private bank to seek CRA qualifying capital:

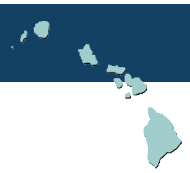
- Assess current service market(s) and capital needs
- Assure services offered align with requirements of CRA
- Demonstrate a need for funds
- Develop a plan for expending the capital
- Provide historical portfolio data demonstrating creditworthiness and acceptable loan performance metrics
- Research the bank’s operations and mission.

SELF's process begins with education and training. Once a client is preapproved, a state-certified energy rater performs an energy audit on the client's property. SELF's energy experts then assist clients in reviewing the audit and identifying the most cost-effective projects for their specific situation. These audits structure financing projects, which include all eligible technologies and installation costs.

Limitations tied to existing funding sources currently require borrowers to repay SELF loans within five years. The high upfront cost of solar installations means that larger projects frequently do not have cash flow within the five-year period, leading to a high monthly payment burden for borrowers. In order to mitigate risk, SELF requires a UCC-1 on all removable project equipment as well as the participation of a co-borrower to encourage positive repayment. In addition to traditional underwriting practices incorporating projected cash flow from utility savings, SELF employs a scorecard considering alternative factors related to character and determination for loan repayment.

Since the program began lending in 2011, SELF has closed nearly 500 loans totaling $4 million. Loans carry an average size of $8,579.33 at an average annual percentage rate of 4.59%. More than 2/3rds of loan borrowers reside in LMI census tracts. Additionally, characteristics of the borrowers are as follows: 34% of borrowers have very low income, 41% have women as the heads of households, and 18% are minority borrowers. Approximately 85% of SELF loans have supported energy efficiency retrofits, with the remaining 15% going to renewable energy installations (solar PV). Despite the fact that these loans are virtually unsecured, the delinquency rate is currently under 1% and the default rate is also under 1%.

5. HAWAII [33]



5.1 Overview

Spurred by the realization that Hawaii's overreliance on oil is unsustainable for the long term, the State of Hawaii has implemented policies to dramatically shift away from imported oil. Since 2008, the state has characterized this agenda as the Hawaii Clean Energy Initiative. The Initiative, which began as a groundbreaking partnership between the State of Hawaii, DOE, the military, and the private sector, is now in its second phase. It was clear that the original goal of 40% renewable energy by 2030 was too conservative. Therefore, in 2015, Hawaii passed Act 97[34] that set new RPSs of 100% renewable energy by 2045 and increased Hawaii's 2020 target to 30%. The Hawaii Clean Energy Initiative also has Energy Efficiency Portfolio Standards (EEPSs) reducing 2008 electrical energy consumption by 30% by 2030. The Hawaii Clean Energy Initiative is helping grow Hawaii's innovation sector by stimulating deployment of clean energy infrastructure as a catalyst for economic growth, energy system innovation, and test bed investments.

It is within this context that legislation to fund clean energy technologies was enacted as Act 211, Session Laws of Hawaii 2013, which established the Hawaii Green Infrastructure Authority and a green infrastructure-financing program for the state. This program, the Green Energy Market Securitization (GEMS) Program, engages the capital markets in order to facilitate clean energy financing for underserved consumers, particularly nonprofits, renters, and homeowners.

5.2 Green Energy Market Securitization Program

Organization Name:	Green Infrastructure Authority
Address:	P.O. Box 2359 | Honolulu, Hawaii 96804
Contact Information:	Merissa Sakuda, merissa.h.sakuda@hawaii.gov
Phone:	(808) 586-2366
Website:	http://energy.hawaii.gov/testbeds-initiatives/gems
Legal Structure:	Public organization
Year Established:	2014
Enabling Legislation:	Act 211, Session Laws of Hawaii 2013
Mission:	GEMS' mission is to support Hawaii's strategies to democratize access to clean energy through the development of financing programs that overcome market barriers and access to capital markets.
Capitalization:	GEMS is funded through the issuance of low-cost rate-reduction bonds, which are secured by a green infrastructure fee assessed to all utility ratepayers.

The Hawaii Public Utilities Commission provided final approvals for implementation of the GEMS Program in 2014. In accordance with Act 211, the Hawaii Public Utilities Commission approved two different GEMS-related orders that approved GEMS' purpose, structure, and capitalization. The regulatory process was precedent setting. Hawaii now has the first EIP that is capitalized through a

[33] Information for the Hawaii section was provided by the Hawaii Energy Office
[34] Act 79, Session Laws Hawaii 2015, signed into law on June 10, 2015.

capital markets bond transaction, which is secured by a nonbypassable, irrevocable charge on all utility ratepayer bills, the "Green Infrastructure Fee." Moody's Investors Service, Standard & Poor's, and Fitch Ratings rated the GEMS Bonds as Aaa/AAA/AAA, respectively. The credit rating ensured the capital costs were low, which in turn keeps consumer rates for GEMS as low as possible. Based on the $150 million issuance, the Green Infrastructure Fee is less than $1.50 a month for residential customers and is offset by a reduction of the existing public benefits fee.

In addition, GEMS will give Hawaiian consumers the ability to repay their loans through the Public Utilities Commission's OBR program once this program is established. This added security will enable GEMS to serve a broader segment of the market than the private sector would likely ever do alone. The diagram below illustrates how GEMS' innovative source of capital—a rate reduction bond backed by the Green Infrastructure Fee—supports a market-driven clean energy financing program designed to benefit underserved Hawaii consumers.

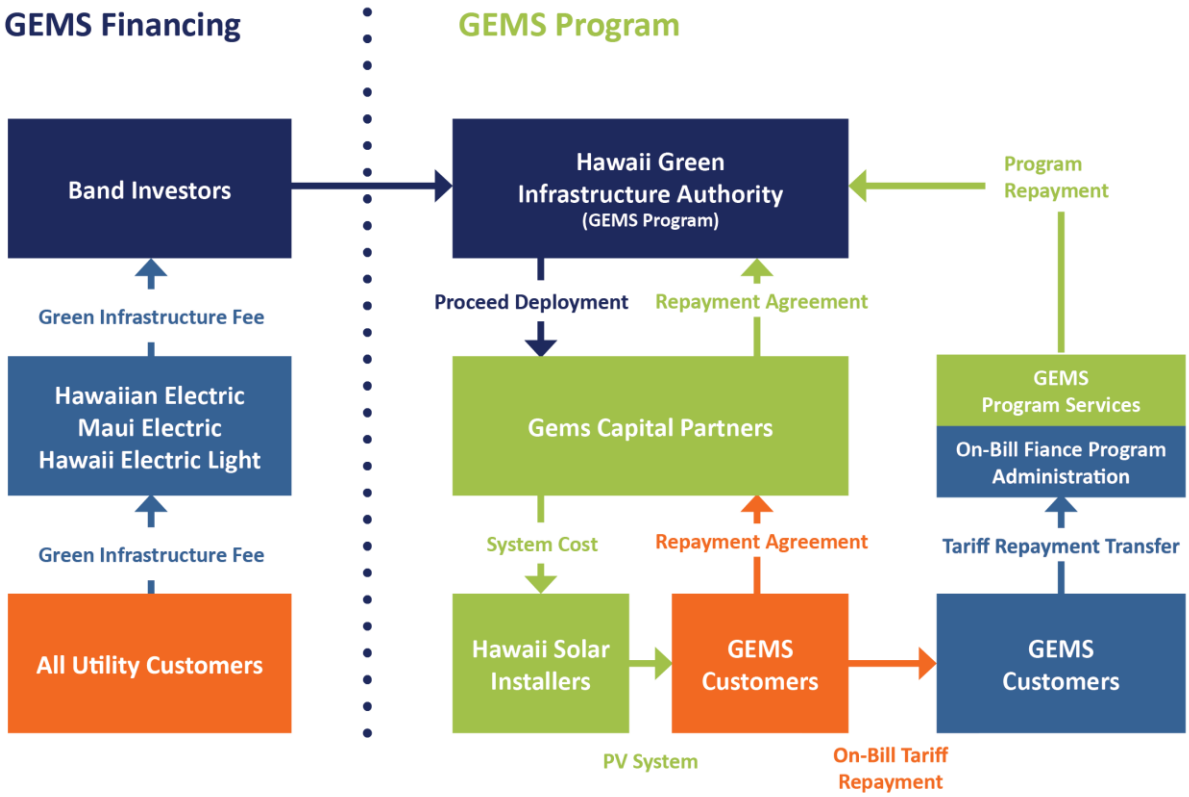


Figure 5. Structure of Hawaii's GEMS Program
Source: Hawaii Energy Office

Overall, GEMS has five primary policy goals, all of which guide program development. Those goals are to accomplish the following:

1. Address financing market barriers to increase the installation of clean energy projects and infrastructure to meet the state's clean energy goals, including the RPS and EEPS.

2. Democratize clean energy by expanding access and affordability of renewable energy and energy efficiency technologies for identified underserved markets while expanding the market generally.
3. Enable more ratepayers to reduce their energy use and energy costs by helping them finance clean energy improvements.
4. Partner with and support existing market entities in the clean energy and financing sector to ensure the GEMS Program can bridge market gaps and facilitate a sustainable and efficient private sector market.
5. Balance these policy goals with repayment risk to achieve an appropriate rate of return on investment.

Taken together, these objectives have the potential to make GEMS an important and impactful tool as the state seeks to achieve ambitious milestones related to its clean energy goals.

In its first phase, GEMS is focusing primarily on deploying solar PV technologies. GEMS chose solar PV for its first phase of deployment because of its low technology risk and because Hawaii has a robust solar PV market. Thus, GEMS is able to design financial products that fit within current market channels, rather than trying to activate completely new products for the market. In 2015, GEMS launched its consumer solar PV product and its nonprofit solar PV product. The program is also working on finalizing a commercial solar PV product and financing commercial energy efficiency.

6. NEW JERSEY [35]

6.1 Overview

Since 1999, the State of New Jersey has dedicated funding to the New Jersey Clean Energy Program (NJCEP) to advance energy efficiency and renewable energy technologies. The New Jersey Board of Public Utilities, which is also the state's energy office, oversees and manages NJCEP. While the specific objectives of NJCEP have evolved over time in response to a constantly changing energy marketplace, NJCEP generally seeks to reduce energy consumption, increase reliance on renewable resources, including solar, and mitigate the environmental impacts caused by power generation.

NJCEP has enjoyed tremendous success over the past 15 years and has helped contribute to New Jersey's third-in-the-nation ranking in solar generation. Additionally, the American Council for an Energy-Efficient Economy always ranks NJCEP's energy efficiency initiatives in the top tier.

While NJCEP has historically focused on cleaner, more efficient energy systems, following Superstorm Sandy in October 2012, the state also has explored ways to encourage and develop more resilient energy systems. The sustained power outages after Sandy had devastating impacts across the state, but several facilities were significantly less affected by the outages because they had invested in resilient, distributed energy resource technologies that allowed them to continue to operate as "islands of power" while the electrical grid was down. In some instances, these systems—CHP, fuel cells, solar with storage, etc.—with built-in islanding capacity could operate for a week or more without needing power from the electrical grid.

Recognizing the benefits of resilient distributed energy systems, but understanding that the considerable initial investment of implementation is a deterrent, the state has sought to incentivize implementation of resilient energy technologies at critical facilities. Through extensive market research, stakeholder outreach, and financial modeling, the state designed the New Jersey Energy Resilience Bank (ERB), which seeks to provide technical assistance and attractive financing to operators of the state's critical facilities and infrastructure, including water and wastewater treatment facilities, acute care hospitals and long-term care facilities, and shelters.

6.2 The New Jersey Clean Energy Program

Program Name:	The New Jersey Clean Energy Program (NJCEP)
Address:	44 South Clinton Avenue, Trenton, NJ 08625-0350
Phone:	866 NJ SMART (866-651-6278)
Website:	http://www.njcleanenergy.com/
Legal Structure:	State government agency within the NJ Board of Public Utilities
Year Established:	2001
Enabling Legislation	The Electric Discount and Energy Competition Act of 1999, N.J.S.A. 48:3-61
Mission:	NJCEP's mission is to advance and promote energy efficiency, demand

[35] Information for the New Jersey section was provided by New Jersey departments and agencies through the New Jersey Governor's Office.

	response programs, and clean energy generation, including renewable energy and CHP/fuel cells.
Capitalization:	NJCEP receives capital from a societal benefits charge through the NJ Board of Public Utilities.

In 1999, New Jersey signed the Electric Discount and Energy Competition Act, N.J.S.A. 48:3-49-109 into law. The act tasked the Board of Public Utilities with advancing energy efficiency and renewable energy programs through the Societal Benefits Charge, N.J.S.A. 48:3-60(a)(3). Today, the Board of Public Utilities' Office of Clean Energy administers a suite of programs that offer New Jersey residents, business owners, and local governments financial incentives, programs, and services that reduce energy demands, save money, and protect the environment.

In 2011, Governor Chris Christie's Administration adopted a new Energy Master Plan that proposed a roadmap to usher in a responsible energy future, including sufficient and reliable energy supplies that are both environmentally responsible and competitively priced. The Energy Master Plan's primary goal is the promotion of cost-effective energy conservation and energy efficiency, and it also calls for the expansion of distributed generation and to assist in improving and enhancing system reliability and fuel efficiency.

Consistent with the policy directives embodied in the Energy Master Plan, the Clean Energy Program portfolio contains the following initiatives:

Residential Rebates and Incentives
NJCEP offers a suite of programs for residential customers, including: New Jersey Home Performance with ENERGY STAR—energy efficiency home upgrades; New Jersey ENERGY STAR Homes—promoting energy efficiency in new construction; rebates to incentivize the recycling of old refrigerators and freezers; and various other rebates to encourage energy-efficient washers, dryers, fluorescent light bulbs, and heating and cooling equipment.

Financial Incentives for Commercial, Industrial, Nonprofit, and Governmental Customers
NJCEP offers significant incentives for commercial, industrial, nonprofit, and governmental customers to integrate energy-efficient and renewable technologies into new construction, upgrades, and cooling and heating equipment installations. One program geared toward the commercial sector encourages various types of distributed generation technology designed to enhance energy efficiency through on-site power generation with recovery and productive use of waste heat.

Renewable Energy
NJCEP is making renewable energy technologies like solar, wind, and biopower more affordable and practical through initiatives such as the Renewable Energy Incentive Program, which provides grants through a competitive solicitation, and the Solar Renewable Energy Certificate Registration Program, which provides energy certificates and long-term financing to solar investors.

Over time, NJCEP has successfully advanced energy efficiency, demand response, and clean energy generation, including renewable energy and CHP. On an annual basis, NJCEP provides approximately $200 million in rebates and incentives, including loan rate buy-downs for energy efficiency loans. The

majority of the incentives are for the energy efficiency and CHP/fuel cell programs, and these incentives are helping to transform the market from rebates to financing. Some highlights include the following:

- Development of a Solar Renewable Energy Certificate system that provided for financing of solar systems, which contributed to New Jersey's third-in-the-nation ranking with over 31,000 solar installations that produce over 1,400,000,000 kilowatt-hours per year
- Installation of 958 MW of distributed generation, including more than 300 MW of CHP installations.

Superstorm Sandy

On October 29, 2012, Sandy caused significant damage to New Jersey's energy infrastructure, disrupting delivery of electricity, petroleum, and natural gas to customers across the state and causing widespread power outages. Sandy impacted 71% of New Jersey's electrical distribution systems. Flooding and high winds damaged high-voltage lines, substations, and distribution components throughout the state, leaving 2.8 million electric utility customers without power. At least one-third of New Jersey residents lacked power for at least six days after the storm.

The state's critical infrastructure was not immune to Sandy's impacts on the electrical grid. The outages significantly compromised the state's drinking water and wastewater operations, leading to widespread and prolonged service disruptions and the discharge of raw, untreated sewage into local bodies of water. The storm forced hospitals, nursing homes, and long-term care facilities to contemplate evacuation in light of prolonged power outages. These are just some examples of how the prolonged power outage after Sandy affected New Jersey critical facilities.

While the effects of the prolonged failures of the electrical grid were widespread, there were several facilities in storm-impacted areas that maintained power despite the sustained outages. These facilities had distributed generation units with "blackstart" technology and islanding capabilities, which allowed them to operate as microgrids while the electrical grid was down. For example, Princeton University's CHP microgrid operated for a week when the larger grid failed, saving the University millions in documented, avoided loss in hundreds of irreplaceable research projects. Similarly, the College of New Jersey's CHP microgrid provided heat, power, hot food, and hot showers to 2,000 mutual aid workers from other states that helped to restore power after the storm. These examples highlighted the opportunity to protect certain critical infrastructure and enhance disaster response capabilities by pursuing technologies that allow facilities to operate independently from the electrical grid while utilizing cleaner and more energy efficient technology.

6.3 New Jersey Energy Resilience Bank

Program Name:	New Jersey Energy Resilience Bank (ERB)
Contact	New Jersey Economic Development Authority
Address:	36 W. State Street, Trenton, NJ 08625
Phone & Email:	609-858-6767 erb@njeda.com
Year Established:	2014
Borrower Profile:	Initial products target water and wastewater treatment facilities as well as hospitals and critical care facilities
Website:	www.njerb.com
Projects Financed:	The NJ ERB finances installation or retrofitting of commercially available and cost effective resilient energy technologies at critical facilities.
Capitalization:	Two hundred million dollars from the U.S. Department of Housing and Urban Development's (HUD's) Community Development Block Grant–Disaster Recovery program currently capitalizes the ERB

In spite of the successes of the handful of facilities that had invested in resilient energy technologies prior to Sandy, the majority of critical facility operators have not pursued these technologies. Substantial outreach by the state along with DOE identified three major impediments to implementation of resilient energy systems: (1) the technology is too complex, (2) the financial arrangements do not work within existing capital budgets, and (3) current incentives are insufficient. In many cases, the ability to "island" increases an energy project's total price tag by 10% to 30%.

To address these barriers to energy resilience, New Jersey initially allocated $200 million of Community Development Block Grant–-Disaster Recovery funds to capitalize the New Jersey ERB. The ERB will use this financing to develop or enhance distributed energy resource technologies at critical facilities—largely lifeline and life-safety facilities—that Superstorm Sandy or other disasters directly or indirectly impacted and the U.S. Department of Housing and Urban Development's (HUD's) guidelines deem eligible. The New Jersey Economic Development Authority manages the ERB program with technical assistance and support from the New Jersey Board of Public Utilities.

While technology agnostic, the ERB is presently focusing on existing commercially available and cost-effective distributed generation technologies, including CHP, fuel cells, battery storage and resilience upgrades for renewable technologies. Nevertheless, the ERB can adapt to the emergence of new markets and new technologies that are practical, cost-effective, and offer the same or greater resiliency benefits as current distributed generation technologies.

The ERB launched its first product in October 2014 that will provide financing of up to $65 million for public, nonprofit, or certain eligible for-profit wastewater treatment plant and water treatment plant operators. After receiving necessary regulatory approvals from HUD, the ERB recently launched a new product in October 2015 for hospitals and their related healthcare facilities. For non-profit and public applicants, the ERB will finance 100% of unmet funding needs for an eligible project. Eligible for profit applicants must make an equity contribution as required by HUD. The percentage of the unmet funding need/funding gap to be provided as a grant/forgivable loan is determined during the underwriting process and based on program criteria, which may include but not be limited to, ownership structure, project economic feasibility, rate of return, and other policy considerations. Extensive, sector-specific

market research and stakeholder outreach following Sandy developed the program structure and financing terms. ERB may announce future funding rounds for additional critical facilities depending on available funds.

7. NEW YORK [36]

7.1 Overview

As one of the most populous states in the nation, New York faces unique challenges and opportunities in scaling its clean energy deployment across the rural and urban communities from Long Island to Buffalo.

From the recently released 2015 State Energy Plan:

> "In 2014, Governor Andrew M. Cuomo launched New York's signature energy policy, Reforming the Energy Vision (REV). REV will build an integrated energy network able to harness the combined benefits of the central grid with clean, locally generated power.
>
> The [State Energy] Plan, as a roadmap for REV, fosters economic prosperity and environmental stewardship – government and industry working together through public-private partnerships to achieve our shared goal of a healthier and stronger New York economy.
>
> The initiatives outlined in the State Energy Plan, along with private sector innovation and investment fueled by REV, will put New York State on a path to achieving the following clean energy goals:
>
> - 40% reduction in greenhouse gas emissions from 1990 levels
> - 50% of energy generation from renewable energy sources
> - 600 trillion British thermal units (Btu) increase in statewide energy efficiency"[37]

In setting out to accomplish these goals, Governor Andrew M. Cuomo has launched an expansive effort to improve energy affordability, to design a cleaner, more resilient and flexible power grid, to give customers more control over their energy use, and to better align energy innovation with market demand.

The state coordinates its clean energy investment activities through several state agencies, including the New York State Energy Research and Development Authority (NYSERDA). NYSERDA leads the state's efforts in market transformation, promoting the widespread development and use of innovative technologies to improve the state's energy, economic, and environmental well-being.

7.2 New York State Energy Research and Development Authority

Organization Name:	New York State Energy Research and Development Authority (NYSERDA)
Address:	17 Columbia Circle | Albany, New York 12203-6399
Phone:	518-862-1090 / 1-866-NYSERDA
Website:	http://www.nyserda.ny.gov/
Legal Structure:	Government agency

[36] Information for the New York section was provided by the New York Governor's Office, NYSERDA and the NY Green Bank

[37] New York State. "New York State Energy Plan." Retrieved from: http://energyplan.ny.gov/

Year Established:	1975
Enabling Legislation:	Article 8, Title 9 and Title 9A of the State Public Authorities Law
Mission:	NYSERDA's mission is to advance innovative energy solutions in ways that improve New York's economy and environment.
Capitalization:	State ratepayers primarily fund NYSERDA through the System Benefits Charge. Energy efficiency programs, research and development initiatives, low-income energy programs, and environmental disclosure activities have received System Benefits Charge funds. Other funding sources include the Regional Greenhouse Gas Initiative and DOE's Energy Efficiency and Conservation Block Grant-American Recovery and Reinvestment Act (EECBG-ARRA) Grant, under the Better Buildings Neighborhood Program.

Founded in 1975, NYSERDA was part of the state's reconstituted Atomic and Space Development Authority. NYSERDA focused initially on research alone, finding ways to reduce the state's consumption of petroleum. Over time, the agency's activities shifted to the research and promotion of energy efficiency and renewable energy generation technologies.

NYSERDA has developed a diverse and robust suite of programs and services, including research in energy technologies, environmental concerns, and energy pricing and consumption data. Education and workforce development efforts address the skill sets required by a clean energy economy. Research and development programs include attention to market demand and clean energy technology commercialization. Finally, NYSERDA administers a variety of financing programs designed to increase energy efficiency and renewable energy projects across diverse sectors.

This report concentrates on the recently established New York Green Bank (NYGB), a division of NYSERDA, as well as the financial design and recent securitization of NYSERDA's Green Jobs–Green New York (GJGNY) program. These two initiatives offer unique approaches to the concept of securitization and the movement of New York from a subsidy-based model to one accessing capital markets. The agency oversees many additional financing programs, and readers can review NYSERDA's conduit bond activities, Industrial and Process Efficiency Program, Agriculture Energy Efficiency Program, and other incentive programs on the NYSERDA website at www.nyserda.ny.gov.

7.2.1 Green Jobs – Green New York

Program Name:	Green Jobs – Green New York (GJGNY)
Contact Information:	Karen Hamilton, keh@nyserda.ny.gov
Year Established:	2009 (2012 for OBR)
Borrower Profile:	Residential, multifamily/single-family, small commercial, nonprofit
Projects Financed:	GJGNY finances energy efficiency, net-metered projects.
Financing Range:	The financing range is at a maximum of $25,000 for single-family residential properties and at a maximum of $50,000 for commercial and nonprofit properties.
Term of Financing:	The term of financing is at a maximum of 15 years.
Cost of Financing:	The cost of financing is 3.44%, on average.

GJGNY is a comprehensive program established in NYSERDA through the GJGNY Act of 2009. In addition to providing financing to residential, commercial, and nonprofit property owners, GJGNY offers technical services and educational opportunities for clean energy jobs. GJGNY partners with constituency-based organizations, typically nonprofit independent contractors, in targeted communities to market program services and support property owners through the application process.

The GJGNY 2013 Annual Report anticipates that financing activities under the program will sustain themselves through recapitalization from existing loan repayment (NYSERDA June 2013). Other services and workforce development initiatives will deplete existing funding within the next year, however, NYSERDA proposed work to continue through New York State's Clean Energy Fund (http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={FC3FBD53-FBAC-41FB-A40E-3DA0A5E0866A}). GJGNY's financing options include direct loans for energy efficiency or renewable energy improvements to single- and multi-family residential, small commercial, and nonprofit properties.

Applicants for GJGNY financing must engage in a qualified energy audit to determine the exact improvements to be made. Calculations of the total cost of improvements to the property, less any rebates or subsidies available to the borrower, determine the project size. Eligible costs include equipment or system removal, purchase, and installation, as well as related services and the customer's expense for an energy audit (NYSERDA June 2013).

With the receipt of an EECBG-ARRA Grant, under the Better Buildings Neighborhood Program, from DOE, NYSERDA has allocated approximately $8.5 million toward LLRs and debt service reserves to back the GJGNY portfolio. The resulting collateral reserve account was an important piece in the sale of the portfolio in August 2013. Figure 6 explains this sale further.

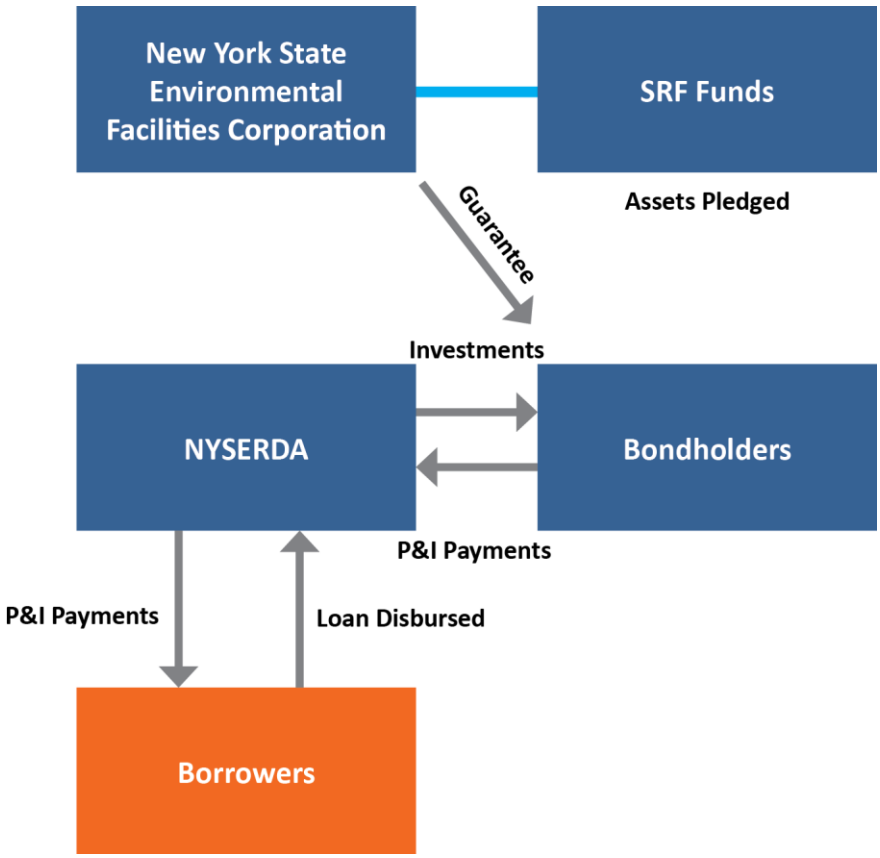


Figure 6. Structure of GJGNY
Source: NYSERDA

One-to four-family residential buildings comprise the portfolio segment with the greatest amount of activity to date for GJGNY. As of June 2014, funds disbursed to this borrower profile total over $57 million in value—94% of all GJGNY loans. (http://www.nyserda.ny.gov/-/media/Files/EDPPP/GJGNY/Annual-Report-GJGNY/2014-gjgny-annual-report.pdf) Small commercial and nonprofit borrowers comprise the smallest segment of the portfolio at $515,553. However, with the average loan size for commercial borrowers topping $52,000 (and $27,000 for the NYSERDA share of the loan), loans in this segment are significantly larger than those in the one-to-four-family residential segment (approximately $9,700 per loan).

7.2.2 New York Green Bank

Organization Name:	New York Green Bank (NYGB)
Address:	1359 Broadway | New York, NY 10018
Phone:	212.379.6260
Website:	http://www.greenbank.ny.gov/
Legal Structure:	Division of New York State Research and Development Authority (NYSERDA), a Government agency established in 1975
Year Established:	2013
Mission:	NYGB's mission is to accelerate clean energy deployment in New York State

	by working in partnership with the private sector to transform financing markets.
Capitalization:	The New York State Public Service Commission approved NYGB's initial capitalization on December 19, 2013, in the "Order Establishing New York Green Bank and Providing Initial Capitalization," calling for the reallocation of $165.6 million in uncommitted NYSERDA EEPS I and System Benefits Charge III funds, uncommitted utility EEPS funds, and NYSERDA RPS funds for the purpose of capitalizing NYGB.

New York's creation of NYGB is evidence of the state's dedication to accelerating the transition to a cleaner energy economy through powerful public-private partnerships that animate the private sector in more meaningful ways. NYGB is a $1 billion state-sponsored specialized financial entity working in partnership with the private sector—including financial institutions, project developers, property managers, and energy service companies—to increase private sector investments into New York's clean energy markets, ultimately transforming those markets and creating a more efficient, reliable, and sustainable energy system.

NYGB enables greater private investment in New York's clean energy marketplace by opening up financing markets. Through innovative financing solutions and strategic partnerships with private sector intermediaries, it significantly accelerates the deployment of commercially proven clean energy technologies throughout the state. NYGB is a cost-effective and complementary addition to New York State's evolving portfolio of clean energy programs. Using demonstrated financing tools to promote self-sustaining markets, while enabling private sector capital to expand the frontiers of current commercial clean energy lending opportunities, NYGB increases the deployment of proven clean energy technologies throughout New York State.

In February 2014, NYGB officially opened for business by issuing an open solicitation to clean energy market participants. Through this request for proposals, NYGB accepts investment opportunities from interested parties who are achieving success in clean energy markets, but who find that a lack of availability of financing limits their success.

Proposals must meet NYGB's investment requirements, which at a minimum include the following:

1. Transactions will have expected financial returns such that the revenues of NYGB on a portfolio basis will be in excess of expected portfolio losses.
2. Transactions will contribute to financial market transformation in terms of scale, improved private sector participation, level of awareness and confidence in clean energy investments, and/or other aspects of market transformation.
3. Transactions will have the potential for energy savings and/or clean energy generation that will contribute to GHG reductions in support of New York's clean energy policies.

From NYGB's recently released updated 2015 Business Plan:

"Demand for NYGB investments and participation in transactions, in dollar terms and by technology, is evidenced by proposals that have been submitted to NYGB in response to its investment request for

proposal. To date,[38] proposals requesting over $734.0 million of NYGB capital have been received, in connection with total proposed clean energy investments in New York State of an estimated $3.0 billion[39] (including private sector capital)."

NYGB is a leading example of a larger trend in EIPs. Subsidy models and direct public investment in energy efficiency and renewable energy projects are yielding to innovative partnership models, wherein the public sector requires significant private investment per government dollar expended. This scaling of private investment is most readily achieved through innovative project structuring and the use of credit enhancements such as LLRs, warehousing, guarantees, securitization, certifications, and other proven development finance tools.

[38] From NYGB inception through and including June 12, 2015.

[39] Sixty-seven percent of the proposals received by NYGB identify the total project value of the investments proposed at $2.3 billion. While 33% of the proposals received do not specify the total project value of investments, these have been estimated at just under $1.0 billion.

NYSERDA/NYSEFC Bond Issuance

Issuer: NYSERDA
Total Issuance: $24.3 million
Rating: AAA/Aaa
Bond Underwriter: Citigroup Global Markets Inc.
Bond Counsel: Hawkins, Delafield & Wood LLP
Type of Bond: Taxable, Qualified Energy Conservation Bond
Issuance Date: August 13, 2013
Final Cost of Financing: Roughly 3.21%
Type of Portfolio: Energy Efficiency

On August 13, 2013, NYSERDA issued over $24 million in Qualified Energy Conservation Bonds in a sale of its GJGNY residential energy efficiency portfolio. The bonds received the highest possible rating from Standard & Poor's Financial Services LLC and Moody's Investors Service due to a unique collaboration with the New York State Environmental Facilities Corporation (NYSEFC). As a credit enhancement, NYSEFC provided a guarantee of gross principal and interest payments on the bonds. The guarantee involved applying the assets of NYSEFC's Clean Water State Revolving Fund, regulated by the U.S. Environmental Protection Agency (EPA). To use these funds as backing for the GJGNY portfolio, NYSEFC submitted a letter to the EPA requesting approval on the basis that the energy efficiency improvements financed through NYSERDA's portfolio reduced the accumulation of air pollutants in the state's waters. The EPA consented to this use of the state revolving fund.

Funding from an Energy Efficiency Block Grant helped to establish an $8.5 million collateral reserve account to protect the NYSEFC and its state revolving fund asset, in an additional layer of credit enhancement. The collateral reserve account would reimburse NYSEFC in the event that draws from its state revolving fund were required to service the bonds. Payments on the principal go toward reducing the balance of the collateral reserve account and returning funds go to NYSERDA on a pro rata basis. For more information about this bond issue, please see the Clean Energy + Bond Finance Initiative's *Anatomy of the Deal: CE+BFI Examines Innovative NYSERDA Energy Efficiency Bond Deal.*

8. OHIO [40]

8.1 Overview

The State of Ohio holds a strong industrial and political legacy, hosting the eighth-largest economy in the nation (U.S. Department of Commerce 2013). The state has strong manufacturing and agricultural industries, with ready access to the largest cities in the Northeast, South, and Midwest. Fossil fuels play a large part in Ohio's economy, as Appalachian counties on the eastern side of the state yield abundant coal and natural gas deposits. Ohio also has a RPS requiring a minimum of 12.5% of their energy must come from renewable sources.[41]

Competing state interests largely decentralize financing programs for clean energy projects, resulting in regional development finance entities offering individual programs within their area of service. Under Chapter 4582 of the Ohio Revised Code, the state enabled the development of port authorities. Ohio law authorizes these entities to engage in activities that "enhance, foster, aid, provide, or promote transportation, economic development, housing, recreation, education, governmental operations, culture, or research within the jurisdiction of the port authority." The law also authorizes port authorities to issue a variety of bonds, allowing them to tap into private capital to finance projects in the public interest.

Two Ohio port authorities have made great strides in financing commercial clean energy improvements in their regions. The first is the Toledo-Lucas County Port Authority (TLCPA), which resides in the heavily industrial northwestern part of the state. The second, the Port of Greater Cincinnati Development Authority, sits in the southwestern part. Among nonprofit organizations active in financing clean energy projects in the state, the Greater Cincinnati Energy Alliance has developed several programs of interest—in addition to a collaborative C-PACE program administered with the regional port authority. The clean energy investment activities in these two regions of Ohio are explored in greater detail below.

8.2 Toledo-Lucas County Port Authority

Organization Name:	Toledo-Lucas County Port Authority (TLCPA)
Address:	One Maritime Plaza, Suite 701 | Toledo, OH 43604-1866
Phone:	419-243-8251
Website:	http://www.toledoportauthority.org/en-us/home.aspx
Legal Structure:	Government agency – port authority
Year Established:	1955, entered business finance arena in 1988
Enabling Legislation:	Chapter 4582 of the Ohio Revised Code
Mission:	TLCPA concentrates on transportation and economic development. TLCPA focuses on three initiatives: maritime, aviation, and development.
Capitalization:	Ninety-three percent of Port Authority funding comes from revenue generated by its operating divisions and its finance programs. This revenue

[40] Information for the Ohio section was provided by the Toledo-Lucas County Port Authority and the Greater Cincinnati Energy Alliance

[41] Ohio's Renewable Portfolio Standard is required under ORC Section 4928.64.

	pays for all administrative costs including staff salaries. The other 7% comes from revenue generated by its tax levy, used exclusively for capital improvement projects.

TLCPA's founding occurred in 1955 to develop transportation infrastructure and boost economic vitality within northwestern Ohio. The impetus for its establishment was to develop the region's access to the St. Lawrence Seaway system, thereby opening the Great Lakes to the Atlantic Ocean. TLCPA was the first port authority established in Ohio (Toledo-Lucas County Port Authority 2014).

As an Ohio Port Authority, TLCPA has the capacity to issue bonds for certain development and capital improvement projects through the Northwest Ohio Bond Fund. In 1988, TLCPA entered into business finance to grow its regional economy. Since then, TLCPA has closed nearly 300 economic development projects, investing more than $1 billion to create and retain over 15,000 jobs. In 2010, supported by startup funding from DOE's, EECBG-ARRA Grant, under the Better Buildings Neighborhood Program, TLCPA entered into clean energy finance (Toledo-Lucas County Port Authority 2014).

TLCPA directs clean energy financing applicants to a suite of supplemental, complementary subsidy and rebate programs offered through utilities companies and other sources. TLCPA also has a wide range of economic and infrastructure development financing products unrelated to clean energy improvements, including small business, new construction, and brownfield site redevelopment. This report concentrates on TLCPA's BetterBuildings Northwest Ohio (BBNWO) program and its flexible structure that uses revolving loan funds, bonds, and PACE assessments to customize financing for commercial property owners seeking to make clean energy improvements.

8.2.1 BetterBuildings Northwest Ohio

Program Name:	BetterBuildings Northwest Ohio (BBNWO)
Contact Information:	Kevin Moyer, kmoyer@toledoportauthority.org
Year Established:	2010
Borrower Profile:	Funds are available to owners of the following types of buildings: industrial/manufacturing, educational, commercial/retail, healthcare, government/municipal, and nonprofit. BBNWO has the flexibility to cover any sector other than casinos, zoos, aquariums, and golf courses per DOE requirements. Its focus includes office buildings, private schools, small healthcare, convenience stores and groceries, auto dealerships, restaurants, and other small-to-medium-sized businesses. BBNWO offers revolving loan funds and/or bond funds through the PACE structure.
Projects Financed:	BBNWO finances renewable energy projects and energy efficiency building retrofits.
Term of Financing:	The term of financing is 15 years.
Cost of Financing:	The cost of financing is 4.50%–5.50% depending on term, project tax status, and U.S. Treasury rate.

BBNWO offers competitive, fixed-rate financing for projects that implement energy savings measures through energy efficiency and alternative energy retrofits to existing facilities. The program can finance energy efficiency improvements to all types and sizes of buildings. The program provides 100% financing

of all project costs, including evaluation and design, equipment, installation labor, and other transaction and financing costs (Moyer 2013). TLCPA's BBNWO offers financing to growing and underserved small-to–medium-sized businesses and nonprofit markets. Utilizing program revolving loan funds to begin construction and aggregate smaller projects, TLCPA BBNWO is able to package projects into efficiently sized bond issues to minimize bond issuance costs. PACE assessment payments predominantly provide the revenue backing for bond issuances (80%), with the balance supplied by power purchase agreements, Loan and Security Agreements, and Energy Service Agreements. TLCPA BBNWO has also augmented financing packages with Qualified Energy Conservation Bonds and loans from the Ohio Development Services Agency's Energy Loan Fund. Energy savings for projects can range from 20% to 50% or more and give building owners the cash flow to make the energy efficiency improvements. The PACE structure allows commercial building owners to pay for the improvements through a voluntary special assessment on the property tax duplicate.

The PACE structure also provides the financing entity with a senior lien position in the event of a default and foreclosure. First-mortgage holders must have lender consents to the special assessment placed on the property for energy project improvements. Lenders usually grant such consents, as they recognize that the projects increase property value, extend the building's and its critical systems' economic life, and provide current and future cash flow benefit to the business.

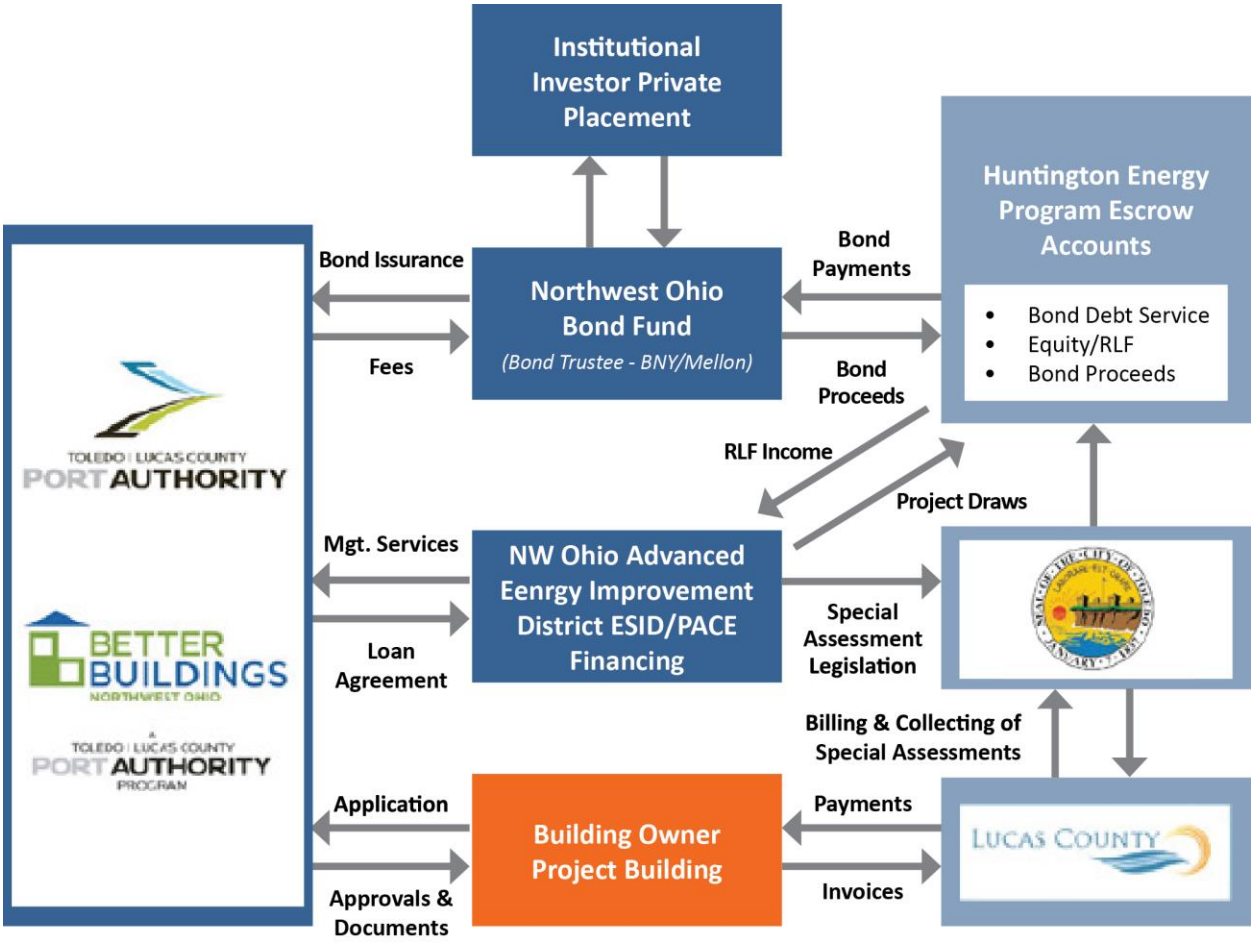


Figure 7. Structure of BetterBuildings Northwest Ohio
Source: BBNWO

The Midwest Energy Efficiency Alliance, PACE*Now*, the Council of Development Finance Agencies, DOE, and many other national and regional energy finance groups have profiled the BBNWO business model and solution to challenging clean energy projects. Because of its efficient funding structure and flexible terms for borrowers, BBNWO has had a wide-ranging impact on northwestern Ohio's aging commercial building stock.

As of December 2013, BBNWO had completed 60 projects, with 20 in construction, and had attracted $30 million in capital including $17 million in bonds, $8 million in equity and tax grants, $3 million in revolving loan funds, and $2.7 million in state energy loans. BBNWO has a current pipeline of $32 million in developing projects. Demand in northwest Ohio is high for TLCPA's energy efficiency financing programs, and continual improvements have scaled BBNWO's application to a broader scope of clients. PACE financing continues to be a rapidly emerging and growing financing and economic development tool for communities in Ohio as well as on the national stage.

The Greater Cincinnati region of southwestern Ohio is an emerging force within the national clean energy finance landscape. As Ohio takes a decentralized approach to establishing EIPs, Cincinnati is one of several highly active regions within the state working to drive private investment in energy efficiency

and renewable energy generation projects. The Cincinnati region's partnership consists primarily of two entities: the Greater Cincinnati Energy Alliance (GCEA) and the Port of Greater Cincinnati Development Authority (the "Port").

8.3 Greater Cincinnati Energy Alliance

Organization Name:	Greater Cincinnati Energy Alliance (GCEA)
Address:	200 W. 4th Street, Suite 600 | Cincinnati, Ohio 45202
Phone:	513-621-3000
Website:	http://www.greatercea.org/
Legal Structure:	Regional, nonprofit economic development agency
Year Established:	2009
Enabling Legislation:	N/A
Mission:	GCEA's mission is to develop and deliver energy efficiency and renewable energy solutions that provide a sustainable return on investment to stakeholders.
Capitalization:	GCEA initially received capital from a $17 million EECBG-ARRA grant from DOE under the Better Buildings Neighborhood Program. GCEA has since raised capital from other public and private investors.

GCEA's founding occurred prior to the availability of funds through ARRA, which granted seed capital to clean energy programs on a national scale. Seven counties in southwestern Ohio and northern Kentucky contributed capital to GCEA to establish programming, as they believed that a regional nonprofit could scale clean energy financing more effectively than individual municipal governments funded through EECBG. GCEA's early efforts involved education and outreach to drive demand for clean energy projects. GCEA later added complementary services, such as contractor certification, financial incentives, and lending, to its programming.

GCEA offers a broad selection of services and incentives to residential, commercial, and nonprofit building owners seeking to make energy efficiency improvements to their properties. The organization's website provides links to city and state incentives, in addition to direct financial resources. GCEA also provides a listing of energy audit and contractor partners for commercial and nonprofit clients and directly performs residential audits at a low cost for homeowners (free for whole-home loan recipients). This report concentrates on GCEA's financing programs, Greater Cincinnati Home Energy Loan Program (GC-HELP) and the Building Communities Loan Program, and addresses Greater Cincinnati-PACE (GC-PACE) after introducing GCEA's primary partner in the program.

8.3.1 Greater Cincinnati Home Energy Loan Program

Program Name:	Greater Cincinnati Home Energy Loan Program (GC-HELP)
Contact Information:	Chris Jones, cjones@greatercea.org
Year Established:	2011
Borrower Profile:	Single-family, residential
Projects Financed:	GC-HELP finances energy efficiency and renewable energy projects.
Financing Range:	The financing range is $1,000–$20,000.
Term of Financing:	The term of financing is at a maximum of 10 years.

Cost of Financing:	The cost of financing is 6.99%–9.99%, depending on the scope of the project.

GC-HELP is GCEA's residential loan program targeting energy efficiency projects. Single-family and duplex homeowners are eligible to apply for up to $20,000 in financing for improvement-specific projects (such as attic insulation or furnace replacement) or whole-home retrofits. The program provides borrowers with a prequalified pool of contractors and energy assessment services and assists borrowers with accessing all applicable cash incentives.

An allocation of GCEA's EECBG-ARRA grant from DOE under the Better Buildings Neighborhood Program and an impact investment from the Greater Cincinnati Foundation capitalize GC–HELP. Applications are accessible on GCEA's website. GCEA contracts AFC First to underwrite and service the loans, although they remain on GCEA's balance sheet throughout the term. A UCC-1 lien on the improvements made to the property secure the GC-HELP loans to ensure a broad pool of eligible borrowers.

Since the program's inception, GCEA has approved more than 140 GC-HELP loans for over $1.3 million in principal. Only three loans have been written off, for less than $7,500; this amounts to a default rate well below 1%. Though the program is still in its early years, GC-HELP has demonstrated demand for its loan product and exhibits excellent repayment performance to date. The first asset-backed security transaction of unsecured consumer energy efficiency loans securitization included a portion of the GC-HELP loan pool. This securitization of over $12.5 million was through Warehouse for Energy Efficiency Loans partnered with Renew Financial, Citi, and AFC First.

8.3.2 Building Communities Loan Program

Program Name:	Building Communities Loan Program
Contact Information:	Chris Meyer, cmeyer@greatercea.org
Year Established:	May 2013
Borrower Profile:	Nonprofit organizations
Projects Financed:	The program finances energy efficiency projects.
Financing Range:	The financing range is $5,000–$25,000.
Term of Financing:	The term of financing is five years.
Cost of Financing:	The cost of financing is 3.00%–5.00%.

The Building Communities Loan Program started in May 2013 and received its initial capital through a grant from DOE's EECBG-ARRA Grant, under the Better Buildings Neighborhood Program, and an impact loan from the Greater Cincinnati Foundation. Targeting nonprofit organizations within GCEA's territory, Building Communities contributes up to $25,000 to eligible energy efficiency improvements.

The Cincinnati Development Fund, a CDFI with extensive commercial underwriting experience, administers underwriting for the Building Communities loan program. A UCC-1 filing on project equipment secures Building Communities loans, without the requirement of a property lien. This gives an alternative for applicants who do not fit the PACE model described below. So far, GCEA has closed two loans worth approximately $60,000 through the Building Communities program.

8.4 Port of Greater Cincinnati Development Authority

Organization Name:	Port of Greater Cincinnati Development Authority (the "Port")
Address:	299 East Sixth Street, Suite 2A | Cincinnati, Ohio 45202
Phone:	513-621-3000
Website:	http://www.cincinnatiport.org/
Legal Structure:	Government agency – port authority
Year Established:	2000
Enabling Legislation:	Chapter 4582 of the Ohio Revised Code
Mission:	The Port's mission is to revitalize properties by increasing value, creating jobs, and improving the lives of residents.
Capitalization:	Port operations receive funding from city and county budget allocations, revenue from financing products and services, foundation and corporate grants, issuance of infrastructure debt through tax increment financing/special improvement district holdings, and state financing. The City of Cincinnati will make additional capital contributions toward specific projects.

The Port is primarily an economic development entity. With activities in bond finance and tax increment finance, the Port developed expertise in structuring deals to accommodate a wide variety of project structures and barriers to financing. In recent years, the development finance industry as a whole has prioritized clean energy investments, and the Port has assessed its current financing programs for applicability to energy efficiency and renewable energy within the Greater Cincinnati region. Because of the Port's history of revitalizing brownfield sites and aging industrial properties, manufacturing facilities emerged as logical prospects for an expansion into financing energy efficiency projects.

The Port worked with regional partners to determine the barriers encountered by building owners seeking financing for energy efficiency projects. After discussions with the nonprofit Green Umbrella, TLCPA, and GCEA, the Port decided to partner with GCEA on a new PACE program designed to fit the needs of southwestern Ohio. The Port saw a successful application of traditional economic development financing tools to clean energy through Toledo's model and relied on the services and technological expertise offered by GCEA.

8.4.1 Greater Cincinnati Property Assessed Clean Energy Program (GC-PACE)

Program Name:	GC-PACE
Contact Information:	Chris Jones, cjones@greatercea.org
Year Established:	2014
Borrower Profile:	Commercial, industrial, and nonprofit building owners
Projects Financed:	GC-PACE finances energy efficiency and renewable energy projects.
Financing Range:	The financing range is $25,000–$10,000,000.
Term of Financing:	The term of financing is at a maximum of 30 years.
Cost of Financing:	The cost of financing is at 4.50%–7.00%.

Combining bonding authority or private debt with other financial incentives and services, the recent partnership between GCEA and the Port has created the new GC-PACE program, opening investment in commercial clean energy projects to private lenders and bondholders.

The GC-PACE program allows building owners to finance energy efficiency and renewable energy generation improvements through a voluntary assessment on their property tax bill. The State of Ohio passed legislation in 2010 allowing development finance entities to implement the PACE financing model through the creation of Energy Special Improvement Districts.[42]

GC-PACE financing can come from either the Port or a third-party lender, depending on the credit of the borrower and the structure of the project. This is a unique feature to the program, as the Port has agreed to direct property owner applicants to the best financing structure for the needs of their business. Monthly cash flow and the total cost of financing will inform the determination of the best lender for a given project. The Port will not finance all GC-PACE deals, allowing private financiers in the region to invest in commercial clean energy projects.

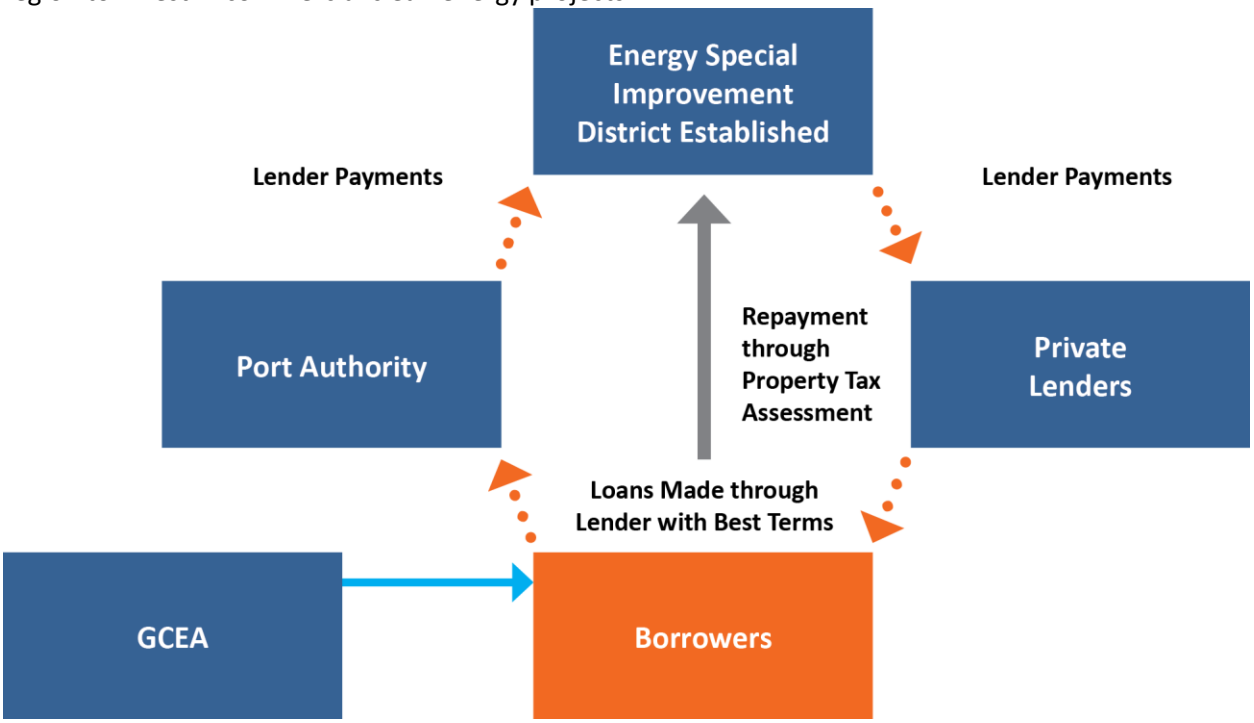


Figure 8. Structure of Greater Cincinnati Property Assessed Clean Energy Program (GC-PACE)
Source: GCEA

The exact terms of GC-PACE will solidify over time, as the Port and GCEA determine the needs of the regional business community and assess program performance. In the interim, the design of the program allows it to be highly flexible to encourage deal flow and assess barriers to financing clean energy projects in the region. PACE loans take a tax lien on the improved property as collateral, allowing long-term debt capital to be raised from the private sector. GC-PACE will work with capital providers, whether potential bondholders or private financial institutions, to determine appropriate collateral on a

[42] See Senate Bill 232 passed in 2010: http://archives.legislature.state.oh.us/bills.cfm?ID=128_SB_232

deal-by-deal basis. The GC-PACE program has stipulated that transferability applies the debt obligation transfers automatically to the next property owner upon the sale of an improved property.

9. OREGON [43]

9.1 Overview

The State of Oregon has been a historic leader in crafting policies to support clean energy and has diversified its energy portfolio through significant use of hydroelectric power. According to the Oregon Department of Energy, nearly 39% of the state's consumed electricity comes from hydroelectric generation, 36% comes from coal, 16% comes from natural gas, 4% comes each from wind and nuclear, and 1% comes from other sources (Oregon Department of Energy 2014). The state has implemented a RPS, requiring utilities to source a minimum of 25% of their energy from renewable sources by 2025.

Since 1975, state leaders in Oregon have advocated for the transition of the state's energy sources from fossil fuels to renewable alternatives (Oregon Department of Energy 2011). In the midst of an energy crisis, Governor Tom McCall established the Oregon Department of Energy to facilitate the adoption of renewable energy and alleviate strain on the state's infrastructure, setting an initial tone of support for clean energies. The Oregon Department of Energy instituted the first loan program of its kind in 1979, financing small-scale energy projects throughout the state. In 2009, this program expanded to allow for a larger volume of small loans to businesses and individuals seeking energy efficiency and renewable energy improvements (Ibid.).

A number of organizations with a large geographic footprint have collaborated in Oregon to structure a unique residential energy efficiency product, reducing the upfront cost of improvements for single-family homeowners. The Energy Trust of Oregon (ETO) provides incentives to nonprofit Enhabit (formerly Clean Energy Works Oregon) to finance origination fees and borrower equity contributions for loan applicants. Rather than directly financing and servicing energy efficiency loans, Enhabit acts as an aggregator for borrowers, lenders, and contractors. To illustrate the flow of incentives through Enhabit, this report briefly describes each participating entity then focuses on a nonprofit lender's energy efficiency portfolio under Enhabit's program.

9.2 Energy Trust of Oregon

Organization Name:	Energy Trust of Oregon (ETO)
Address:	421 SW Oak Street #300 | Portland, OR 97204
Phone:	503-493-8888
Website:	http://energytrust.org/
Legal Structure:	Nonprofit organization
Year Established:	2002
Enabling Legislation:	Senate Bill 1149
Mission:	ETO's mission is to provide comprehensive, sustainable energy efficiency, conservation, and renewable energy solutions to ratepayer clients.
Capitalization:	ETO primarily receives funding through a public purpose charge on the

[43] Information for the Oregon section was provided by CRAFT3 and Oregon departments and agencies through the Oregon Governor's Office

	ratepayers of Portland General Electric, Pacific Power, NW Natural, and Cascade Natural Gas.

In 1999, Oregon Senate Bill 1149 established a public purpose charge on ratepayers of several utilities, with proceeds to go toward incentivizing energy efficiency improvements. The 3% charge on ratepayers supplied about $60 million per year toward the establishment of energy efficiency programs. This legislation led to the creation of the ETO, chartered by the Oregon Public Utilities Commission to administer ratepayer fees and programs funded with these monies.

In March 2002, ETO began operations subsidizing energy efficiency through cash incentives, reducing the cost of energy efficiency improvements (Energy Trust of Oregon 2014). ETO's operations support only ratepayers within the territories of participating utilities, as not all utilities in Oregon pay into the system. ETO delivers technical assistance and cash incentives, including rebates based on purchases and energy savings.

ETO provides services and incentives to individuals and also arranges annual or multiyear contracts with lending allies and other partners supporting demonstrated energy savings. These arrangements help reduce the upfront cost of financing clean energy projects. Enhabit, one such partner, aggregates eligible projects to receive financing from ETO and passes savings on to homeowners financing property improvements.

9.3 Enhabit

Organization Name:	Enhabit[44]
Address:	1733 NE 17th Avenue | Portland, OR 97212
Phone:	855-870-0049
Website:	https://enhabit.org/
Legal Structure:	Nonprofit organization
Year Established:	2010
Enabling Legislation:	N/A
Mission:	Enhabit's mission is to impact three areas of its service territory—energy, economy, and equity. Enhabit works to connect homeowners to financing options, which generate good jobs, increase access to opportunity, and minimize energy waste.
Capitalization:	Enhabit received a $20 million DOE, EECBG-ARRA Grant, under the Better Buildings Neighborhood Program. The organization leverages existing incentives and partnerships to finance many of its programs.

Enhabit serves as an intermediary, standardizing and aggregating financing products and services for homeowners seeking clean energy improvements. Originating as Clean Energy Works Portland in 2009, Enhabit operates within a 19-county region in Oregon to give low-cost financing, free home energy assessments, and information on available incentives to homeowners seeking to reduce energy

[44] Enhabit, formerly known as Clean Energy Works Oregon, operates in both Oregon and Washington. This report uses the functional name of the organization while concentrating on its Oregon-specific efforts.

consumption.[45] Enhabit seeks to provide benefits to the community by improving residents' comfort. It provides environmental benefits by reducing energy consumption and the use of fossil fuels and creates jobs targeted to women and people of color through the establishment of qualified contractors and technical service providers.

Enhabit partners with private lenders to supply capital for its home energy efficiency loan program. Within its service region, each county is able to select among three and eleven loan products for its energy efficiency project. Some of Enhabit's clients pay cash for the improvements to their property or make use of home equity lines of credit. Roughly half of Enhabit's applicants who require financing for their home efficiency upgrades select Craft3 as their lender.

9.4 Craft3

Organization Name:	Craft3
Address:	203 Howerton Way, SE | Ilwaco, WA 98624
Phone:	888-231-2170
Website:	www.craft3.org
Legal Structure:	501(c)(3) Nonprofit organization – U.S. Treasury CDFI
Year Established:	1995
Enabling Legislation:	N/A
Mission:	Craft3's mission is to strengthen economic, ecological, and family resilience in Pacific Northwest communities.
Capitalization:	Craft3 receives funding from donations, grants, and loans from financial and corporate entities, philanthropic and religious institutions, and government agencies.

Craft3 started in rural Ilwaco, Washington, in 1995 with a mission to invest in entrepreneurs and individuals without access to traditional bank financing (Craft3 2014a). The nonprofit established a suite of supporting services for these clients, including training, networking, and advocacy opportunities. Craft3 takes a triple bottom line approach to its development activities, incorporating social equity, economic, and environmental goals into its strategies and programming. Craft3 has a service area composed of rural and urban residents throughout the Pacific Northwest, and a recent strategic plan identifies regional development initiatives in central and eastern Oregon and Washington as targets for expanded services in the coming years.

As part of its commitment to ecological resilience, Craft3 has developed investment strategies to address conservation of sensitive lands, preservation of water quality, and energy efficiency. Single-family homeowners in several counties of Oregon are eligible to receive a Craft3 loan through Enhabit's Home Energy Efficiency Loan Program (Craft3 2014b).

Craft3 provides a comprehensive financing solution for clean energy projects. In addition to financing homeowners who are installing energy efficiency improvements, Craft3 offers a line of credit for qualified contractors performing the improvement work. Up to $100,000 is available to contractors, with an

[45] Enhabit. (2014). *About Us*. Retrieved from: https://enhabit.org/about/

advance available for 50% of the cost of any associated project loan. Contractors pay a 2.49% fee on the advanced amount to access the financing. Though Craft3 offers a variety of financial products, this report concentrates on Craft3's lending activities related to Enhabit in the residential energy efficiency sector.

9.4.1 Craft3/Enhabit Home Energy Efficiency Loan Program

Program Name:	Craft3/Enhabit Home Energy Efficiency Loan Program
Contact Information:	Adam Zimmerman, azimmerman@craft3.org
Year Established:	2009
Borrower Profile:	Residential, single-family homes in Benton, Clackamas, Clatsop, Columbia, Crook, Deschutes, Hood River, Jackson, Josephine, Jefferson, Klamath, Lake, Lane, Marion, Multnomah, Polk, Tillamook, Washington and Yamhill Counties
Projects Financed:	Craft3/Enhabit finances energy efficiency projects.
Financing Range:	The financing range is at a maximum of $30,000.
Term of Financing:	The term of financing is at a maximum of 15 years.
Cost of Financing:	The cost of financing is 5.99%.

Craft3's Home Energy Efficiency Loan Program uses the structure set forth through Enhabit to provide fixed-rate financing to homeowners making energy efficiency improvements. Cash incentives flow through ETO to Enhabit to subsidize the cost of financing, as Enhabit aggregates energy savings from Craft3's projects for submission in bulk to ETO. This structure offers benefits to homeowners within ETO's service territory, using a regional collaboration to invest in clean energy projects.

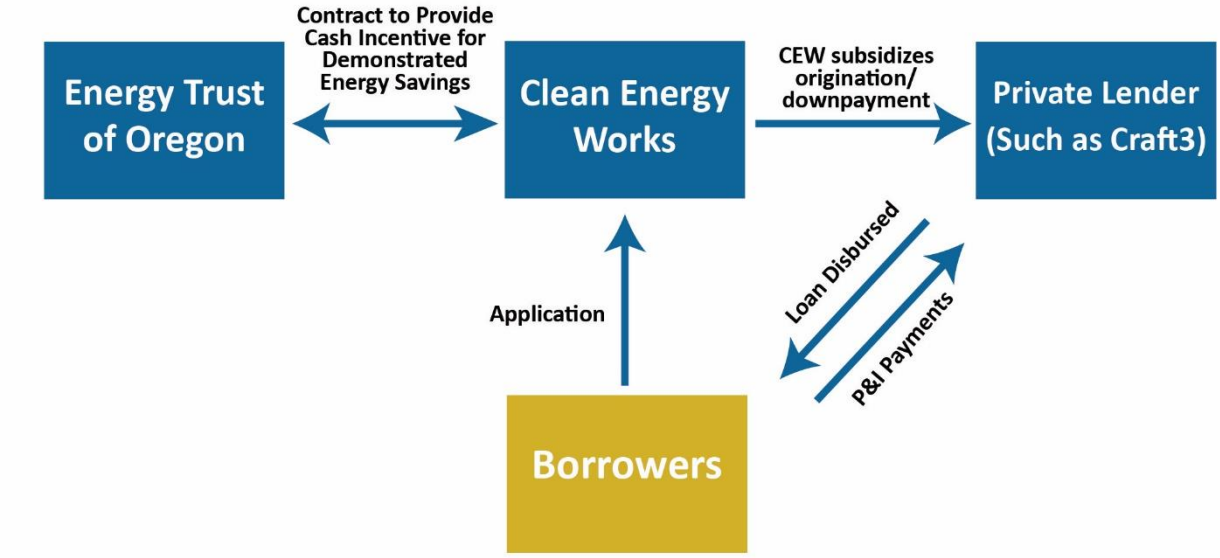


Figure 9. Craft3/Enhabit Home Energy Efficiency Loan Program
Source: Craft3

Craft3 is a CDFI and leverages multiple public and private sources of capital to issue its energy efficiency loans. The structure of financing and subsidies from ETO incentivize private capital to enter the portfolio. Craft3 uses OBR to underwrite borrowers and collect loan payments through the borrower's

utility bill, a mechanism that has demonstrated a reduction in payment risk to lenders. The use of OBR mitigates loss risk, as a UCC-1 on installed equipment collateralizes Craft3's loans. Customer payments go toward utilities first to ensure that there will not be a disconnection of the customers' power or gas for lack of payment on the loan.

Through June 2015, Craft3 has issued more than 3,000 loans in Oregon, for a total principal investment exceeding $40 million. Under the Aeris rating system, a third-party independent assessment of CDFI performance in meeting financial and social ("impact") goals, Craft3 has received the highest possible rating in program impact and a 2/5 rating (where 1 indicates the strongest position) for finance strength and performance (Craft3 2014c). Craft3's successful financing of energy efficiency projects in the State of Oregon has enabled the organization to participate in a private sale of its Enhabit assets, providing liquidity to the energy efficiency portfolio. For more information on the resale of the Craft3 loan portfolio to Self-Help Credit Union, go to http://emp.lbl.gov/sites/all/files/craft3-policy-brief_0.pdf.

10. ACCESSING THE CAPITAL MARKETS

10.1 Overview

A primary feature of EIPs is the ability to attract private capital to finance clean energy projects. Private sector participation lowers the need for a significant public investment, allowing the government to deploy funds elsewhere. Additionally, as private investors see consistent returns from clean energy projects, consumer access to financing will rise and the need for public participation in financing these deals will decrease. EIPs currently make use of a variety of mechanisms to attract private capital into clean energy projects, directly or indirectly.

At the project level, EIPs can use credit enhancements, bonds, CDFI leverage, or crowdfunding to attract private investment. An EIP can also attract private investment through secondary markets by issuing bonds or asset-backed securities to capitalize or sell off portfolios of clean energy loans. EIPs can use credit enhancements at this level as well, to improve bond ratings or lower the cost of financing. EIPs already employ many of these mechanisms throughout the country. The following sections describe established finance tools and their application to clean energy projects and portfolios.

10.2 Credit Enhancement

Credit enhancement involves improving the creditworthiness of a deal in order to obtain favorable terms. This usually involves providing additional security to lenders or equity investors through the use of third-party guarantees, additional collateral, or insurance. Credit enhancement lowers the risk of default for a lender, thereby increasing the credit rating of the deal and lowering the interest rate. Credit enhancement can also allow portfolio sales to take place at parity so EIPs don't take a loss on the transaction.

10.2.1 Guarantees

By providing a guarantee, a third-party entity agrees to assume the obligation of the borrower in the event of a default. In many cases, the guarantor for a transaction is a government entity, and the tool is frequently used in a variety of development finance transactions to correct for market failures, allowing smaller or less-established borrowers to access the same financing terms as larger, more-established firms. Upon default, a guarantor must make payments on the debt through its maturity, under conditions specified in the project's loan documents.

Guarantees provide a way for EIPs to participate indirectly in a transaction by pledging future revenues to service any defaults in a portfolio. In a portfolio sale, an EIP or government partner's guarantee can raise the credit rating of the instrument. The risk of loss is minimal, granted the portfolio follows responsible underwriting guidelines. The use of guarantees, which lower the cost of financing for borrowers, can incentivize private lends or investors to require lower return rates.

For example, NYSERDA made use of a guarantee from NYSEFC in its September 2013 sale of the GJGNY portfolio. The NYSEFC guarantee, backed by the assets of its state revolving fund, allowed the deal to earn an AAA/AAA rating from Standard & Poor's Financial Services LLC and Moody's Investors Service.

With its excellent risk rating, NYSERDA was able to sell bonds with an interest rate of approximately 3.21%.

10.2.2 Loan Loss Reserve

A LLR fund is a deposit of cash pledged by an entity to provide partial risk coverage on any write-offs in a loan portfolio. When provided by third parties to a transaction, LLRs can decrease the total exposure of a lender or investor to bad loans. Most LLRs cover first losses on a portfolio for a set percentage of the total portfolio principal—up to 20% of the portfolio's value, for example. LLRs can serve to lower credit requirements on deals and/or reduce the cost of financing to a borrower.

EIPs commonly use LLRs to incentivize private participation in programs and to strengthen the sale of loan portfolios on the secondary market. EIPs have applied LLRs to loan programs financed largely or solely through private lenders, as in CGB Smart-E Loan Program. CGB designed the loan product for private banks, providing lists of qualified contractors and products to reduce the banks' need for technical review. To encourage bank adoption of the program while ensuring sustainable underwriting practices, CGB established a "second loss" reserve on Smart-E losses. Nine banks participate in the program with a minor investment from CGB.

10.2.3 Technological Support

Much of the cash flow generated from clean energy projects requires a technical assessment of the property and the specific improvements to be made. A lack of technical expertise in this area can deter private lenders from investing in clean energy projects. Many EIPs have developed this expertise, either in-house or through contracted partnerships with certified energy auditors. Providing free or reduced-cost energy assessments can compensate for a private lender's lack of technical expertise in clean energy projects. Audits can also provide an estimate of cash flow savings, which can support financial projections in the bank's underwriting process.

For example, GCEA uses reduced-cost energy assessments to incentivize private lender and property owner participation in commercial and residential energy efficiency programs. GCEA delivers these services directly to residential borrowers at reduced rates (or free for whole-home borrowers), while listing acceptable contractor partners for commercial property owners. GC-PACE borrowers, whose loans public (port authority) or private lenders may finance, must complete energy audits.

10.2.4 Insurance

Insurance products supply a guarantee for a loan in exchange for premium payments. Some types of insurance are common in financial transactions, such as Federal Housing Administration insurance for home mortgages or optional credit insurance on revolving accounts. Additional insurance projects can enhance a deal by reducing risk and lowering the cost of financing for borrowers. EIPs have applied insurance to leverage private financing into clean energy projects.

For example, CGB's Solar Lease Program uses insurance as part of a structure to leverage a 5:1 ratio of private to public investment. Assurant, Inc., an established insurance provider active in a broad spectrum of services, insures solar installations throughout the life cycle of the investment. This

insurance, in combination with an LLR, offers an additional level of security to debt and equity investors involved in the deal.

10.3 Bonds

Bond financing has emerged over the past 100 years as a mechanism to address essential governmental functions, such as the provision of transportation, infrastructure, clean water, and environmental remediation. Bonds are one of the most prevailing financial mechanisms for addressing development projects through a variety of structures and schemes. A bond is essentially a loan with the entity issuing the bond on the capital markets in return for cash. The cash is then put into projects, and dedicated revenue streams such as taxes, assessments, fees, and tolls eventually repay the loans.

A distinguishing feature of tax-exempt bonds, such as those issued by state and local municipal entities, is that the interest income earned by the bondholder is exempt from federal income taxes.[46] Typically, states also exempt the interest income from bonds issued by the state, its agencies, and political subdivisions from its state and local income taxes. The tax-exempt feature of municipal bonds makes them attractive to individuals and other buyers in higher-margin tax brackets. The tax exemption enables state and local governments and their various political subdivisions to come to capital markets and borrow funds at lower interest rates than those prevailing in the taxable markets such as the corporate bond market.

EIPs have used bond financing to sell off multiple clean energy loan portfolios. NYSERDA's 2013 bond sale recapitalized the GJGNY program, for example. Other organizations have applied bond proceeds to finance large, utility-scale projects or capitalize new revolving loan programs. When paired with credit enhancements, these existing bond deals prove that clean energy portfolios can obtain high credit ratings and effectively scale clean energy investment from the private sector.

10.4 The CDFI Model

CDFIs provide financial products to underserved markets without access to traditional bank financing. The U.S. Treasury's CDFI Fund, which also capitalizes these institutions through a variety of programming (U.S. Department of the Treasury 2014), certifies CDFIs. CDFIs typically have social and financial goals, requiring a targeted approach to eligibility criteria.

CDFIs leverage private funding from bank CRA investments and foundation grants, in addition to public funds from local, state, and federal government agencies. CDFIs pool this funding and apply individual financing packages to borrowers who meet the social and financial investment requirements from capital providers. CDFIs typically operate within a limited territorial footprint, basing their lending activities on the needs of borrowers and the requirements of investors.

SELF in St. Lucie County is an example of a CDFI active in lending to clean energy projects. Based in a working-class community, SELF has invested 70% of its loans in LMI individuals seeking capital for clean

[46] Section 103(a) of the U.S. Internal Revenue Code (IRC) of 1986 specifically exempts the interest income earned on municipal bonds from federal taxation. The Tax Reform Act of 1986 represents the most recent fundamental reform of the tax exemption to a select number and type of municipal bonds.

energy improvements. Another CDFI active in clean energy finance is Craft3, which offers energy efficiency financing to King County in Washington and multiple counties in Oregon.

10.5 Crowdfunding[47]

Crowdfunding is a relatively new and evolving method of using the Internet to raise capital to support a wide range of ideas and ventures. An entity or individual raising funds through crowdfunding typically seeks small individual contributions from a large number of people. Individuals interested in the crowdfunding campaign – members of the "crowd" – may share information about the project, cause, idea or business with each other and use the information to decide whether to fund the campaign based on the collective "wisdom of the crowd."

Title III of the Jumpstart Our Businesses Act of 2012 ("Title III") added a new Securities Act Section 4(a)(6),7 which provides an exemption from the registration requirements of Securities Act Section 58 for certain crowdfunding transactions. To qualify for the exemption under Section 4(a)(6), crowdfunding transactions by an issuer (including all entities controlled by or under common control with the issuer) must meet specified requirements, including the following:

- The amount raised must not exceed $1 million in a 12-month period
- Individual investments in all crowdfunding issuers in a 12-month period are limited to:
  - The greater of $2,000 or 5% of annual income or net worth, if annual income or net worth of the investor is less than $100,000
  - Ten percent of annual income or net worth (not to exceed an amount sold of $100,000), if annual income or net worth of the investor is $100,000 or more
- Transactions must be conducted through an intermediary that either is registered as a broker-dealer or is registered as a new type of entity called a "funding portal."

10.6 Conclusion

EIPs seek to access private capital through a variety of financing mechanisms. EIPs can apply credit enhancements at the program level to enhance the sale of loan portfolios on secondary markets. EIPs may access capital through leveraging funds as a CDFI, soliciting individual investments via a crowdfunding platform, working with financial institutions to issue asset-backed securities, or issuing bonds directly or in partnership with an issuing government agency.

As EIPs develop new projects in collaboration with the private sector, a new investment class is beginning to emerge. Private investors are becoming more familiar with clean energy portfolio investments, and the role of the public sector is diminishing, with credit enhancement to private activities replacing direct government investment. EIP activities aim to reduce government involvement further and eventually help clean energy projects reach private investors without the need for government involvement.

[47] U.S. Securities and Exchange Commission. Retrieved from: https://www.sec.gov/rules/final/33-8518.pdf

11. CONCLUSION

This report highlights the essential drivers behind some of the country's most innovative and effective EIPs. By establishing state and regional partnerships to repurpose existing funding sources and attract private capital, each EIP has generated an impact well beyond savings on utility bills. The diversity in structure, markets, and execution illustrates a multitude of ways that EIPs can increase investment in clean energy projects. The EIPs profiled in this document represent a few of the ways that public and private funding sources can combine to optimize access and affordability of financing for businesses and homeowners.

Through the development of strategic partnerships with public, private, and nonprofit entities, each EIP has expanded its capacity to market, analyze, and service investments in clean energy projects. Financial products and services vary among EIPs, and EIPs customize them to deliver solutions to customers within defined state and local conditions. The ability to offer a variety of approaches has proved necessary to address the needs of both private investors and property owners implementing clean energy improvement projects.

The potential impact of EIPs extends across environmental, fiscal, social, and physical boundaries. This report distills some of the core characteristics of successful state-and community-scaled partnerships advancing clean energy investment. This report can serve as a reference to provide insight into some of the most novel characteristics of environmental and financial policies and programs in place throughout the nation. Through forming partnerships and addressing the diverse needs of stakeholders, EIPs contribute valuable direction toward reducing the need for public capital in the transition to a clean energy economy.

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CONNECTICUT
GREEN BANK

Memo

To: The Connecticut Green Bank Board of Directors

From: Genevieve Sherman, Director, C&I; Alex Kovtunenko, Counsel, C&I

CC: Bryan Garcia, President and CEO; Bert Hunter, EVP and CIO; Brian Farnen, General Counsel and CLO

Date: December 16, 2015

Re: Extending timeline for closing certain C-PACE transactions

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Summary

The Connecticut Green Bank Board of Directors (the "Board" or "BOD") or the Connecticut Green Bank Deployment Committee (the "Deployment Committee" or "DC") has previously approved and authorized C-PACE financing for the following six (6) properties:

Project Address	Approved	Expired
300 Great Hill Rd, Naugatuck	8/17/15 by DC (extension)	12/15/2015
44 Berkshire Road, Newtown	8/17/15 by DC	12/15/2015
555 Connecticut Ave, Norwalk	8/17/15 by DC	12/15/2015
225 New Britain Ave, Plainville	8/17/15 by DC (extension)	12/15/2015
245 New Britain Ave, Plainville	10/17/14	2/14/2015
80 Ferry Blvd, Stratford	6/19/15 by BOD	10/17/2015

Each financing agreement was authorized to be consistent with the terms, conditions, and memorandums submitted to the Board or Deployment Committee and made no later than 120 days from the date of Board or Deployment Committee approval.

Due to delays in fulfilling pre-closing requirements for the transactions listed above, the C-PACE program staff requests more time to close these transactions and execute the financing agreements. The staff requests an additional 120 days from the date of this Board meeting to execute the financing agreements for the transactions listed above.

Resolutions

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

WHEREAS, pursuant to the C-PACE program the Green Bank Board of Directors (the "Board") or the Connecticut Green Bank Deployment Committee (the "Deployment Committee") has previously approved and authorized the President of the Green Bank to execute financing agreements for the six (6) C-PACE projects described in the Memo submitted to the Board on December 16, 2015 (collectively, the "Finance Agreements");

WHEREAS, the Finance Agreements were authorized to be consistent with the terms, conditions, and memorandums submitted to the Board or the Deployment Committee and shall be executed no later than 120 days from the date of Board or Deployment Committee approval; and

WHEREAS, due to delays in fulfilling pre-closing requirements for the C-PACE transactions listed above the Green Bank will need more time to execute the Finance Agreements.

NOW, therefore be it:

RESOLVED, that the Board extends authorization of the Finance Agreements to no later than 120 days from December 18, 2015 and consistent in every other manner with the original Board or Deployment Committee authorization for each Finance Agreement.

Submitted by: Bryan Garcia, President and CEO, Bert Hunter, EVP and CIO, Genevieve Sherman, Director of Commercial and Industrial Programs, Brian Farnen, General Counsel and CLO

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CONNECTICUT
GREEN BANK

December 2, 2015

RENEW Energy Efficiency Bridgeport LLC
c/o RENEW Energy Partners, LLC
745 Atlantic Avenue, 8th Floor
Boston, MA 02111

Re: RENEW Energy Efficiency Bridgeport LLC's ESA for 285 Lafayette Street, Bridgeport

Dear Energy Efficiency Bridgeport LLC:

The Connecticut Green Bank, (the "Green Bank") is pleased to provide you with the following summary of terms and conditions for a Term Loan to RENEW Energy Efficiency Bridgeport LLC ("Borrower"), as defined below. The proposed terms and conditions contained herein are provided for discussion purposes only and in no way constitute an offer, agreement, or legally binding commitment to lend. This summary does not include descriptions of all of the terms, conditions and other provisions that would be contained in the definitive documentation relating to the Term Loan. The actual terms and conditions upon which the Green Bank might extend credit are subject to the satisfactory completion of underwriting due diligence, credit committee approval, satisfactory review of documentation, negotiation and execution of definitive documents and other such terms and conditions as are determined by the Green Bank or its counsel in their sole discretion.

This summary of terms with the proposed financing arrangements described herein is delivered to you on the understanding that any of the terms of substance hereunder shall not be disclosed, directly or indirectly, to any other person or entity except Bridgeport International Academy, Inc. and your investors, officers, agents and advisors who are directly involved in the consideration of this matter unless prior written consent has been given by the Green Bank.

Borrower:	RENEW Energy Efficiency Bridgeport LLC, a Delaware limited liability company.
Loan Amount/Type:	$130,000 Term Loan. The Term Loan will be evidenced by a promissory note for no less than $130,000 and no more than $160,000, with the final amount subject to the terms of the Final Payment as described below.
Loan Term:	108 months from receipt of advance of loan.
Interest Rate:	[redacted]

	[redacted] If the balance in the Operating Account (as defined below) is insufficient to cover monthly Term Loan payments, the interest rate will increase by 0.50%, per annum, for each month of shortfall.
Amortization:	[redacted]
Final Payment	On the last business day of the 108th month of the Term Loan, in addition to payment of any remaining outstanding principal of, and interest on, the Term Loan, the Borrower shall make a payment to the Green Bank for the lesser of either (1) $30,000, or (2) the Fair Market Value (as defined in the energy service agreement "ESA") of the Equipment (as defined in the ESA) on such date.
Commitment Fee:	None.
Site Host:	Bridgeport International Academy, Inc., a Connecticut corporation, ("BIA") facility located at 285 Lafayette Street, Bridgeport CT 06604 (the "Property").
Collateral:	(1) first priority lien on all personal property of Borrower, (2) collateral assignment of the Energy Service Agreement by and between Borrower and BIA (the "ESA"), and (3) collateral assignment of that certain Engineering and Procurement Contract by and between Borrower and Integrated Building Services, LLC, dated [execution date] (the "EPC"). Borrower shall exercise diligent effort to acquire a lien on the Property which would be subordinate to any mortgage on the Property.
Purpose of Loan:	To finance the purchase and installation of multiple energy efficiency measures for Site Host's Property set forth in the EPC, which installations shall be part of the energy services provided by Borrower to BIA pursuant to the ESA.
Advances:	One advance for 100% of the Term Loan Amount will be at the Commercial Operating Date (as defined in the ESA).
Prepayment Penalty:	3% for the first 60 months of the Term Loan, 2% for the next 24 months of the Term Loan, and 1% for the final 24 months of the Loan.
ESA Purchase Option:	If BIA exercises the Purchase Option (as defined in the ESA) before the expiration of the Term Loan then the proceeds from such sale of the Equipment (as defined in the ESA) shall be used to prepay the Term Loan.
Representations and Warranties:	Usual and customary for similar transactions.

Covenants:	Usual and customary affirmative and negative covenants for similar transactions, including compliance with laws, payment of taxes, maintenance of insurance as provided for in the ESA, audit rights, preservation of corporate existence, maintenance of properties and licenses, and others deemed appropriate by the Green Bank as a result of Green Bank's due diligence. In additional, the ESA and EPC shall not be amended without Green Bank's written consent. Borrower shall maintain a debt service coverage ratio ("DSCR") of at least 15.0x during the first 60 months of the Term Loan and a DSCR of at least 1.50x during final 48 months of the Term Loan, to be tested annually. Income for debt service coverage calculation will include net income plus reserves, plus interest, less expenses for capital improvements.
Financial Statements:	The Borrower shall provide the Green Bank with (1) BIA's and Borrower's annual CPA prepared financial statements (reviewed by a CPA acceptable to the Green Bank, within 150 days of fiscal year end), (2) BIA's and Borrower's annual management prepared financial statements, and (3) BIA's and Borrower's annual budget within 150 days of fiscal year end. All financial statements shall be in form and substance satisfactory to the Green Bank.
Operating Account:	An auto-deduct account established by Green Bank, held by Green Bank and maintained with [Bank] (the "Operating Account"). During the Loan Term BIA's payments under the ESA will be remitted directly to the Operating Account. Term Loan payments will be auto-deducted monthly from the Operating Account and the remainder will be remitted to the Borrower in accordance with the Term Loan.
Secondary Financing:	No secondary financing permitted without the Green Bank's prior written consent with the exception of the BIA's Senior Loan and SBA Loan.
Conditions:	The conditions precedent to closing of the Term Loan and draw downs on the loan commitments thereunder (as applicable) shall include but not be limited to the following:

1) Evidence of equity investment by Borrower [redacted];
2) Closing of the ESA and the EPC contracts. The Green Bank will be named a Designated Third Party under Section 15 of the ESA;
3) Completion of Green Bank's (and its applicable third party consultants' and advisers') technical, business, financial, legal and environmental due diligence, the results of which are reasonably satisfactory to the Green Bank;
4) Negotiation of satisfactory legal documentation, including but not limited to security agreements, legal opinions and certificates, each in form and substance reasonably satisfactory to the Green Bank;

5) Green Bank shall have received all fees required to be paid, and all expenses for which invoices have been presented at the time of drawdown of the loan commitments;
6) Receipt of all required corporate consents and approvals;
7) Internal investment committee approval of the Green Bank;
8) All representations and warranties under the financing agreements are, true and correct in all respects;
9) No Material Adverse Effect has occurred and no Event of Default has occurred and is continuing;
10) An independent third party engineer (licensed in CT, experienced in verifying energy performance contracting, and acceptable to the Green Bank) shall have issued a Final Measurement and Verification Commissioning Report certifying, in accordance with accepted industry standards and the equipment manufacturers' recommendations, that the Project (as defined in the ESA) was installed correctly and is performing according to specifications, at a cost not to exceed $1,000.

Indemnities:	Usual and customary for a transaction of this type, as deemed appropriate by the Green Bank as a result of Green Bank's due diligence review.
Closing Date:	The Term Loan shall close simultaneously with the execution of the ESA and the EPC, all on or before December 31, 2015.
Legal Fees:	The Borrower is responsible to pay the Green Bank's out of pocket expenses associated with this Term Loan including legal fees, filing fees, and any other administrative fees. Total fees shall not exceed $5,500 and shall be paid upon receipt of loan advance.
Governing Law:	Connecticut.
Enabling Statute and State Contracting Provisions:	Green Bank is subject to the requirements outlined in Sections 16-245n of the Connecticut General Statutes and Borrower will be responsible for complying with applicable state contracting requirements.
Other:	Borrower shall provide the Green Bank with the following information: • Borrower to provide evidence of final approval of both the ESA and EPC agreements, as well as executed copies; • All organizational and authorization documents for the Borrower and BIA; • Such other financial and property information as may be reasonably requested by the Green Bank.

Subject to: **The closing of this Term Loan is subject to approval and closing of the ESA and EPC agreements as well as Borrower's investment [redacted]. In the event of a default following the Commercial Operation Date of either the ESA or the Green Bank Term Loan, the Green Bank Term Loan will accelerate and become immediately due and payable.**

The transaction contemplated by this Summary of Terms and Conditions is expressly contingent upon and subject to, among other things, (i) satisfactory completion of Green Bank's due diligence, (ii) the negotiation, execution and delivery of the Loan Documents satisfactory to Green Bank, (iii) all representations and warranties of the Borrower and, as may apply, Borrower's subsidiaries, affiliates and representatives in connection with the proposed Term Loan being complete and correct in all material respects and not containing any untrue statement of any material facts or omitting any material facts, (iv) the satisfaction of the conditions precedent to be contained in the Loan Documents and (v) approval of the Term Loan by Green Bank's Board of Directors.

Green Bank reserves the right to cease all discussions and negotiations at any time prior to entering into the Loan Documents without any liability whatsoever to the parties to the proposed transactions.

If you are in agreement with the terms of the transaction as described in this letter, please sign and return a copy of this letter by December 11, 2015.

THIS APPLICATION IS NOT A COMMITMENT OR AN OFFER TO MAKE A LOAN BY THE GREEN BANK.

The terms and conditions outlined in this letter are presented for a limited time only and shall expire on December 31, 2015 if not confirmed by the Borrower and returned to the Green Bank. I look forward to working with you on this matter. Please do not hesitate to contact me at (860) 257-2174 if you have any questions.

I look forward to working with you on this matter. Please do not hesitate to contact me at (860) 257-2174 if you have any questions.

Sincerely,

Bert Hunter

Executive Vice President & Chief Investment Officer Connecticut Green Bank

I/We grant to the Connecticut Bank, permission to obtain a credit report or other information on any or all of the undersigned, and to report any information concerning this transaction and events subsequent to the making of a loan by the Connecticut Green Bank, to any consumer reporting agency or person seeking such information. I/We acknowledge receipt of a photocopy of this application including the Disclosure of Rights listed above.

The foregoing is accepted by:

RENEW Energy Efficiency Bridgeport LLC

By: Stephen R. Pritchard

Title: Managing Member and Principal

Date:_____

845 Brook Street, Rocky Hill, CT 06067
T 860.563.0015
ctgreenbank.com

CONNECTICUT GREEN BANK

Memo

To: Connecticut Green Bank Board of Directors

From: Bert Hunter, EVP and CIO
Genevieve Sherman, Director of Commercial & Industrial Programs

CC: Brian Farnen, General Counsel; Bryan Garcia, President & CEO; Mackey Dykes, Vice President and Chief Operating Officer; George Bellas, VP, Finance and Administration; Ben Healey, Director Clean Energy Finance; Mike Yu, Senior Manager Clean Energy Finance; Anthony Clark, Senior Manager Commercial & Industrial Programs

Date: December 10, 2015

Re: Bridgeport International Academy Energy Services Agreement Strategic Investment

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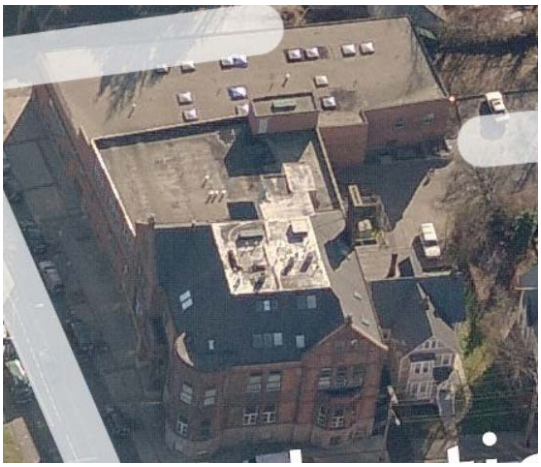
Overview

This memo proposes a nine year, $130,000 term loan (the "Loan") to Boston-based capital provider RENEW Energy Efficiency Bridgeport, LLC ("Renew" or the "Borrower") to finance the purchase and installation of multiple energy efficiency measures for the Bridgeport International Academy, Inc. ("BIA") property at 285 Lafayette Street in Bridgeport, CT. The installation of these measures shall be part of the energy services provided by Borrower to BIA pursuant to an Energy Services Agreement ("ESA"). The Loan is a strategic investment in developing the ESA product that would allow underserved markets to access energy efficiency improvements. This would be the first ESA financed by the Connecticut Green Bank ("Green Bank").

Background and Purpose

Background

The facility owned by BIA at 285 Lafayette Street, Bridgeport, CT was originally constructed in 1892 and now comprises a private school and residential property for students and faculty of about 42,000 square feet in size. The Green Bank first engaged BIA in 2013 regarding a proposed C-PACE investment to support installation of efficiency upgrades including new lighting, building management system controls, and heat pumps. At that time, the Green Bank completed a full technical and financial review of the project. On April 30, 2013, the Green Bank Deployment Committee



approved a C-PACE loan in the amount of $492,933 for BIA. On July 2, 2013, the Deployment Committee approved a request to increase the C-PACE loan amount by $87,890 to allow for inclusion of a maintenance contract, bringing the total approved C-PACE loan amount to $580,823. Unfortunately, BIA was unable to obtain the consent of their existing mortgage lenders, [redacted], to execute a C-PACE loan.

In October 2015, Renew requested a loan from the Green Bank to fund an ESA structure proposed to be used to implement the energy project at BIA. As described in greater detail below, BIA is an ideal property and host for the Green Bank's first commercial ESA. Primarily, BIA is representative of a significant pool of properties that are currently underserved by the Green Bank because they cannot qualify for C-PACE and lack options for financing deep energy retrofit projects. Additionally, the project and project partners are well known to the Green Bank: BIA previously completed thorough technical and financial due diligence via the C-PACE program, the energy contractors are registered with the C-PACE Program, and Renew is a registered C-PACE capital provider.

Off-Ramps for C-PACE

Since the launch of C-PACE in January 2013, the Green Bank has reviewed or approved nearly $40 million in projects that were ultimately unable or unwilling to execute a C-PACE loan despite great interest in implementing energy efficiency improvements. These projects have primarily been located in "public-purpose facilities" such as education, healthcare, senior living, and/or recreation and public assembly. Principal factors prohibiting their access to C-PACE have included:

- *Inability to obtain consent from existing senior mortgage lender*: In many cases, property owners have been unable to obtain consent from their existing mortgage lender for placement of the senior lien on the property needed to secure C-PACE financing. The benefits of increasing the property value and potential to improve cash flow through energy savings at the site have not proved sufficiently persuasive in many of these cases.

- *Restrictive debt covenants*: Larger institutions, particularly in the health care and education sector, may have significant outstanding debt in the form of loans or bonds (e.g. from the Connecticut Health and Educational Facilities Authority) that include restrictive covenants impeding placement of a senior lien or entering into an agreement such as a C-PACE loan that includes a right to foreclosure.

- *Insecurity around 'off-balance sheet' treatment*: Some institutional property owners have received mixed interpretations from their accountants about the off-balance sheet nature of a C-PACE loan. While the current year's C-PACE assessment would be on the balance sheet, there is some uncertainty regarding whether future year assessments (up to the total value of the C-PACE loan) should also be included.

Over the past year, Green Bank staff has been researching new financial products that could serve as an 'off-ramp' for facilities seeking financing but unable to access C-PACE. Our focus has been primarily on existing and promising energy financing structures that achieve the same benefits as C-PACE, but obviate the need to secure those energy improvements with a senior lien. A 2014 analysis for the Green Bank prepared by students at MIT explored potential financing structures to serve this market. The analysis drew upon detailed surveys with more than a dozen university, school, and hospital executives in Connecticut as well as a range of capital providers

and ESA providers, and it investigated potential financing structures that could deliver benefits similar to those offered under C-PACE, specifically:

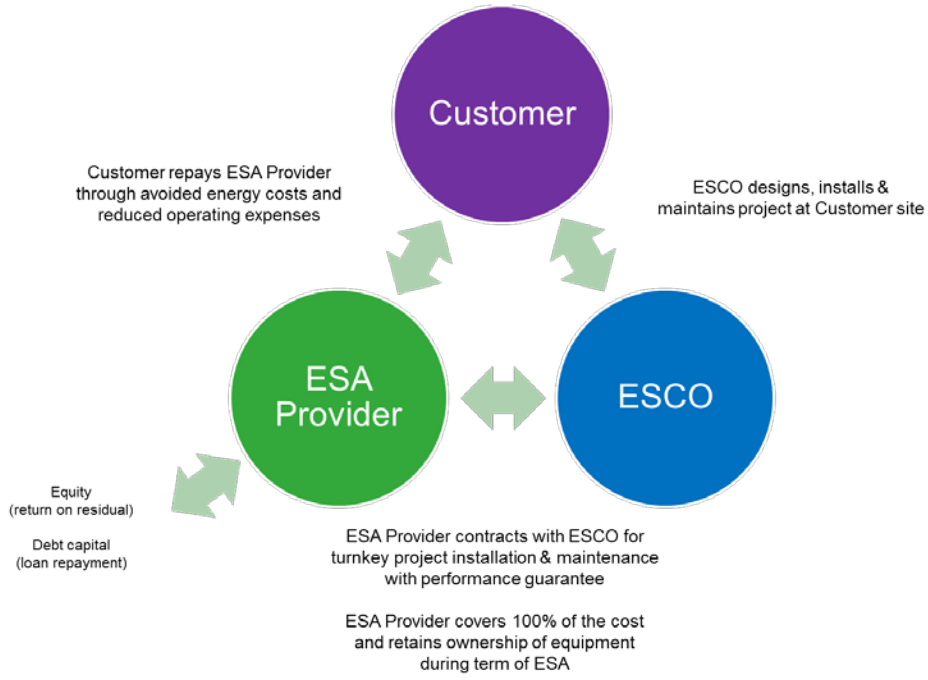
- 100% upfront financing
- Performance-based, i.e. investments are paid for through energy savings
- Capable of financing capital-intensive deep energy retrofits
- Off-balance sheet

Of several structures including Energy Services Performance Contracts, equipment leases, and ESAs, attributes of the ESA model discussed below made it the most attractive of the options considered.

About Energy Services Agreements

The ESA is a relatively new and promising model for financing deep energy retrofits, especially at public purpose facilities that are capital constrained, credit challenged, or both. An ESA is akin to a Power Purchase Agreement ("PPA") in that a property owner can contract for a specified term to purchase energy services in exchange for a fee. The key difference for an ESA vs. a PPA is that the stream of energy being delivered during the course of the agreement is created through energy efficiency savings ("negawatts") rather than production of power from a generation source. The host site property owner receives the benefit of installation of energy conservation measures with little or no upfront cost and pays for the use of that equipment through savings associated with reduced energy costs. Ownership of the Energy Conservation Measures ("ECMs") is retained by the ESA provider (as depicted in the diagram below) for the term of the ESA; an option to purchase the equipment at the end of the term is specified in the ESA. The ESA provider finances the improvements, thus distancing the facility from any debt obligation.

General ESA Structure



Proposed Strategic Loan

In the course of conducting ESA research and due diligence on this proposed transaction, Green Bank staff has identified a lack of capital available today to fund ESA transactions at terms that preserve the unique benefits of ESAs as outlined in the previous section. While the 100% upfront financing and off-balance sheet characteristics are achievable, there are challenges to sourcing longer term financing that allows for investing in deep energy retrofits with ESA payments that can be serviced through realized energy savings.

The unsecured nature of ESAs and the credit challenges faced by many public purpose facilities lead available lenders to require shorter terms and higher rates of return than can adequately be paid for through the cost and energy savings. For example, the initial ESA proposal presented to BIA was funded entirely through expensive equity capital over a short term, resulting in a reduced scope of work and much less cash flow for BIA itself.

The proposed strategic loan structure presented here is a pilot for the Green Bank as we investigate models that can attract cost-effective debt capital into an ESA structure in such a way that is scalable and that retains the core benefits of the ESA structure for public purpose facilities.

Terms and Conditions

The proposed $130,000 term loan will represent no more than 25% [redacted] of the capital required to complete the project. The Green Bank's loan will co-fund an investment consisting of multiple ECMs, to be disbursed in a single advance at the Commercial Operating Date (as defined in the ESA).

Renew will provide 100% of the funding to Borrower required for construction and implementation of the project. Upon project completion and commissioning (as referenced in the term sheet attached hereto as Appendix 1), Renew will receive 100% of the incentives from the Energy Efficiency Fund.

The term of the Loan shall be 9 years, matching that of the ESA, [redacted]. Upon the maturity date of the Loan, in addition to payment of any remaining outstanding principal and interest due, the Borrower shall make a payment to the Green Bank of the lesser of either (1) $30,000, or (2) the Fair Market Value of the Equipment (both terms as defined in the ESA). Inclusive of this final payment, the overall rate of return to the Green Bank's investment [redacted] somewhat more than C-PACE pricing for a similar term but appropriate considering the lack of the C-PACE lien.

Collateral

1. First priority lien on all personal property of Borrower.

2. Collateral assignment of the ESA by and between Borrower and BIA. The ESA contract requires BIA to make fixed payments that are predetermined based on projected energy savings. The ESA contract includes operations and maintenance services to ensure savings are realized.

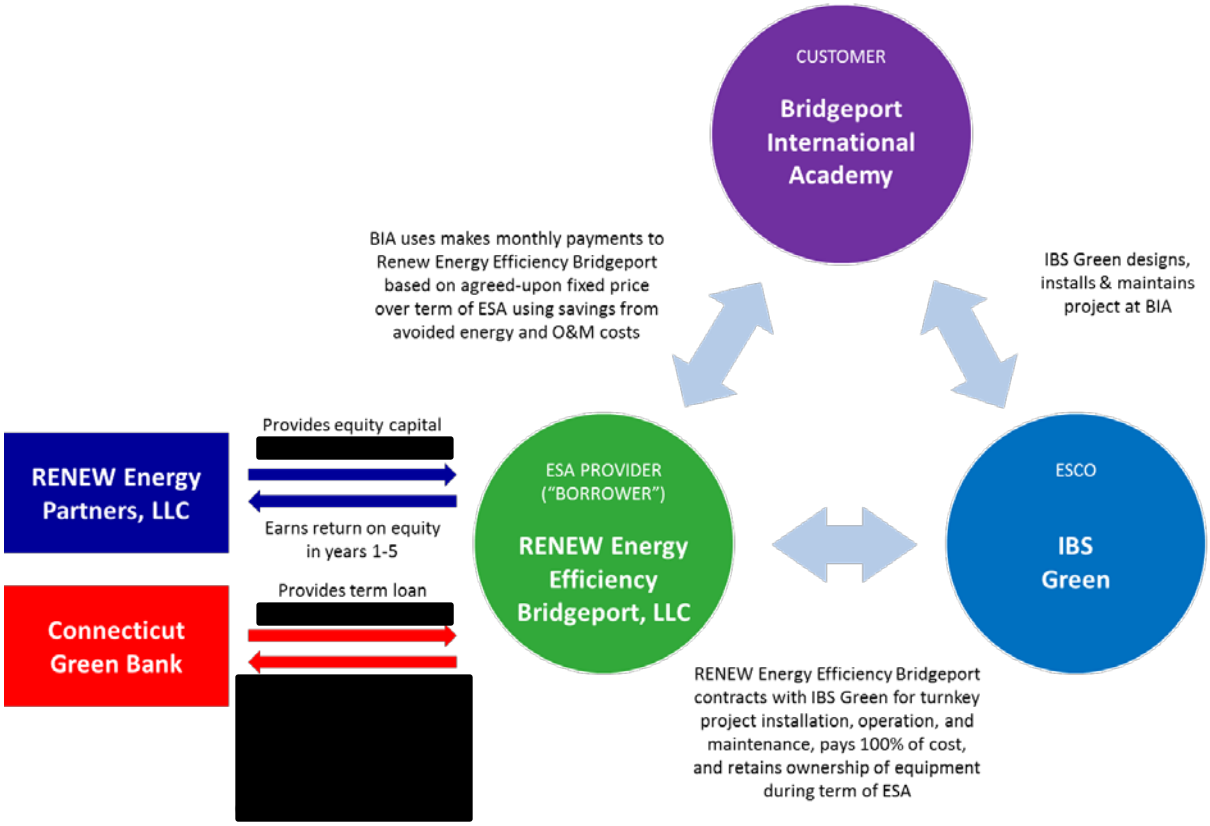
3. Collateral assignment of the Engineering, Procurement and Construction ("EPC") Contract by and between Borrower and Integrated Building Services, LLC.

In addition, Borrower shall exercise diligent efforts to acquire a lien on the Property, which would be subordinate to any mortgage on the property.

Repayment

The Green Bank will establish and hold an operating account (the "Operating Account"). For the term of the Loan, BIA's payments under the ESA will be remitted directly to the Operating Account. Loan payments will be auto-deducted monthly from the Operating Account and the remainder will be remitted to the Borrower in accordance with the Loan. Monthly term loan payments to the Green Bank shall be [redacted].

Detailed Capital Flow Diagram



Scope of Work for Energy Services Agreement

1. Remove and replace 19 vintage 1996 water source heat pumps (WSHPs) throughout the building. New units will be Carrier WSHPs of various sizes to address the needs of the space being conditioned. Retrofit 2 WSHPs and install in new location.
2. Install a Johnson Controls Building Management System controlling the WSHPs.
3. Install Variable Frequency Drives on 2 ea. 10 HP circulating pumps.
4. Remove and replace 3 HVAC split system units. New Units will be Carrier 24ABB 16 SEER.
5. Provide and install New LED bulbs and LED fixtures throughout the building. Provide and install motion sensors throughout the building as per the attached lighting schedule.
6. Provide Measurement and Verification of the energy savings for a period of 5 years.

Strategic Plan

Is the program or project proposed, consistent with the Board approved Comprehensive Plan and Budget for the fiscal year?

The FY16 budget includes $250,000 for ESAs, which this investment will draw upon. In particular, this investment supports our priority to develop an Institutional Off-Credit ESA Program outlined in the 2015-2016 Comprehensive Plan.

The Green Bank previously tested an off-credit ESA model through a $1 million pilot program called Campus Efficiency Now. This off-balance sheet and off-credit ownership and financing approach is critical for credit constrained facilities. Green Bank staff believes the off-credit ESA model is viable in Connecticut, and could provide an important off-ramp for projects unable to use C-PACE.

Staff believes that the ESA for BIA fits well within the requirements for a Strategic Selection from the Connecticut Green Bank Operating Procedures Section XII:

- **Special Capabilities**: Renew is focused on developing ESAs specifically for public purpose facilities.
- **Uniqueness:** BIA is highly representative of the type of public purpose building with an unsuccessful C-PACE project for whom the Green Bank seeks to provide alternative financing to enable deep energy retrofits and cost savings. The relatively small project and limited amount of Green Bank dollars at risk provides an excellent opportunity to learn about the ESA structure and build towards a more programmatic approach where the Green Bank's position in such projects will be further leveraged through cost-effective, debt capital. BIA is well known to the Green Bank given previously conducted due diligence on the property.
- **Strategic Importance**: As outlined in the 2015-2016 Comprehensive Plan, exploring an off-balance ESA product that can also serve as a C-PACE off-ramp is a priority for the Green Bank. This project will provide proof-of-concept and enable replicability and scale with capital providers interested in this structure. Successful funding of the project will also serve as a "win" with the local contractor who previously invested significant time in our C-PACE program and build confidence with our contractors that the Green Bank is solution-oriented.
- **Urgency and Timelines**: The project timing is driven by core operational and seasonality needs in the facility. The project is also 'shovel-ready' with a vetted lending partner (Renew) and vetted off-taker (BIA).
- **Multiphase Project**: This project can serve as an important building block in the above-mentioned strategic priority to explore the viability of ESAs.

Ratepayer Payback

How much clean energy is being produced (i.e. kWh over the projects lifetime) from the project versus the dollars of ratepayer funds at risk?

The project is projected to deliver annual savings of 333,254 kWh of electricity and 1,957 therms of natural gas. The combined savings over nine years, when converted to MMBtu,

total 11,988 MMBtu. Given the $130,000 total investment, the objective function result is 0.09 MMBtu saved per dollar at risk.

Capital Expended

How much of the ratepayer and other capital that Green Bank manages is being expended on the project?

Total capital expended would be $130,000

Risk

What is the maximum risk exposure of ratepayer funds for the project?

The maximum exposure is $130,000, the total of the proposed strategic investment loan.

The key risk factor for this project would be the failure of the ESA provider to make loan payments to the Green Bank as outlined in the term sheet. If this were to occur, the Green Bank has the right to take over the ESA contract and directly receive payments from BIA contracted under the ESA. The Green bank would also obtain ownership of the ECMs installed pursuant to the ESA.

As part of our loan agreement, the Borrower also agrees to diligent pursuit of a junior lien on the real property of BIA.

Key Project Partners

RENEW Energy Partners, LLC

Formed in early 2013, Boston-based RENEW Energy Partners is a provider of energy efficiency and clean energy project development and financing solutions to commercial, industrial and institutional customers, and is a certified capital provider under C-PACE. The firm's principals are Stephen Pritchard, formerly the President of I-Group, a private equity company with a $1.8 billion real estate and infrastructure investment portfolio, and Charles Lord, previously Manager of C-Quest Capital, a project developer and financier of carbon-reducing projects in Africa, India and Latin Africa. In 2014, Renew signed an agreement with Advanced Energy Capital ("AEC"), an energy finance company, to provide project financing for up to $25,000,000 in energy efficiency and clean energy retrofit projects in commercial, institutional and industrial buildings. Renew is focused on utilizing these funds to capitalize C-PACE loans and ESAs in commercial and non-profit facilities.

RENEW Energy Efficiency Bridgeport LLC

RENEW Energy Efficiency Bridgeport, LLC is a limited liability company and affiliate of RENEW Energy Partners, LLC, that will serve as the borrower for the Green Bank loan and is the ESA provider for Bridgeport International Academy.

IBS Green Integrated Building Services

IBS Green was the contractor for the proposed 2013 C-PACE project and is the contractor for the current proposed ESA project. IBS Green is a local building services company that specializes in

sustainability, from energy efficiency audits to integrated clean energy deployment to turnkey project management and owner's representation services.

Financial Statements

How is the project investment accounted for on the balance sheet and profit and loss statements?

The loan would result in a $130,000 reduction of Unrestricted Cash on the Green Bank's balance sheet and an equivalent increase in promissory notes receivable.

Resolutions

WHEREAS, in accordance with (1) Connecticut Green Bank's ("Green Bank") statutory mandate to foster the growth, development and deployment of clean energy sources that serve end use customers in the State of Connecticut, (2) the State's Comprehensive Energy Strategy and (3) Green Bank's Comprehensive Plan for Fiscal Year 2015 and 2016 (the "Comprehensive Plan") Green Bank continuously aims to develop financing tools to further drive private capital investment in clean energy projects in the commercial and industrial market sector;

WHEREAS, the Green Bank wishes to continue its support and commitment to driving investment in comprehensive clean energy projects in public purpose facilities underserved by current financing products and not well addressed by C-PACE;

WHEREAS, RENEW Energy Efficiency Bridgeport, LLC ("Borrower"), a limited liability company and affiliate of RENEW Energy Partners, LLC, is seeking financing from the Green Bank for the purchase and installation of multiple energy efficiency measures at a facility owned by Bridgeport International Academy, Inc. ("BIA"), a Connecticut nonprofit organization, located at 285 Lafayette Street, Bridgeport, CT. The installation of these measures shall be part of the energy services provided by Borrower to BIA pursuant to an Energy Services Agreement ("ESA") with a term of nine years (the "BIA ESA Project"); and

WHEREAS, Green Bank staff recommends that the Board of Directors approve a strategic selection and award of a term loan not to exceed **$130,000** (the "Loan") to Borrower to finance the BIA ESA Project because advantages of this strategic selection and award clearly outweigh the general public interest in an open and public process for the following reasons: the special capabilities of RENEW Energy Partners, LLC in developing such ESA projects, the uniqueness of the BIA ESA Project and its leverage, and the strategic importance and urgency of reducing energy costs for a nonprofit organization in a distressed municipality.

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors approves the Loan to Borrower for development of the BIA ESA Project as a strategic selection and award pursuant to the Green Bank Operating Procedures Section XII;

RESOLVED, that the President of the Green Bank and any other duly authorized officer is authorized to execute and deliver the Loan with terms and conditions consistent with the memorandum submitted to the Board dated December 11, 2015, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from the date of authorization by the Board of Directors; and

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

Submitted by: Bryan Garcia, President and CEO; Bert Hunter, EVP and CIO; Genevieve Sherman, Director of Commercial and Industrial Programs.

Appendix 1: Term Sheet

[Attached separately.]

CONNECTICUT GREEN BANK

845 Brook Street
Rocky Hill, Connecticut 06067

300 Main Street, 4th Floor
Stamford, Connecticut 06901

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www.ctcleanenergy.com

Memo

To: Connecticut Green Bank Board of Directors

From: Mariana Trief, Manager, Clean Energy Finance

Cc: Bryan Garcia, President and CEO; Bert Hunter, EVP and CIO; Brian Farnen, General Counsel and CLO; Mackey Dykes, COO; George Bellas, VP Finance and Administration; Kerry O'Neill, Managing Director of Residential Programs; Kim Stevenson, Associate Director of Multifamily Programs; Ben Healey, Director, Clean Energy Finance

Date: December 11, 2015

Re: Green Bank Guaranty and Program Agreement for the Housing Development Fund

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Background

On June 30, 2014, the Connecticut Green Bank ("Green Bank") submitted a proposal to the John D. and Catherine T. MacArthur Foundation ("MacArthur") for a Program Related Investment ("PRI") in the amount of $5,000,000 to support the Green Bank's efforts to accelerate energy efficiency and clean energy upgrades in affordable multifamily properties across the state of Connecticut (see Exhibit A). On January 16, 2015, the Green Bank's Board of Directors authorized the Green Bank to execute and accept the $5,000,000 MacArthur PRI (see Exhibit B).

Upon the Board of Director's approval, MacArthur and the Green Bank proceeded to finalize documentation and diligence. The two parties, however, were unable to close on a final funding agreement, due to the fact that state contracting rules associated with the Green Bank's quasi-public status include a number of terms that presented compliance challenges for MacArthur as an out-of-state charitable foundation. Nevertheless, both MacArthur and the Green Bank have remained committed to finding a solution to this state contracting challenge, so that the PRI can proceed and MacArthur can support affordable multifamily clean energy efforts throughout Connecticut, both for their own sake and as a model that – through state-based networks and the growing green bank movement – may spread across the country.

HDF Participation and Green Bank Guaranty

As a solution to the standstill with MacArthur with respect to documentation, the Green Bank and MacArthur sought out a third party to receive and administer the MacArthur Funds, with the goal of sourcing an organization that shares the Green Bank's programmatic goals, has experience in the state's affordable multifamily sector, and maintains a robust and proven lending platform. The Housing Development Fund ("HDF") meets all three criteria, and is

already a trusted partner of the Green Bank, having administered the Cozy Home Loan program on the Green Bank's behalf. Additionally, HDF is active in national affordable housing networks.

At this point, the Green Bank and HDF have held multiple discussions, and HDF's Board of Directors has provided preliminary consent to proceed with documentation. The following summarizes the main aspects of the proposed structure:

HDF's responsibilities with respect to the MacArthur PRI would include:

- Receive the $5 million PRI from MacArthur ("MacArthur Funds") and undertake the obligation to repay MacArthur (i.e. both principal and interest) according to a mutually agreed upon amortization schedule;
- Using MacArthur Funds, provide financing to qualifying owners of eligible multifamily properties ("Program Loans"), according to criteria and terms as determined collaboratively between the Green Bank and HDF and consistent with the original Green Bank proposal to MacArthur; and,
- Approve, administer and service all Program Loans made using MacArthur Funds. This includes underwriting and approving loans consistent with mutually agreeable programmatic guidelines and as sourced by the Green Bank and other channel partners, closing loans, disbursing funds, and managing the servicing of all Program Loans financed using MacArthur Funds.

The Green Bank's main responsibilities would include:

- Provide a guaranty to HDF, in an amount not to exceed $5,000,000, for all Program Loans made using the MacArthur Funds, and hold HDF harmless for any losses associated with Program Loans;
- Formulate programmatic and underwriting guidelines for the various financing programs to be capitalized using MacArthur Funds, in collaboration with HDF;
- Support HDF in drafting policies and procedures for each program;
- Conduct marketing and serve as a source of origination for each program, both directly and through various channel partners;
- Directly underwrite applications for financing and advise HDF as to each applicant's suitability for financing using MacArthur Funds, in collaboration with HDF and in instances where HDF is not managing the underwriting process; and,
- Support HDF in managing and servicing Program Loans, as necessary and as mutually agreed by HDF and Green Bank.

For its services, the Green Bank would also agree to pay HDF an amount not-to-excee[redacted] annually, with the following breakdown of fees: an annual fixed administrative fee set at [redacted] per annum, a direct pass-through loan servicing fee, carrying costs associated with the interest payments on the PRI due to MacArthur, and HDF's related legal fees (including preparation of all loan documents for loans made using MacArthur funds). To be clear, the Green Bank would have to directly bear the majority of these expenses (i.e. the carrying costs associated with the MacArthur Funds, Program Loan servicing fees, and legal fees) if we were not to partner with HDF anyway, so the only "additional expense" proposed herein is for HDF

administration. From staff's perspective, this [redacted] per annum is a good use of funds, given limited internal capacity at the Green Bank to run this program directly.

The Green Bank presented the proposed strategy with HDF to MacArthur on September 30, 2015 (see Exhibit C) and has received preliminary approval from MacArthur's Investment Committee. The proposed strategy with HDF is set to be formally approved by MacArthur's Board of Directors in December, 2015.

Strategic Selection

Due to the nature of this engagement with HDF, Green Bank staff believes that the proposed agreement with HDF fits well within the requirements for a Strategic Selection from the Connecticut Green Bank Operating Procedures Section XII:

- Special Capabilities: HDF shares the Green Bank's programmatic goals at an organizational level, has deep experience in the state's affordable multifamily sector, and maintains a robust and proven lending platform. Most importantly, HDF is a trusted partner from the MacArthur perspective and has met MacArthur's diligence criteria to receive these funds.

- Uniqueness: MacArthur has uniquely underwritten HDF to play this role. If we do not proceed with this partner, these funds will not flow into Connecticut.

- Strategic Importance: Mobilizing this low-cost capital from MacArthur is critical to achieving the Green Bank's goals in the multifamily sector. Staff expects to partner with HDF to deploy MacArthur funds in advancing our predevelopment loan initiatives, in deepening our focus on financing health and safety improvements that are preventing energy upgrades from occurring in affordable multifamily properties, and in lending initiatives with partners where more "patient capital" is required, among other priorities.

- Urgency and Timelines: MacArthur is ready to close and fund this PRI. After the incredibly long lead time associated with this engagement, now is the time to act.

- Multiphase Project: This partnership with HDF will serve as the springboard for not only a significant amount of direct lending, but also for broader initiatives, as this deployment of MacArthur funds will allow the Green Bank to further develop our various programmatic approaches to the challenge of financing energy upgrades in affordable multifamily properties.

Conclusion

Given the attractive nature of the MacArthur PRI, and the Green Bank's ability to leverage it alongside the work we already undertake with HDF, we believe the approach outlined in this memo is both practicable and will lead to programmatic success as the Green Bank works to further support energy efficiency and clean energy upgrades in Connecticut's affordable multifamily housing sector. From a capital at risk and programmatic objective perspective, the approach is consistent with the proposal submitted to the Board in January 2015, excepting the strategic collaboration with HDF and the associated, limited administrative expense. Accordingly, staff recommends approval by the Board per the resolutions attached.

Resolutions

WHEREAS, the Connecticut Green Bank ("Green Bank") is actively seeking to deploy private capital to support clean energy upgrades in the state's affordable multifamily housing sector;

WHEREAS, the John D. and Catherine T. MacArthur Foundation ("MacArthur") offers concessionary financing in the form of Program Related Investments ("PRIs") to support core social welfare goals;

WHEREAS, MacArthur agreed to make a PRI in the amount of $5,000,000 (the "MacArthur Funds") to support the Green Bank's efforts to accelerate energy efficiency and clean energy upgrades in affordable multifamily properties across the state of Connecticut;

WHEREAS, MacArthur selected the Housing Development Fund ("HDF") to receive and administer the MacArthur Funds;

WHEREAS, the Green Bank proposes to pay HDF an annual amount not-to-exceed [redacted] on a contracted, renewable basis, which amount shall include an annual fixed administrative fee initially set at [redacted] per annum, a direct pass-through loan servicing fee, carrying costs associated with interest payments on the PRI due to MacArthur, and related legal fees;

WHEREAS, the Green Bank proposes extending a guaranty (the "Guaranty"), in an amount not to exceed $5,000,000, to HDF for the purpose of securing loans for energy upgrades and clean energy to affordable multifamily owners made with MacArthur Funds; and

WHEREAS, the proposed Guaranty qualifies as a strategic selection and award pursuant to Green Bank Operating Procedures Section XII due to HDF's proven experience in the state's affordable multifamily sector, the organization's robust and proven lending platform, and MacArthur's independent selection of HDF as an appropriate recipient of its PRI funds.

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors ("Board") authorizes the President of the Green Bank and any other duly authorized officer of the Green Bank, to pay HDF for its services and execute and deliver the Guaranty materially consistent with the memorandum submitted to the Board dated December 11, 2015, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from the date of authorization by the Board; and

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

Submitted by: Bryan Garcia, President and CEO; Bert Hunter, EVP and CIO; Ben Healey, Director, and Mariana Trief, Manager, Clean Energy Finance

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CLEAN ENERGY
FINANCE AND INVESTMENT AUTHORITY

Memo

To: Connecticut Green Bank Board of Directors

From: Ben Healey, Assistant Director

Cc: Bryan Garcia, President and CEO; Bert Hunter, EVP and CIO; Brian Farnen, General Counsel and CLO; Mackey Dykes, COO; George Bellas, VP Finance and Administration; Kerry O'Neill, Director of Residential Programs; Kim Stevenson, Associate Director of Multifamily Programs

Date: January 16, 2015

Re: $5,000,000 Program Related Investment from the MacArthur Foundation

---

Background

On June 30, 2014, the Connecticut Green Bank ("Green Bank") sent a proposal to the John D. and Catherine T. MacArthur Foundation ("MacArthur") for a Program Related Investment ("PRI")[1] in the amount of $5,000,000 to support our efforts to drive clean energy deployment in affordable multifamily properties across the state. This sector is a priority for the Green Bank, as the affordable portion of the state's housing stock, defined as units housing families who earn 80% of area median income or below, represents about 507,000 units, or 34% of CT's total housing units. Properties with low-income residents run the gamut from single-family owner-occupied homes to small and large investor-owned buildings. However, across the board, affordable housing in CT suffers from years of deferred maintenance, as well as a lack of public investment under prior administrations, now changing under Governor Malloy. Many owners in the affordable multifamily market (whether naturally occurring or subsidized) are less sophisticated and much more stretched than is true of owners in the traditional commercial and industrial market. Consequently, developing energy upgrade projects to a point where they are ready for financing is a huge challenge and requires significant technical support to owners.

Despite the challenges in addressing this sector, the fact is that low-income residents bear a brutal utility cost burden, and so it is critical that Green Bank-supported programs target affordable properties in order to lower total energy/operating costs and tenant utility costs for those for whom these expenses are hardest to bear. Furthermore, in order to maximize the benefits of our programs, the Green Bank seeks to offer comprehensive financing solutions that address deferred

[1] Program Related Investments (PRIs) are investments made by foundations to support social welfare activities that involve the return of capital within an established timeframe. PRIs include financing methods commonly associated with banks or other private investors, such as loans, loan guarantees, linked deposits, and even equity investments in charitable organizations or in commercial ventures, with concessionary rates and terms

maintenance, health and safety, and energy improvements, including both efficiency and clean energy generation, all at the same time.

MacArthur, as one of the nation's largest independent foundations, has a suite of U.S. programs focused on issues that align well with the Green Bank, including both community and economic development writ broadly, as well as housing, with a focus on the preservation of affordable rental housing. Since 1978, MacArthur has paid out $5.5 billion through nearly 22,000 grants and PRIs to more than 7,900 organizations and individuals in the United States and around the world, with $228.4 million paid out in 2013 alone.

With respect to its "impact investing" strategy, MacArthur has allocated $300 million at the foundation level to making investments that advance core programmatic priorities, with a goal of unlocking new, more, and more useful or suitable forms of capital for targeted populations, regions, sectors or markets. Similar to the Green Bank, MacArthur sees a PRI into the affordable multifamily clean energy market as an opportunity to provide a meaningful test-bed for innovation and development – giving new projects and, indeed, an entire sector, the opportunity to demonstrate creditworthiness and value by successfully repaying loans and generating positive financial returns.

Proposal

The Green Bank's June 30, 2014 proposal to MacArthur is attached to this memo as Exhibit A, but a high-level overview of the Green Bank's proposed uses of MacArthur funds follows below:

> *[The Green Bank will create] at least three new, integrated products, to fill gaps that the Green Bank has identified as critical obstacles to advancing energy saving, emissions reducing projects in the multifamily sector:*
>
> *(1) A high risk, revolving predevelopment loan fund to cover the costs of energy opportunity assessments, audits, and project scope definition – the **Energy Opportunity Assessment Loan Fund;***
>
> *(2) A loan pool to finance remediation of unfunded health and safety measures (i.e. asbestos, mold, leaking roofs, etc.) that must be addressed before energy improvements can be installed – the **Healthy Homes Loan Fund;** and*
>
> *(3) Term financing to bridge gaps and provide a lower weighted average cost of capital for viable projects where projected energy savings don't quite cover financing costs, and which would not otherwise close without additional, subordinate and/or less costly financing – the **Finish Line Loan Fund.***

MacArthur has since accepted this proposal, indicated the foundation's eagerness to support the Green Bank's initiatives in this effort, and given us a draft term sheet for this PRI (see Exhibit B), with a goal of closing in February 2015. Although this term sheet is not yet finalized, the most important terms to the Green Bank are as follows:

- Principal of $5,000,000, to be drawn in (at least) two separate disbursements
- Interest rate of 1%, to be paid quarterly, with a back-ended amortization in the last four years of the loan
- Tenor of 15 years
- The PRI will be unsecured, but with full recourse to the Green Bank

Given the attractive nature of this financing, and the Green Bank's ability to leverage it alongside our partners to support energy upgrade investments in Connecticut's affordable multifamily housing sector, Green Bank staff is now looking forward to closing this loan and putting MacArthur's capital to work.

Resolutions

WHEREAS, the Connecticut Green Bank ("Green Bank") is actively seeking to deploy private capital to support clean energy upgrades in the state's affordable multifamily housing sector;

WHEREAS, the John D. and Catherine T. MacArthur Foundation ("MacArthur") offers concessionary financing in the form of Program Related Investments ("PRIs") to support core social welfare goals;

WHEREAS, Pursuant to Section 99 of Public Act No. 11-80 of the Connecticut General Assembly, as amended from time to time (the "Act"), the Green Bank is authorized to accept both charitable gifts and loans from philanthropic foundations; and

WHEREAS, the Green Bank drafted a proposal to MacArthur dated June 30, 2014, which the latter has accepted, for a $5,000,000 PRI to support three or more new multifamily clean energy financing programs in Connecticut;

NOW, therefore be it:

RESOLVED, that the President of the Green Bank and any other duly authorized officer of the Green Bank, is authorized to execute and accept the MacArthur PRI, and in so doing obligate the Green Bank in a total amount not to exceed $5,000,000 with terms and conditions consistent with the memorandum and associated exhibits submitted to the Board of Directors dated January 16, 2015, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from January 23, 2015; and

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

Submitted by: Bryan Garcia, President and CEO; Bert Hunter, EVP and CIO; Ben Healey, Assistant Director

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CLEAN ENERGY
FINANCE AND INVESTMENT AUTHORITY

Memo

To: Mijo Vodopic and Allison Clark, MacArthur Foundation

From: Ben Healey and Kim Stevenson, CEFIA

Date: June 30, 2014

Re: Proposal for $5 Million Program Related Investment into Connecticut's Multifamily Housing Sector for Clean Energy and Energy Efficiency Upgrades

---

Background

The Connecticut legislature established the Clean Energy Finance and Investment Authority (CEFIA) as a quasi-public agency on July 1, 2011 through Public Act 11-80. As the nation's first state "Green Bank"[1], CEFIA leverages public and private funds to drive investment and scale up clean energy deployment across the state, thereby lowering carbon emissions, creating jobs, and adding significant value to the state's built environment.

In 2013, after early success financing energy upgrades in the state's single-family residential and commercial markets, CEFIA's Board of Directors recognized that the multifamily sector was particularly difficult to serve, and instructed staff to develop a comprehensive approach to addressing the energy upgrade needs of multifamily properties. Thus, over the past year, CEFIA has built deep partnerships with established multifamily stakeholders, created targeted financing programs, and initiated energy efficiency and renewable energy demonstration projects. This approach has 1) helped CEFIA determine how best to bring both capital and technical assistance to the table, as well as broader market coordination and a pragmatic, "one- stop-shopping" approach, as well as 2) uncovered various barriers to success. Cost-effective, carbon emission reducing projects do not move forward for a number of reasons – from the high cost of energy audits, to health and safety issues, to energy savings that do not quite cover capital costs due to a mismatch between financing terms and project needs.

With those obstacles in mind, but also in the context of CEFIA's initial multifamily financing programs and strategies already in place, CEFIA is now requesting $5 million from MacArthur in the form of a long-term, low-cost Program Related Investment (PRI) to capitalize a new set of revolving and term loan products that can be put to work to further animate this market. These products would complement CEFIA's existing suite of offerings and fit within the coordinated multifamily energy upgrade finance machine that we are working to build. These MacArthur funds would not only help CEFIA leverage significant private capital in the short term, but would also demonstrate to investors the scalability and long-term financial viability of the broader multifamily energy upgrade market.

[1] Pursuant to Public Act 14-94, CEFIA was recently renamed the "Connecticut Green Bank".

CEFIA's Strategic Approach to the Multifamily Sector

As MacArthur knows well, successfully navigating the multifamily market is no easy task. There are obstacles throughout the value chain: challenges securing financing, split incentives between owners and tenants, and a lack of reliable performance data and case studies that might help build investor confidence. All of these difficulties are exacerbated by an often byzantine and intractable implementation process. Therefore, key tenets of CEFIA's operating strategy are as follows:

- Attract and partner with **national leaders** who have deep experience and a record of success in the multifamily market (that is, those who know how to build deal flow, run programs, and close win-win transactions);
- Identify existing programs and centers of excellence in Connecticut and use CEFIA's leadership position to help **coordinate, rationalize, and leverage resources** among fragmented players, and fill critical gaps where needed;
- Take a **portfolio approach** to program development. CEFIA recognizes that innovation and risk-taking always comes with some failures, and a portfolio approach allows for minimizing overall risk. By building on what's working and cutting losses on what is not, CEFIA can ensure that everyone is benefitting from lessons learned; and
- **Simplify, streamline and clarify**. CEFIA steadfastly refuses to accept the status quo with respect to how difficult it is for multifamily property owners to negotiate the energy upgrade process. Impediments are exacerbated in affordable housing, which involves a complex maze of funders and requirements that can stymie even the most motivated property owner.

In the past, CEFIA has shared our guiding multifamily strategy documentation with MacArthur (included for convenience as an attachment to this proposal), and so we won't repeat it here. Suffice it to say that the partnerships described in that strategy document have been solidified and work is well underway on each front with: CEFIA's Commercial Property Assessed Clean Energy (C-PACE) Multifamily Partner, Urban Ingenuity; New Ecology, Inc. (NEI); the Connecticut Housing Investment Fund (CHIF); and the Connecticut Housing Finance Authority (CHFA).

Current CEFIA Initiatives

CEFIA currently offers a suite of products and services to help multifamily property owners and managers navigate the energy improvement process, access financing, and implement high quality projects, inclusive of remediation of health and safety problems.

Commercial Property Assessed Clean Energy (C-PACE): C-PACE allows commercial, industrial, and multifamily property owners to access affordable, long-term financing for energy upgrades to their buildings by placing a voluntary assessment on their property tax bills. Loan terms are up to 20 years with interest rates presently of 6% or less, and repayment obligations transfer automatically to subsequent owners when properties are sold. CEFIA has partnered with Urban Ingenuity to support both market rate and affordable multifamily property owners in taking advantage of C-PACE financing, generally for larger projects.

Low-Income Multifamily Energy (LIME) Loan: LIME is a new initiative of the Connecticut Housing Investment Fund (CHIF), a Hartford-based Community Development Financial Institution with whom CEFIA has partnered to expand financing resources for multifamily housing that serves low-income

residents. This product is an unsecured loan, with interest rates in the 6% - 6.5% range and terms of up to 12 years. LIME is ideal for smaller, affordable multifamily properties.

CEFIA Credit Enhancement Request for Proposals (RFP): For projects that don't fit neatly into either the C-PACE or LIME buckets, CEFIA has also released an RFP for partners to propose how CEFIA credit enhancements could drive financing for energy efficiency and renewable energy upgrades in specific multifamily properties or portfolios. CEFIA sees this RFP as an opportunity to learn from the market what new products and approaches we might need to surface to address this sector holistically.

Technical Assistance and Energy Opportunity Assessments: CEFIA is offering multifamily property owners support in navigating the energy retrofit and green building construction process, thanks to the engagement of program partner New Ecology, Inc. (NEI). This support includes complete one-stop-services for owners, such as any combination of energy benchmarking, assessments and audits, cost estimation, construction management, and performance monitoring.

Solarize – State Sponsored Housing Portfolio (SSHP): In collaboration with CHFA, multifamily SSHP properties will be assessed for the potential to install photovoltaic arrays and solar thermal systems to provide distributed generation of electricity and/or hot water. Solarize is a highly successful, proven "group purchasing" model that has been adopted in over 40 Connecticut communities to date. It includes significant group discounts, preselected installers, outreach, and a clear end date to encourage owners to go solar.

Multifamily Energy Efficiency Demonstration Program: CEFIA has partnered with the Connecticut Housing Finance Authority (CHFA) to administer a demonstration program for five multifamily properties seeking to invest in energy upgrades, with the goal of replicating successful results across CHFA's entire portfolio. Program delivery partners include K.A. Dorgan Architecture & Planning, NEI, Urban Ingenuity, Sustainable Real Estate Solutions (CEFIA's C-PACE Technical Program Administrators), and Connecticut's local utility companies. The goal of the pilot is to develop a streamlined, cross-agency service and financing delivery model for multifamily energy projects. As we are currently well into program execution, this effort is already proving to be an invaluable platform – providing real world projects to flesh out and solve critical issues in the existing, difficult-to-navigate multifamily energy improvement process. Lessons from this pilot will give CEFIA, CHFA, and our utility partners an opportunity to define, streamline, clarify, and simplify, as well as educate the market with respect to best practices.

Proposed Use of MacArthur Investment

The proposed MacArthur PRI would be used to support at least three new, integrated products, to fill gaps that CEFIA has identified as critical obstacles to advancing energy saving, emissions reducing projects in the multifamily sector:

(1) A high risk, revolving predevelopment loan fund to cover the costs of energy opportunity assessments, audits, and project scope definition – the ***Energy Opportunity Assessment Loan Fund;***

(2) A loan pool to finance remediation of unfunded health and safety measures (i.e. asbestos, mold, leaking roofs, etc.) that must be addressed before energy improvements can be installed – the ***Healthy Homes Loan Fund;*** and

(3) Term financing to bridge gaps and provide a lower weighted average cost of capital for viable projects where projected energy savings don't quite cover financing costs, and which would not otherwise close without additional, subordinate and/or less costly financing – the ***Finish Line Loan Fund.***

Energy Opportunity Assessment Loan Fund

As CEFIA has launched its various multifamily initiatives, the biggest impediment to moving projects forward is the high cost of taking the very first step: completing a reliable energy assessment to evaluate savings potential and scope out a smart implementation plan. Doing so requires a high risk investment of time and capital that most owners, particularly owners of affordable multifamily housing, simply don't have, regardless of how great the energy savings potential might be. From the very beginning of the process, multifamily owners face a seemingly insurmountable barrier.

The Energy Opportunity Assessment Loan Fund will provide predevelopment funds to complete this upfront work. Critically, it will be marketed alongside CEFIA's multifamily products, making it clear to owners that term financing is available from the start and that it is accessible from a one-stop-provider. CEFIA will support owners in securing well-qualified contractors, including NEI, for this work. The loan will be repaid at closing and wrapped into long-term project financing. If a project is unable to move forward for legitimate reasons beyond the owner's control, then the loan will be forgiven. Owners will be required to contribute up to 25% of total predevelopment costs to ensure their commitment to the project.

PROJECT EXAMPLE – MT. CARMEL CONGREGATE, HAMDEN, CT

Property Profile: Congregate Housing is a 30-unit, elderly affordable housing development owned by the Hamden Housing Authority. The building was originally constructed in the 1920's as a school building and was converted into multifamily housing in 1982. Planned energy improvements include installing new HVAC units and heat pumps, water efficiency measures, and a solar PV system. The NPV of projected savings is $483,742 from a total investment of $330,491.

Project Profile: Congregate Housing typifies the likely ***Energy Opportunity Assessment Loan Fund*** borrower. Barely cash flow positive in 2012, followed by a $6,000 deficit in 2013 and a shortfall of $8,000 through 2014 to date, total utility bills run from $50,000 to $70,000 per year. The potential energy savings identified by the CEFIA team could dramatically alter the financial viability of this property. Yet, Congregate has only $30,000 in reserves, making the roughly $25,000 necessary for predevelopment costs (i.e. an energy assessment, bid documents, securing proposals, loan application fees, and required environmental testing) cost prohibitive. A predevelopment loan for this type of property would immediately ease the first and frequently most difficult barrier to making multifamily property energy improvements.

Healthy Homes Loan Fund

A significant percentage of multifamily housing owners and managers in Connecticut are deferring weatherization and other energy improvements because of costly health and safety measures that must be remediated first. Deferral estimates range from 20% to 30% (and perhaps more) of total units[2]. The issues are most serious in the lowest income communities and among smaller properties (20 units and less), which lack necessary financial and property management resources. For units with asbestos, lead, mold, and leaking roofs, CEFIA, in conjunction with experts including the CT Efficient and Healthy Homes Initiative (CT-EHHI) and the CT Department of Public Health's CT Healthy Homes Initiative, has conservatively estimated an average health and safety remediation cost of $20,000 per unit.

A Healthy Homes Loan Fund supported by a MacArthur PRI will be used to provide subordinate and low-cost debt to finance otherwise unfunded health and safety project costs that are preventing energy upgrades from moving forward, alongside CEFIA's term financing for the energy upgrades themselves. CEFIA will operate the Healthy Homes Loan Fund in coordination with the CT Healthy Homes Initiative, which is currently convening the fragmented but still insufficient resources in this sector, and which has the remediation of lead, asbestos, and radon as an important focus under the CT Department of Public Health's recently released Strategic Plan.

PROJECT EXAMPLE – LUDLOW COMMONS, NORWALK, CT

Property Profile: Ludlow Commons is a 44-unit affordable housing development for the elderly built in 1940. Proposed upgrades include water, heating, and lighting efficiency along with a solar PV installation. The NPV of projected energy savings is $427,379 for a $294,294 investment.

Project Profile: The Ludlow Commons building typifies the likely ***Healthy Homes Loan Fund*** borrower. This affordable property is a Converted schoolhouse that has not been renovated since it was converted 18 years ago. Many health and safety improvements including a roof replacement are needed. Leaks are causing structural issues and mold growth. CEFIA is proposing a new solar PV system, with energy savings that will cover most, but not all of the roof replacement costs. There are additional health and safety measures needed, including ventilation and asbestos treatment. Estimated at roughly $20,000, these critical issues are directly preventing energy savings from occurring. Using MacArthur funds, CEFIA will offer loans targeting these otherwise unfunded measures. With low rates and long amortization terms, monthly financing costs will be covered by energy savings and ensure that these projects remain cash flow positive for multifamily property owners.

Finish Line Loan

PRI capital from MacArthur will also be used to ensure that viable projects for which energy savings don't fully cover existing financing costs can still get done. Through CEFIA's established commercial and residential programs, CEFIA has demonstrated an ability to attract low-cost, long-term private

[2] For a more detailed breakdown of units being deferred for weatherization improvements, please see the recent CT Rapid HIA: Weatherization Plus Health in Connecticut

capital into the energy upgrade market. But capital costs need to come down even further to ensure that such costs do not outweigh projected energy savings in the more challenging multifamily market, especially for the 160,000 units of affordable multifamily housing across the state. CEFIA's current products require threshold "energy savings coverage ratios", and for some projects under existing financing terms, such thresholds may not be achievable. The ability to blend in PRI capital in order to lower interest rates, stretch out terms, or both, will be an extremely valuable tool for CEFIA in financing properties over the next several years. Then, with a record of success under our belt and a larger pool of seasoned, aggregated assets to take to market, CEFIA will be able to attract cheaper private debt due to the demonstrated stability and bankability of the energy savings cash flows of these projects.

PROJECT EXAMPLE - KIRTLAND COMMONS, DEEP RIVER, CT

Property Profile: Kirtland Commons is a 26-unit affordable housing development encompassing one building built in 1993. Proposed upgrades include water, heating, and lighting efficiency with solar PV and solar thermal installation. The NPV of projected energy savings are $180,246 for an $88,136 investment.

Project Profile: Kirtland Commons, owned by the Deep River Housing Authority, typifies the likely ***Finish Line Loan Fund*** borrower. The Property has no debt, and its financial goals are to break even. In 2013, Kirtland had an operating loss of $14,266 against projected net operating income of $3,791. That $18,000 difference was principally due to $8,000 in higher than expected utility bills, with another $4,000 due to emergency maintenance. Replacement and operating reserves are small and insufficient to address significant capital needs. After completing an energy assessment audit through the CHFA-CEFIA Demonstration Program, it was determined that the facility could save $20,708 in utility costs its first year, after making investments that would have a savings to investment ratio of 2x. These are critical investments that will enhance the financial viability of the property, improve the living experience of the tenants, and limit wasteful energy use and carbon emissions. However, the property's thin margins put its ability to service a loan with a 6% interest rate in question. But with a blended mix of MacArthur PRI funds and private capital sourced at a 6% rate, this project could meet required debt service coverage ratios and allow the upgrades to go forward. Similarly, PRI funds could be used to help stretch out a loan over a longer term, making monthly debt service more affordable. Such an offering would allow CEFIA to bridge the gap between market lenders and affordable housing projects, and thereby give CEFIA the ammunition we need to build the case for more affordable private debt for these critical energy upgrades.

Anticipated Allocation and Proposed Terms of MacArthur Investment

Out of the proposed $5 million PRI, CEFIA anticipates allocating $1 million to the ***Energy Opportunity Assessment Loan Fund*** and $2 million each to the ***Healthy Homes Loan Fund*** and the ***Finish Line Loan Fund*** on a preliminary basis. However, as we gain further experience in assessing market needs, CEFIA would request the flexibility to reallocate PRI dollars between the funds in an ongoing fashion. For each fund, of course, specific loan requirements and underwriting terms would be established and presented to MacArthur for approval prior to closing on this investment.

With respect to rate and term for this PRI, CEFIA would initially propose that in order to provide the greatest flexibility to adapt to market needs, we work towards a 1% annual return for MacArthur over a tenor of 20 years.

CEFIA understands that this proposal is just the beginning of a larger conversation, but from our perspective, it is clear that the opportunity to intervene in the multifamily market – to lower carbon emissions, enhance buildings' operating performance, and improve the quality of life for residents – is a real one. With coordination, appropriately structured long-term financing, and thoughtful, targeted investments designed to overcome the obstacles to project success, Connecticut now has the chance to demonstrate a viable path forward with respect to multifamily energy projects. With support from MacArthur in the form of a PRI, we look forward to doing so.

Proposed Terms and Conditions for:
$5,000,000 Program Related Investment ("Loan" or "PRI") to Connecticut Green Bank

Lender:	John D. and Catherine T. MacArthur Foundation ("Foundation" or "Lender")
Borrower:	The borrower shall be the Connecticut Green Bank ("Borrower")
Investment Amount:	$5,000,000
Interest Rate:	1% on all balances outstanding. All interest to be paid quarterly by certified or cashier's check, ACH transfer, or by federal wire transfer. Interest shall be computed based on the amount of principal outstanding on the basis of a 360-day year, a 30-day month, and the actual number of days elapsed in any period of less than one (1) calendar month.
Term:	Fifteen (15) years from initial closing. Loan shall be due in four installments during the final four years of the term as follows: $750,000 due 12 years from closing date $750,000 due 13 years from closing date $1,500,000 due 14 years from closing date $2,000,000 due 15 years from closing date
Use of Proceeds	Proceeds shall be used by Borrower to support the creation of up to three or more loan funds, at Borrower's discretion but with notification of Foundation, to finance clean energy and energy related health and safety improvements, as defined by Borrower's statutory mandates, on multifamily affordable rental housing properties.
Collateral:	The loan shall be unsecured
Recourse:	Full recourse to Borrower
Payout:	Proceeds shall be disbursed in two draws totaling $2,500,000. The first draw may be funded within nine (9) months of closing, at Borrower's request and with reasonable advance notice to Foundation, and the second draw on a date mutually agreeable to Borrower and Foundation at any time after the Borrower has disbursed at least 75% of the first draw but no later than twenty-four (24) months after closing.
Proposed Covenants	In addition to all standard covenants, the Loan Agreement will include the following covenants:

1. Borrower shall promptly notify Foundation of any change to the following individuals employed by Borrower: Chief Executive Officer/President, Chief Investment Officer, or Chairperson of the Board during the term of the Loan.
2. Borrower shall at all times maintain an unrestricted net asset balance that is the lesser of 80% of Borrower's current unrestricted net asset balance as reflected in its most recent audited financial statements OR fifty million dollars ($50,000,000) .

Annual Reporting Requirements

Borrower shall provide the following information to the Lender as outlined below for the duration of the Loan:

1. Written annual report providing a detailed outline of the use of the Foundation's loan during the previous 12 months including number of transactions and property locations. This report shall include a breakdown of activity according to loan program supported by the proceeds of the PRI.
2. Annual audited financial statements for Borrower.

Semiannual Reporting Requirements

Borrower shall provide the following information to the Lender as outlined below for the duration of the Loan:

1. Written interim report providing a detailed outline of the use of the Foundation's loan during the previous 6 months including number of transactions and property location. This report shall include a breakdown of activity according to loan program supported by the proceeds of the PRI.
2. Semiannual unaudited financial statements for Borrower. These may be internally prepared.

Closing Conditions

Borrower shall provide prior to closing copies of the following documents for Borrower:

1. All organizational documents including a copy of any IRS letters of determination
2. Current Certificate of Existence (no more than 3 months old)
3. Three years of audited financial statements for Borrower
4. Most recently unaudited financial statement (should be dated no more than 90 days from anticipated date of closing)

Enabling Statute and State Contracting

The Borrower is subject to the requirements outlined in Sections 16-245n of the Connecticut General Statutes, and Lender will be responsible for complying with applicable state contracting requirements.

Expenses	Each party shall bear its own expenses and legal fees incurred with respect to the drafting, negotiation and execution of the transactions contemplated hereby, whether or not a closing takes place.

Memo

To: Allison Clark, Associate Director, Impact Investments, MacArthur Foundation

From: Ben Healey, Assistant Director, Clean Energy Finance, Connecticut Green Bank
Joan Carty, President and CEO, Housing Development Fund

Date: September 30, 2015

Re: Update on Proposed MacArthur Foundation $5 Million Program Related Investment into Connecticut Affordable Multifamily Clean Energy Projects

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Background

On June 30, 2014, the Connecticut Green Bank ("Green Bank") submitted a proposal to the John D. and Catherine T. MacArthur Foundation ("MacArthur") for a Program Related Investment ("PRI") in the amount of $5,000,000 to support the Green Bank's efforts to accelerate energy efficiency and clean energy upgrades in affordable multifamily properties across the state of Connecticut (see Exhibit A). MacArthur accepted the Green Bank's funding proposal, agreeing to make a $5 million, 15-year, 1% per annum PRI to enable the Green Bank to create three new, integrated financing products substantially as follows:

(1) *A high risk, revolving predevelopment loan fund to cover the costs of energy opportunity assessments, audits, and project scope definition – the* ***Energy Opportunity Assessment Loan Fund;***

(2) *A loan pool to finance remediation of unfunded health and safety measures (i.e. asbestos, mold, leaking roofs, etc.) that must be addressed before energy improvements can be installed – the* ***Healthy Homes Loan Fund;*** *and*

(3) *Term financing to bridge gaps and provide a lower weighted average cost of capital for viable projects where projected energy savings don't quite cover financing costs, and which would not otherwise close without additional, subordinate and/or less costly financing – the* ***Finish Line Loan Fund.***

This PRI is a great opportunity and honor for the Green Bank and Connecticut to receive. Unfortunately, although MacArthur and the Green Bank have agreed in principle on both a programmatic approach and financing terms, the two parties have been unable to close on a final funding agreement, due to the fact that state contracting rules associated with the Green Bank's quasi-public status include a number of terms that do not work for MacArthur as an out-of-state charitable foundation. That said, both MacArthur and the Green Bank have remained committed to finding a solution to this state contracting challenge, so that this PRI can proceed and MacArthur can support affordable multifamily clean energy efforts throughout Connecticut,

both for their own sake and as a model that – through state-based networks and the growing green bank movement – may spread across the country.

HDF Participation

Since the Green Bank and MacArthur have come to a standstill with respect to documentation, the Green Bank has sought out a third party to receive and administer these funds – an organization that shares its programmatic goals, has experience in the state's multifamily sector, and maintains a robust and proven lending platform. The Housing Development Fund ("HDF") meets all three criteria, and is already a trusted partner of the Green Bank. Now, after multiple discussions between Green Bank and HDF staff and having received preliminary HDF Board of Directors consent to proceed with documentation and diligence, the Green Bank and HDF propose to MacArthur the following as a go-forward strategy:

- HDF would receive the $5 million PRI from MacArthur, as well as undertake the obligation to repay MacArthur (i.e. both principal and interest) according to a mutually agreeable amortization schedule
    - This amortization schedule would be back-ended and occur in the last four years of the 15-year loan, per the previous terms discussed between the Green Bank and MacArthur
    - The Green Bank would agree to pay for all carrying costs associated with the PRI (i.e. the 1% p.a. interest) not covered by programmatic lending (as further described below)
- The Green Bank would finalize design of the three lending products outlined above, in collaboration with HDF, and drive all origination / underwriting efforts
- Specifically, the Green Bank would be responsible for formulating underwriting guidelines, preparing loan application forms, crafting loan policies and procedures, marketing loan programs, and underwriting all loans that would be funded using the MacArthur PRI
- HDF would loan funds to qualifying owners of eligible multifamily properties, on a) terms and b) according to criteria determined by Green Bank (in consultation with HDF)
- HDF would administer and service all loans made using MacArthur PRI funds, and earn an annual fee (already agreed upon between the two organizations) that would be paid directly by the Green Bank. While administrative fees would be fixed, the Green Bank would pay servicing costs on a direct, pass-through basis
- The Green Bank would guarantee all HDF loans made using MacArthur PRI funds, and hold HDF harmless for any secondary losses (that is, the Green Bank would fully indemnify HDF with respect to its obligations to MacArthur)
- The Green Bank would pay for all of HDF's legal fees, including preparation of all loan documents for loans made using MacArthur PRI funds

- HDF would serve in the primary role of an administrative manager
- Specifically, HDF would close loans, disburse funds, and manage the servicing of all loans funded using the MacArthur PRI, and would report to the Green Bank and MacArthur on a monthly basis with respect to loan performance
- All fees and interest earned on loans made using the MacArthur PRI would remain at HDF in a segregated account designated for reinvestment into affordable multifamily energy upgrade projects
- HDF would retain all investment interest earned on funds sitting in its accounts
- HDF would maintain the right to terminate its contract with the Green Bank after two years, subject to suitable provisions that would survive the contract and ensure the return of all unused and/or repaid MacArthur PRI funds to the Green Bank for continued investment or repayment to MacArthur

Next Steps

The Green Bank and HDF are both excited about this partnership, and believe that the approach outlined in the section above is both practicable and will lead to programmatic success. We would now like to engage MacArthur to ensure that this proposal is workable for all three parties, proceed from there with remaining due diligence items over the course of the fall, and then work towards approval and final documentation in December so that we can put these PRI funds to work as soon as possible thereafter.

Exhibit A

Original Connecticut Green Bank (f/k/a Clean Energy Finance and Investment Authority)
Proposal to MacArthur Foundation

Memo

To: Mijo Vodopic and Allison Clark, MacArthur Foundation

From: Ben Healey and Kim Stevenson, CEFIA

Date: June 30, 2014

Re: Proposal for $5 Million Program Related Investment into Connecticut's Multifamily Housing Sector for Clean Energy and Energy Efficiency Upgrades

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Background

The Connecticut legislature established the Clean Energy Finance and Investment Authority (CEFIA) as a quasi-public agency on July 1, 2011 through Public Act 11-80. As the nation's first state "Green Bank"[1], CEFIA leverages public and private funds to drive investment and scale up clean energy deployment across the state, thereby lowering carbon emissions, creating jobs, and adding significant value to the state's built environment.

In 2013, after early success financing energy upgrades in the state's single-family residential and commercial markets, CEFIA's Board of Directors recognized that the multifamily sector was particularly difficult to serve, and instructed staff to develop a comprehensive approach to addressing the energy upgrade needs of multifamily properties. Thus, over the past year, CEFIA has built deep partnerships with established multifamily stakeholders, created targeted financing programs, and initiated energy efficiency and renewable energy demonstration projects. This approach has 1) helped CEFIA determine how best to bring both capital and technical assistance to the table, as well as broader market coordination and a pragmatic, "one- stop-shopping" approach, as well as 2) uncovered various barriers to success. Cost-effective, carbon emission reducing projects do not move forward for a number of reasons – from the high cost of energy audits, to health and safety issues, to energy savings that do not quite cover capital costs due to a mismatch between financing terms and project needs.

With those obstacles in mind, but also in the context of CEFIA's initial multifamily financing programs and strategies already in place, CEFIA is now requesting $5 million from MacArthur in the form of a long-term, low-cost Program Related Investment (PRI) to capitalize a new set of revolving and term loan products that can be put to work to further animate this market. These products would complement CEFIA's existing suite of offerings and fit within the coordinated multifamily energy upgrade finance machine that we are working to build. These MacArthur funds would not only help CEFIA leverage

[1] Pursuant to Public Act 14-94, CEFIA was recently renamed the "Connecticut Green Bank".

significant private capital in the short term, but would also demonstrate to investors the scalability and long-term financial viability of the broader multifamily energy upgrade market.

CEFIA's Strategic Approach to the Multifamily Sector

As MacArthur knows well, successfully navigating the multifamily market is no easy task. There are obstacles throughout the value chain: challenges securing financing, split incentives between owners and tenants, and a lack of reliable performance data and case studies that might help build investor confidence. All of these difficulties are exacerbated by an often byzantine and intractable implementation process. Therefore, key tenets of CEFIA's operating strategy are as follows:

- Attract and partner with **national leaders** who have deep experience and a record of success in the multifamily market (that is, those who know how to build deal flow, run programs, and close win-win transactions);
- Identify existing programs and centers of excellence in Connecticut and use CEFIA's leadership position to help **coordinate, rationalize, and leverage resources** among fragmented players, and fill critical gaps where needed;
- Take a **portfolio approach** to program development. CEFIA recognizes that innovation and risk-taking always comes with some failures, and a portfolio approach allows for minimizing overall risk. By building on what's working and cutting losses on what is not, CEFIA can ensure that everyone is benefitting from lessons learned; and
- **Simplify, streamline and clarify**. CEFIA steadfastly refuses to accept the status quo with respect to how difficult it is for multifamily property owners to negotiate the energy upgrade process. Impediments are exacerbated in affordable housing, which involves a complex maze of funders and requirements that can stymie even the most motivated property owner.

In the past, CEFIA has shared our guiding multifamily strategy documentation with MacArthur (included for convenience as an attachment to this proposal), and so we won't repeat it here. Suffice it to say that the partnerships described in that strategy document have been solidified and work is well underway on each front with: CEFIA's Commercial Property Assessed Clean Energy (C-PACE) Multifamily Partner, Urban Ingenuity; New Ecology, Inc. (NEI); the Connecticut Housing Investment Fund (CHIF); and the Connecticut Housing Finance Authority (CHFA).

Current CEFIA Initiatives

CEFIA currently offers a suite of products and services to help multifamily property owners and managers navigate the energy improvement process, access financing, and implement high quality projects, inclusive of remediation of health and safety problems.

Commercial Property Assessed Clean Energy (C-PACE): C-PACE allows commercial, industrial, and multifamily property owners to access affordable, long-term financing for energy upgrades to their buildings by placing a voluntary assessment on their property tax bills. Loan terms are up to 20 years with interest rates presently of 6% or less, and repayment obligations transfer automatically to subsequent owners when properties are sold. CEFIA has partnered with Urban Ingenuity to support both market rate and affordable multifamily property owners in taking advantage of C-PACE financing, generally for larger projects.

Low-Income Multifamily Energy (LIME) Loan: LIME is a new initiative of the Connecticut Housing Investment Fund (CHIF), a Hartford-based Community Development Financial Institution with whom CEFIA has partnered to expand financing resources for multifamily housing that serves low-income residents. This product is an unsecured loan, with interest rates in the 6% - 6.5% range and terms of up to 12 years. LIME is ideal for smaller, affordable multifamily properties.

CEFIA Credit Enhancement Request for Proposals (RFP): For projects that don't fit neatly into either the C-PACE or LIME buckets, CEFIA has also released an RFP for partners to propose how CEFIA credit enhancements could drive financing for energy efficiency and renewable energy upgrades in specific multifamily properties or portfolios. CEFIA sees this RFP as an opportunity to learn from the market what new products and approaches we might need to surface to address this sector holistically.

Technical Assistance and Energy Opportunity Assessments: CEFIA is offering multifamily property owners support in navigating the energy retrofit and green building construction process, thanks to the engagement of program partner New Ecology, Inc. (NEI). This support includes complete one-stop-services for owners, such as any combination of energy benchmarking, assessments and audits, cost estimation, construction management, and performance monitoring.

Solarize – State Sponsored Housing Portfolio (SSHP): In collaboration with CHFA, multifamily SSHP properties will be assessed for the potential to install photovoltaic arrays and solar thermal systems to provide distributed generation of electricity and/or hot water. Solarize is a highly successful, proven "group purchasing" model that has been adopted in over 40 Connecticut communities to date. It includes significant group discounts, preselected installers, outreach, and a clear end date to encourage owners to go solar.

Multifamily Energy Efficiency Demonstration Program: CEFIA has partnered with the Connecticut Housing Finance Authority (CHFA) to administer a demonstration program for five multifamily properties seeking to invest in energy upgrades, with the goal of replicating successful results across CHFA's entire portfolio. Program delivery partners include K.A. Dorgan Architecture & Planning, NEI, Urban Ingenuity, Sustainable Real Estate Solutions (CEFIA's C-PACE Technical Program Administrators), and Connecticut's local utility companies. The goal of the pilot is to develop a streamlined, cross-agency service and financing delivery model for multifamily energy projects. As we are currently well into program execution, this effort is already proving to be an invaluable platform – providing real world projects to flesh out and solve critical issues in the existing, difficult-to-navigate multifamily energy improvement process. Lessons from this pilot will give CEFIA, CHFA, and our utility partners an opportunity to define, streamline, clarify, and simplify, as well as educate the market with respect to best practices.

Proposed Use of MacArthur Investment

The proposed MacArthur PRI would be used to support at least three new, integrated products, to fill gaps that CEFIA has identified as critical obstacles to advancing energy saving, emissions reducing projects in the multifamily sector:

(4) A high risk, revolving predevelopment loan fund to cover the costs of energy opportunity assessments, audits, and project scope definition – the ***Energy Opportunity Assessment Loan Fund;***

(5) A loan pool to finance remediation of unfunded health and safety measures (i.e. asbestos, mold, leaking roofs, etc.) that must be addressed before energy improvements can be installed – the ***Healthy Homes Loan Fund;*** and

(6) Term financing to bridge gaps and provide a lower weighted average cost of capital for viable projects where projected energy savings don't quite cover financing costs, and which would not otherwise close without additional, subordinate and/or less costly financing – the ***Finish Line Loan Fund.***

Energy Opportunity Assessment Loan Fund

As CEFIA has launched its various multifamily initiatives, the biggest impediment to moving projects forward is the high cost of taking the very first step: completing a reliable energy assessment to evaluate savings potential and scope out a smart implementation plan. Doing so requires a high risk investment of time and capital that most owners, particularly owners of affordable multifamily housing, simply don't have, regardless of how great the energy savings potential might be. From the very beginning of the process, multifamily owners face a seemingly insurmountable barrier.

The Energy Opportunity Assessment Loan Fund will provide predevelopment funds to complete this upfront work. Critically, it will be marketed alongside CEFIA's multifamily products, making it clear to owners that term financing is available from the start and that it is accessible from a one-stop-provider. CEFIA will support owners in securing well-qualified contractors, including NEI, for this work. The loan will be repaid at closing and wrapped into long-term project financing. If a project is unable to move forward for legitimate reasons beyond the owner's control, then the loan will be forgiven. Owners will be required to contribute up to 25% of total predevelopment costs to ensure their commitment to the project.

PROJECT EXAMPLE – MT. CARMEL CONGREGATE, HAMDEN, CT

Property Profile: Congregate Housing is a 30-unit, elderly affordable housing development owned by the Hamden Housing Authority. The building was originally constructed in the 1920's as a school building and was converted into multifamily housing in 1982. Planned energy improvements include installing new HVAC units and heat pumps, water efficiency measures, and a solar PV system. The NPV of projected savings is $483,742 from a total investment of $330,491.

Project Profile: Congregate Housing typifies the likely ***Energy Opportunity Assessment Loan Fund*** borrower. Barely cash flow positive in 2012, followed by a $6,000 deficit in 2013 and a shortfall of $8,000 through 2014 to date, total utility bills run from $50,000 to $70,000 per year. The potential energy savings identified by the CEFIA team could dramatically alter the financial viability of this property. Yet, Congregate has only $30,000 in reserves, making the roughly $25,000 necessary for predevelopment costs (i.e. an energy assessment, bid documents, securing proposals, loan application fees, and required environmental testing) cost prohibitive. A predevelopment loan for this type of property would immediately ease the first and frequently most difficult barrier to making multifamily property energy improvements.

Healthy Homes Loan Fund

A significant percentage of multifamily housing owners and managers in Connecticut are deferring weatherization and other energy improvements because of costly health and safety measures that must be remediated first. Deferral estimates range from 20% to 30% (and perhaps more) of total units[2]. The issues are most serious in the lowest income communities and among smaller properties (20 units and less), which lack necessary financial and property management resources. For units with asbestos, lead, mold, and leaking roofs, CEFIA, in conjunction with experts including the CT Efficient and Healthy Homes Initiative (CT-EHHI) and the CT Department of Public Health's CT Healthy Homes Initiative, has conservatively estimated an average health and safety remediation cost of $20,000 per unit.

A Healthy Homes Loan Fund supported by a MacArthur PRI will be used to provide subordinate and low-cost debt to finance otherwise unfunded health and safety project costs that are preventing energy upgrades from moving forward, alongside CEFIA's term financing for the energy upgrades themselves. CEFIA will operate the Healthy Homes Loan Fund in coordination with the CT Healthy Homes Initiative, which is currently convening the fragmented but still insufficient resources in this sector, and which has the remediation of lead, asbestos, and radon as an important focus under the CT Department of Public Health's recently released Strategic Plan.

PROJECT EXAMPLE – LUDLOW COMMONS, NORWALK, CT

Property Profile: Ludlow Commons is a 44-unit affordable housing development for the elderly built in 1940. Proposed upgrades include water, heating, and lighting efficiency along with a solar PV installation. The NPV of projected energy savings is $427,379 for a $294,294 investment.

Project Profile: The Ludlow Commons building typifies the likely ***Healthy Homes Loan Fund*** borrower. This affordable property is a Converted schoolhouse that has not been renovated since it was converted 18 years ago. Many health and safety improvements including a roof replacement are needed. Leaks are causing structural issues and mold growth. CEFIA is proposing a new solar PV system, with energy savings that will cover most, but not all of the roof replacement costs. There are additional health and safety measures needed, including ventilation and asbestos treatment. Estimated at roughly $20,000, these critical issues are directly preventing energy savings from occurring. Using MacArthur funds, CEFIA will offer loans targeting these otherwise unfunded measures. With low rates and long amortization terms, monthly financing costs will be covered by energy savings and ensure that these projects remain cash flow positive for multifamily property owners.

Finish Line Loan

PRI capital from MacArthur will also be used to ensure that viable projects for which energy savings don't fully cover existing financing costs can still get done. Through CEFIA's established commercial and residential programs, CEFIA has demonstrated an ability to attract low-cost, long-term private capital

[2] For a more detailed breakdown of units being deferred for weatherization improvements, please see the recent CT Rapid HIA: Weatherization Plus Health in Connecticut

into the energy upgrade market. But capital costs need to come down even further to ensure that such costs do not outweigh projected energy savings in the more challenging multifamily market, especially for the 160,000 units of affordable multifamily housing across the state. CEFIA's current products require threshold "energy savings coverage ratios", and for some projects under existing financing terms, such thresholds may not be achievable. The ability to blend in PRI capital in order to lower interest rates, stretch out terms, or both, will be an extremely valuable tool for CEFIA in financing properties over the next several years. Then, with a record of success under our belt and a larger pool of seasoned, aggregated assets to take to market, CEFIA will be able to attract cheaper private debt due to the demonstrated stability and bankability of the energy savings cash flows of these projects.

PROJECT EXAMPLE - KIRTLAND COMMONS, DEEP RIVER, CT

Property Profile: Kirtland Commons is a 26-unit affordable housing development encompassing one building built in 1993. Proposed upgrades include water, heating, and lighting efficiency with solar PV and solar thermal installation. The NPV of projected energy savings are $180,246 for an $88,136 investment.

Project Profile: Kirtland Commons, owned by the Deep River Housing Authority, typifies the likely ***Finish Line Loan Fund*** borrower. The Property has no debt, and its financial goals are to break even. In 2013, Kirtland had an operating loss of $14,266 against projected net operating income of $3,791. That $18,000 difference was principally due to $8,000 in higher than expected utility bills, with another $4,000 due to emergency maintenance. Replacement and operating reserves are small and insufficient to address significant capital needs. After completing an energy assessment audit through the CHFA-CEFIA Demonstration Program, it was determined that the facility could save $20,708 in utility costs its first year, after making investments that would have a savings to investment ratio of 2x. These are critical investments that will enhance the financial viability of the property, improve the living experience of the tenants, and limit wasteful energy use and carbon emissions. However, the property's thin margins put its ability to service a loan with a 6% interest rate in question. But with a blended mix of MacArthur PRI funds and private capital sourced at a 6% rate, this project could meet required debt service coverage ratios and allow the upgrades to go forward. Similarly, PRI funds could be used to help stretch out a loan over a longer term, making monthly debt service more affordable. Such an offering would allow CEFIA to bridge the gap between market lenders and affordable housing projects, and thereby give CEFIA the ammunition we need to build the case for more affordable private debt for these critical energy upgrades.

Anticipated Allocation and Proposed Terms of MacArthur Investment

Out of the proposed $5 million PRI, CEFIA anticipates allocating $1 million to the ***Energy Opportunity Assessment Loan Fund*** and $2 million each to the ***Healthy Homes Loan Fund*** and the ***Finish Line Loan Fund*** on a preliminary basis. However, as we gain further experience in assessing market needs, CEFIA would request the flexibility to reallocate PRI dollars between the funds in an ongoing fashion. For each fund, of course, specific loan requirements and underwriting terms would be established and presented to MacArthur for approval prior to closing on this investment.

With respect to rate and term for this PRI, CEFIA would initially propose that in order to provide the greatest flexibility to adapt to market needs, we work towards a 1% annual return for MacArthur over a tenor of 20 years.

CEFIA understands that this proposal is just the beginning of a larger conversation, but from our perspective, it is clear that the opportunity to intervene in the multifamily market – to lower carbon emissions, enhance buildings' operating performance, and improve the quality of life for residents – is a real one. With coordination, appropriately structured long-term financing, and thoughtful, targeted investments designed to overcome the obstacles to project success, Connecticut now has the chance to demonstrate a viable path forward with respect to multifamily energy projects. With support from MacArthur in the form of a PRI, we look forward to doing so.

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CONNECTICUT GREEN BANK

Memo

To: Members of the Board of Directors of the Connecticut Green Bank

From: George Bellas

CC: Bryan Garcia, Brian Farnen, Bert Hunter, Mackey Dykes

Date: December 11, 2015

Re: CGB 2015 Draft CAFR

Dear Board Members:

I am enclosing the draft CGB 2015 CAFR for your review in advance of the Board meeting this coming Friday, December 18th. Due to the size of this year's CAFR, I have separated the document into the following to files for ease of review:

1. CGB 2015 CAFR-Financial Audit Section

2. CGB 2015 CAFR – Statistical Section

CGB 2015 CAFR – Financial Section:

This section contains the audited financial statements and related footnotes. The audit was again conducted by the firm of Marcum LLP.

The audit itself went well with no material internal control weaknesses identified or material adjustments to the financial books and records required.

There are no further substantive adjustments to the financial statements themselves. What remains are minor modifications to statement format and footnote disclosures, and typographical clean up.

CGB 2015 CAFR – Statistical Section

The statistical section is broken out into two subsections:

Financial Statistics:

This section contains the following tables which are derived from the financial information audited by Marcum:

- Net position by component

- Changes in net position
- Operating revenue by source
- Significant sources of operating revenue
- Outstanding debt by type
- Demographic and economic information
- FTEs by function
- Operating indicators by function
- Capital asset statistics by function

These tables have been completed.

***Non-Financial Statistics*:**

The non-financial statistical section contains statistical data and narrative pertaining to CGB's current programs. There is a table of contents in the front of this section for the reader's use. Minor typographical clean up and revisions to narratives remain.

Federal Single Audit Report

This brief report pertains to the disbursement of federal funds by CGB received under ARRA and DOE grant programs. Marcum is in the process of completing the draft report. The report is required to be submitted to the federal government and the amounts in the report are derived from the federal expenditures audited by Marcum.

ACG Committee Review

The CGB staff presented the draft CAFR to the Audit, Compliance and Governance Committee at the Committee's December 4th meeting. Members of Marcum's audit team discussed the results of their audit of the FY 2016 financial statements with the Committee members as well. As discussed above there were no findings of material internal control weaknesses or necessary material adjustments to the financial statements. The Committee is recommending that the Board approve issuance of the FY 2015 CAFR.

Conclusion and Proposed Board Resolution

Once the Board approves issuance we will complete any remaining open items and submit the 2015 CAFR to the Government Finance Officers Association for consideration in their annual Certificate of Achievement for Excellence in Financial Reporting program.

Our goal with this year's CAFR was to enhance the statistical sections of the report to provide our constituents with a comprehensive overview of the financial and programmatic activities of the CGB.

We propose the following Board resolution:

Resolution

WHEREAS, Article V, Section 5.3.1(ii) of the Connecticut Green Bank ("Green Bank") Operating Procedures requires the Audit, Compliance, and the Governance Committee (the "Committee") to meet with the auditors to review the annual audit and formulation of an appropriate report and recommendations to the Board of Directors of the Green Bank (the "Board") with respect to the approval of the audit report;

WHEREAS, the Committee recommended to the Board for approval the 2015 Comprehensive Annual Financial Report which includes the Financial Statements and the Federal Single Audit Report of the Connecticut Green Bank for the Fiscal Year Ending June 30, 2015.

NOW, therefore be it:

RESOLVED, that the Board approves the 2015 Comprehensive Annual Financial Report which includes the Financial Statements and the Federal Single Audit Report of the Connecticut Green Bank for the Fiscal Year Ending June 30, 2015.

CONNECTICUT GREEN BANK

(A Component Unit of the State of Connecticut)

COMPREHENSIVE ANNUAL FINANCIAL REPORT

FISCAL YEAR ENDED JUNE 30, 2015

(With Summarized Totals as of and for Fiscal Year Ended June 30, 2014)

Department of Finance and Administration
845 Brook Street
Rocky Hill, Connecticut

CONNECTICUT GREEN BANK

(A Component Unit of the State of Connecticut)

COMPREHENSIVE ANNUAL FINANCIAL REPORT

FISCAL YEAR ENDED JUNE 30, 2015

(With Summarized Totals as of and for Fiscal Year Ended June 30, 2014)

Prepared by the

Department of Finance and Administration

Vice President – Finance and Administration – George Bellas

845 Brook Street
Rocky Hill, Connecticut

CONNECTICUT GREEN BANK

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INTRODUCTORY SECTION

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CONNECTICUT
GREEN BANK

[Month] [Day], 2015

We are pleased to present a Comprehensive Annual Financial Report (CAFR) of the Connecticut Green Bank ("Green Bank") for the fiscal year ending June 30, 2015 accompanied by summarized totals as of and for the fiscal year ended June 30, 2014.

Management assumes full responsibility for the completeness and reliability of the information contained in this report based upon a comprehensive framework of internal controls that it has established for this purpose.

Marcum LLP has issued an unmodified opinion on the Green Bank's financial statements for the fiscal years ending June 30, 2014 and 2013. The independent auditor's report is presented in the financial section of this report. This letter of transmittal is designed to complement the Management's Discussion and Analysis (MD&A) and should be read in conjunction with it. The Green Bank's MD&A can be found immediately following the report of the independent auditors.

Profile of the Connecticut Green Bank

The Green Bank[1] was established in a bipartisan manner by the Governor and Connecticut's General Assembly on July 1, 2011 through Public Act 11-80 as a quasi-public agency that supersedes the former Connecticut Clean Energy Fund. As the nation's first state green bank, the Connecticut Green Bank makes green energy more accessible and affordable for all Connecticut citizens and businesses by creating a thriving marketplace to accelerate the growth of green energy. We facilitate green energy deployment by leveraging a public-private financing model that uses limited public dollars to attract private capital investments. By partnering with the private sector, we create solutions that result in long-term, affordable financing to increase the number of green energy projects statewide.

The Green Bank's vision is to lead the green bank movement by accelerating private investment in clean energy deployment for Connecticut to achieve economic prosperity, create jobs, promote energy security and address climate change. By accelerating the growth of green energy we contribute to a better quality of life, a better environment and a better future for Connecticut. The Green Bank's mission is to support the Governor's and Legislature's energy strategy to achieve cleaner, cheaper and more reliable sources of energy while creating jobs and supporting local economic development.

To achieve its vision and mission, the Green Bank has established the following three goals:

[1] Public Act 11-80 repurposed the Connecticut Clean Energy Fund (CCEF) administered by Connecticut Innovations, into a separate quasi-public organization called the Clean Energy Finance and Investment Authority (CEFIA). Per Public Act 14-94, CEFIA was renamed to the Connecticut Green Bank.

1. To attract and deploy capital to finance the clean energy[2] goals for Connecticut, including:

    a. Help Connecticut in becoming the most energy efficient state in the nation;
    b. Scale-up the deployment of renewable energy in Connecticut; and
    c. Provide support for the infrastructure needed to lead the clean energy economy.

2. To develop and implement strategies that bring down the cost of clean energy in order to make it more accessible and affordable to consumers.

3. To reduce reliance on grants, rebates, and other subsidies and move towards innovative low-cost financing of clean energy deployment.

These goals support the implementation of Connecticut's clean energy policies be they statutory (i.e., Public Act 11-80, Public Act 13-298, Public Act 15-194), planning (i.e., Comprehensive Energy Strategy, Integrated Resources Plan), or regulatory in nature. The powers of the Green Bank are vested in and exercised by a Board of Directors that is comprised of eleven voting and two non-voting members each with knowledge and expertise in matters related to the purpose of the organization. The Board of Directors and Staff are governed through the statute, as well as an Ethics Statement and Ethical Conduct Policy, Resolutions of Purposes, Bylaws, and Comprehensive Plan.

Initiatives and Results

Accelerate the Growth of Green Energy

The Green Bank makes green energy more accessible and affordable for all Connecticut citizens and businesses by creating a thriving marketplace to accelerate the growth of green energy. As a result of the efforts undertaken over the past four years, we are deploying more green energy in our state than ever before (see Table 1).[3]

Table 1. Project Investments between FY 2012 through FY 2015[4]

	FY 2012	FY 2013	FY 2014	FY 2015	Total
Total Investment ($ MM)	14,964,413	110,491,743	176,745,827	360,997,462	663,199,456
Green Bank Investment ($ MM)	4,818,389	19,551,561	46,273,068	95,129,679	165,772,696
Leverage Ratio	2.1 : 1.0	4.7 : 1.0	2.9 : 1.0	2.8 : 1.0	3.0 : 1.0
% of Funding Approved as Grants					
Installed Capacity (MW)	2.9	23.5	29.1	79.0	134.5

By using 165.8 millions of ratepayer funds, we have attracted over 491.2 million of private investment in clean energy for a total investment of 663.2 million. This is supporting the deployment of 134.5 MW of renewable energy and producing and saving an estimated 1.3

[2] Public Act 11-80 defines "clean energy" broadly and includes familiar renewable energy sources such as solar photovoltaic, solar thermal, geothermal, wind and low-impact hydroelectric energy, but also includes fuel cells, energy derived from anaerobic digestion (AD), combined heat and power (CHP) systems, infrastructure for alternative fuels for transportation and financing energy efficiency projects.

[3] Connecticut Green Bank – Investment and Public Benefit Performance from Clean Energy Projects from FY 2012 through FY 2015 – Board of Director Memo of October 16, 2015

[4] Includes approved, closed and completed transactions approved by the Board of Directors consistent with its Comprehensive Plan and Budget.

million MMBtu of clean energy while creating over 3,000 job-years and reducing an estimated 1.4 million tons of CO2 emissions over the life of the projects.

We Grow Businesses and We Help People Thrive

As leaders in the green bank movement – through innovation, education, and activation – we accelerate the growth of green energy. By generating a robust, flourishing green energy marketplace, we grow businesses and help people thrive. Within this marketplace the Green Bank partners with contractors and capital providers to offer a diverse portfolio of programs that benefit homeowners, businesses, and institutions. The Green Bank is demonstrating how public resources can be better invested in ways that attract more private investment in our communities, lead to the deployment of more green energy by local contractors, and most importantly providing positive value to our consumers.

The Green Bank helps make homes more energy efficient and sustainable by promoting awareness and offering flexible financing solutions to homeowners and multifamily building owners who seek assistance to make green energy upgrades. We make green energy more attractive to everyone so that residents can integrate it into their lives. The benefits are many – from reducing the burden of energy costs, to improving comfort and health in the home, to a cleaner environment. More green homes mean greener, healthier communities.

The Green Bank makes green energy investments smarter and safer for businesses, including commercial and industrial customers, and institutions, including multifamily and not-for-profit organizations, with affordable, long-term financing for energy upgrades. We demonstrate how green energy improvements are smart investments that lower operating costs. We inspire them to embrace cleaner and more reliable sources of energy to power their buildings which stimulates a healthier local economy. Healthy buildings mean healthy businesses and institutions.

The Green Bank makes green energy more accessible and affordable to grow businesses and help people thrive.

Leading the Green Bank Movement

The Connecticut Green Bank is a leader in the green bank movement. The Connecticut Green Bank and its programs serve as models for other states across the country.

This year, we have seen several of our programs serving as replicable and scalable models, including:

- Commercial Property Assessed Clean Energy (C-PACE)
- Solarize Connecticut with SmartPower and Yale University

CT Solar Loan with Sungage Financial and the Digital Federal Credit Union

The Connecticut Green Bank is leading a movement to use public funds more responsibly by attracting and deploying more private investment in green energy for the state's economy and environment.

In a study done by the Center for America Progress,[5] it is estimated that the U.S. needs at least $200 billion in efficient and renewable energy annually for 20 years to reduce carbon emissions and avert climate disaster. The Natural Resources Defense Council and Coalition for Green

[5] Green Growth: A U.S. Program for Controlling Climate Change and Expanding Job Opportunities by the Center for American Progress (September 2014)

Capital estimate that based on Connecticut, its market size, growth rate, and private-public leverage ratio, that a green bank – like the Connecticut Green Bank – successfully operating in every state in America would yield $200 billion in national annual investment within 5 years, with 90% of funds coming from private sources and all public contributions returned over 10 to 20 years.

Responsible Public Investment in Green Energy

The Green Bank receives funding through a number of sources, including a Systems Benefit Charge, the Regional Greenhouse Gas Initiative (RGGI), renewable energy certificate (REC) sales and the federal government. The Green Bank's predecessor organization's programs were all structured as grants, which meant the funds were spent with no expectation of return. This model put the organization at the mercy of these funding streams which, while reliable, are largely determined by activities outside of our control such as levels of state electricity use and RGGI allowance prices. With the transition to a new financing model, the Green Bank is able to invest its funds in activities that earn a return and begin to build revenue streams that can be reinvested in green energy in Connecticut.

Acknowledgements

First and foremost, we would like to thank the Staff of the Connecticut Green Bank. In our first four years, through their hard work, commitment and innovation, we have built a model that is delivering results for our state and serving as a model across the country and around the world.

We are grateful to our independent auditors, Marcum LLP, for their assistance and advice during the course of this audit, and for supporting our interests in continuing to disclose not only our financial position, but also the public benefits to society resulting from our public-private investments.

Finally, we thank the Board of Directors for their continued leadership and guidance as we continue to prove that there is a new model for how government is able to play a part in deploying more green energy at a faster pace while using public resources responsibly.

Respectfully submitted,

Bryan T. Garcia
President and CEO

George Bellas
Vice President – Finance and Administration

Board of Directors

Connecticut Green Bank

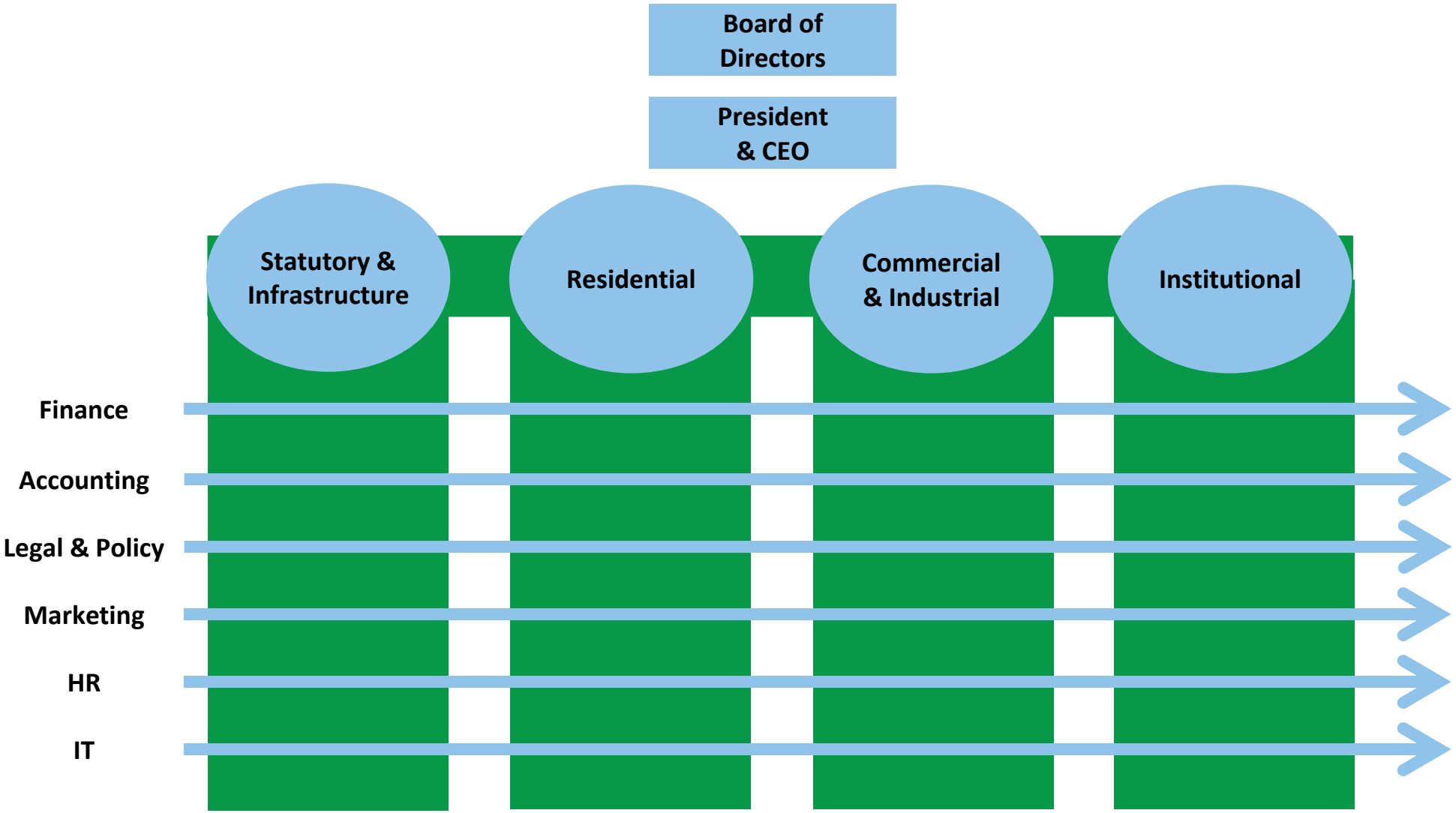
Position	Status	Voting	Name	Organization
State Treasurer (or designee)	Ex Officio	Yes	Bettina Ferguson	Treasurer's Office
Commissioner of DEEP[6] (or designee)	Ex Officio	Yes	Robert Klee[7]	DEEP
Commissioner of DECD[8] (or designee)	Ex Officio	Yes	Catherine Smith[9]	DECD
Residential or Low Income Group	Appointed	Yes	Pat Wrice	Operation Fuel
Investment Fund Management	Appointed	Yes	Norma Glover	NJG Associates
Environmental Organization	Appointed	Yes	Matthew Ranelli[10]	Shipman & Goodwin
Finance or Deployment	Appointed	Yes	Thomas Flynn	Environmental Data Resources
Finance of Renewable Energy	Appointed	Yes	Reed Hundt[11]	Coalition for Green Capital
Finance of Renewable Energy	Appointed	Yes	Kevin Walsh	GE Energy Financial Services
Labor	Appointed	Yes	John Harrity	IAM Connecticut
R&D or Manufacturing	Appointed	Yes	Mun Choi	University of Connecticut
President of the Green Bank	Ex Officio	No	Bryan Garcia	Connecticut Green Bank
Board of Connecticut Innovations[12]	Ex Officio	No	(unfilled)	(unfilled)

Discretely Presented Component Units

Position	Name
President	Bryan Garcia
Treasurer	George Bellas
Secretary	Brian Farnen
Chief Investment Officer	Roberto Hunter

[6] Department of Energy and Environmental Protection
[7] Vice Chairperson of the Board of Directors and Chairperson of the Budget and Operations Committee
[8] Department of Economic and Community Development
[9] Chairperson of the Board of Directors
[10] Secretary of the Board of Directors and Chairperson of the Audit, Compliance and Governance Committee
[11] Chairperson of the Deployment Committee
[12] It should be noted that several members of the Board of Directors of the Green Bank currently serve on the Board of Directors of Connecticut Innovations, including Mun Choi and Catherine Smith.

Organizational Chart



FINANCIAL SECTION

INDEPENDENT AUDITORS' REPORT

To the Board of Directors
Connecticut Green Bank

Report on the Financial Statements

We have audited the accompanying financial statements of the business-type activities and discretely presented component units of the Connecticut Green Bank (CGB) (a component unit of the State of Connecticut) as of and for the fiscal year ended June 30, 2015, and the related notes to the financial statements, which collectively comprise CGB's basic financial statements, as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express opinions on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the business-type activities and the discretely presented component units of the Connecticut Green Bank as of June 30, 2015, and the respective changes in financial position and cash flows for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Restatement of Net Position

As described in Note 1, net position of the total reporting entity and a discretely presented component unit has been restated at July 1, 2014 to reflect the capitalization of certain costs related to financing activities as well as a reclassification of a liability to net position. Our opinion is not modified with respect to these matters.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the Management's Discussion and Analysis as listed in the accompanying table of contents be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the financial statements, and other knowledge we obtained during our audit of the financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide assurance.

Other Information

The introductory section, financial statistical section and other statistical section have not been subjected to the auditing procedures applied in the audit of the basic financial statements, and accordingly, we do not express an opinion or provide any assurance on them.

Other Matter – 2014 Financial Information

As described in Note 1, the financial statements include prior-year summarized information in total but not at the level of detail required for a presentation in conformity with generally accepted accounting principles. This information has been derived from CGB's 2014 complete financial statements on which our audit report dated December 23, 2014 expressed unmodified opinions on the primary government and its discretely presented component units. Accordingly, such information should be read in conjunction with CGB's financial statements for the year ended June 30, 2014, from which the summarized information was derived.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated _____, 2015, on our consideration of the Connecticut Green Bank's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and financial reporting and compliance and the results of that testing, and not to provide an opinion on internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the Connecticut Green Bank's internal control over financial reporting and compliance.

Hartford, CT
_____, 2015

CONNECTICUT GREEN BANK

MANAGEMENT'S DISCUSSION AND ANALYSIS

The following Management's Discussion and Analysis (MD&A) provides an overview of the financial performance of the Connecticut Green Bank (CGB), formerly known as the Clean Energy Finance and Investment Authority, (a component unit of the State of Connecticut) for the fiscal years ended June 30, 2015, 2014, and 2013. The information contained in this MD&A should be considered in conjunction with the information contained in the financial statements and notes to the financial statements included in the "Financial Statements" section of this report.

CBG as a reporting entity is comprised of the primary government and two discretely presented component units as defined under Government Auditing Standards Board Statement 61.

FINANCIAL STATEMENTS PRESENTED IN THIS REPORT

On June 6, 2014, Public Act 14-94 of the State of Connecticut changed the name of the Clean Energy Finance and Investment Authority to the Connecticut Green Bank.

CGB is a quasi-public agency of the State of Connecticut established on July 1, 2011 by Section 16-245n of the Connecticut General Statutes, created for the purposes of, but not limited to: (1) implementing the Comprehensive Plan developed by CGB pursuant to Section 16-245n(c) of the Connecticut General Statutes, as amended; (2) developing programs to finance and otherwise support clean energy investment in residential, municipal, small business and larger commercial projects, and such others as CGB may determine; (3) supporting financing or other expenditures that promote investment in clean energy sources to foster the growth, development and commercialization of clean energy resources and related enterprises; and (4) stimulating demand for clean energy and the deployment of clean energy sources within the state that serve end-use customers in the state. CGB constitutes the successor agency to Connecticut Innovations for the purposes of administering the Connecticut Clean Energy Fund in accordance with section 4-38d of the Connecticut General Statutes and therefore the net assets of such fund were transferred to the newly created CGB as of July 1, 2011.

The financial statements include: Statement of Net Position, Statement of Revenues, Expenses and Changes in Net Position, and the Statement of Cash Flows. The Statement of Net Position provides a measure of CGB's economic resources. The Statement of Revenues, Expenses and Changes in Net Position measures the transactions for the periods presented and the impact of those transactions on the resources of CGB. The Statement of Cash Flows reconciles the changes in cash and cash equivalents with the activities of CGB for the periods presented. The activities are classified as to operating, noncapital financing, capital and related financing, and investing activities.

Notes to the financial statements provide additional detailed information to supplement the basis for reporting and nature of key assets and liabilities.

FINANCIAL HIGHLIGHTS OF FISCAL 2015

NET POSITION

Net position increased by $8.4 million to $109.1 million at June 30, 2015 and cash and cash equivalents decreased by $32 million in 2015 to $48.7 million.

The acquisition of $1.6 million in bonds was a part of the proceeds received by CGB as a result of the sale of CPACE program loans in 2014. See Note 5. Solar lease notes decreased $0.7 million as a result of scheduled principal repayments. See Note 6. The increase in program loans in 2015 to $40.5 million as compared to $13.4 million in 2014 was primarily a result of increased CGB financings of CPACE and Grid Tied projects. See Note 7. Capital assets increased to $27.0 million from $3.1 million in 2015 as a result of the continued acquisition of solar equipment by CT Solar Lease 2 LLC. See Note 1 for further discussion of CT Solar Lease 2 LLC's operations.

As of June 30, 2015, the Board of Directors designated $89.5 million in net position to fund contingent grant, loan and investment commitments as described in Note 15. These grants, loans and investments are expected to be paid or funded over the next one to six fiscal years. In addition to these commitments, an additional $23 million has been designated by the Board to fund future program commitments.

The following table summarizes the net position at June 30, 2015 and 2014 (in thousands):

	2015	2014	Increase (Decrease)
Cash and cash equivalents	$ 48,693	$ 80,925	$ (32,232)
Bonds receivable	1,600	1,600	--
Portfolio investments	1,000	1,000	--
Solar lease notes	9,819	10,544	(725)
Program loans	40,518	13,403	27,115
Capital assets, net	26,971	3,074	23,897
Other assets	10,642	9,943	699
Total Assets	139,243	120,489	18,754
Current liabilities	6,823	4,801	2,022
Deferred revenue	2,519	469	2,050
Pension liabilities	15,432	--	15,432
Other long term liabilities	1,754	--	1,754
Long term debt, less current maturities	3,548	121	3,427
Total Liabilities	30,076	5,391	24,685
Invested in capital assets	26,971	3,074	23,897
Restricted Net Position:			
Non-expendable	1	1	--
Restricted - energy programs	8,799	9,096	(297)
Unrestricted	73,396	88,622	(15,226)
Total Net Position	$ 109,167	$ 100,793	$ 8,374

CHANGES IN NET POSITION

Revenue from interest on cash deposits and promissory notes increased $1.2 million to $2.3 million in 2015. CGB received $16.6 million from the State in RGGI auction proceeds during the year as compared to RGGI auction proceeds of $20.1 million in 2014. Public Act 13-247, see Note 9, allowed the Commissioner of the Connecticut Department of Energy and Environmental Protection to transfer additional RGGI auction proceeds to CGB to be used to support energy efficiency financing opportunities. This increase in RGGI auction proceeds helped offset payments to the State by CGB required under Public Act 13-247.

Total expenditures for grants and programs in 2015 were $22.1 million, a decrease of $1.3 million from the prior year. Grant and program expenditures fluctuate from year to year as they are based on the achievement of contract milestones by the grantee.

General and administrative expenses increased by $580 thousand from $2.5 million to $3.1 million.

The following table summarizes the changes in net position between June 30, 2015 and 2014 (in thousands):

Changes in Net Position
(in thousands)

	2015	2014	Increase (Decrease)
Revenues	$ 46,294	$ 48,754	$ (2,460)
Operating Expenses			
Grants and programs	22,131	23,439	(1,308)
General and administrative expense	3,117	2,537	580
Total Operating Expenses	25,248	25,976	(728)
Operating Income	21,046	22,778	(1,732)
Non-Operating Revenues (Expenses)			
Interest earned	2,311	1,142	1,169
Interest expense	(119)	--	(119)
Investment loss	(1,180)	--	(1,180)
Unrealized loss on interest rate swap	(660)	--	(660)
Provision for loan losses	(564)	(1,311)	747
Capital contribution	6,844	201	6,643
Distribution to member	(105)	(12)	(93)
Payments to State of Connecticut	(19,200)	(6,200)	(13,000)
Net Change	$ 8,373	$ 16,598	$ (8,225)

FINANCIAL HIGHLIGHTS OF FISCAL 2014

NET POSITION

Net position increased by $2.3 million to $100.8 million at June 30, 2014 and cash and cash equivalents increased by $3.3 million in 2014 to $80.9 million.

The acquisition of $1.6 million in bonds was a part of the proceeds received by CGB as a result of the sale of CPACE program loans in 2014. See Note 5. Solar lease notes decreased $0.7 million as a result of scheduled principal repayments. See Note 6. The increase in program loans in 2014 to $13.4 million as compared to $3.8 million in 2013 was primarily a result of increased CGB financings of CPACE and Grid Tied projects. See Note 7. Capital assets increased to $3.1 million from $0.4 million in 2014 as a result of the acquisition of solar equipment by CT Solar Lease 2 LLC. See Note 1 for further discussion of CT Solar Lease 2 LLC's operations.

As of June 30, 2014, the Board of Directors designated $63.5 million in net position to fund contingent grant, loan and investment commitments as described in Note 13. These grants, loans and investments are expected to be paid or funded over the next one to six fiscal years. In addition to these commitments, an additional $34 million has been designated by the Board to fund future program commitments.

The following table summarizes the net position at June 30, 2014 and 2013 (in thousands):

	(as restated) 2014	*(as restated)* 2013	Increase (Decrease)
Cash and cash equivalents	$ 80,925	$ 77,642	$ 3,283
Bonds receivable	1,600	--	1,600
Portfolion investments	1,000	4,788	(3,788)
Promissory notes	--	11,240	(11,240)
Solar lease notes	10,544	--	10,544
Program loans	13,403	--	13,403
Capital assets, net	3,074	362	2,712
Other assets	9,943	6,284	3,659
Total Assets	120,489	100,316	20,173
Current liabilities	4,801	1,816	2,985
Deferred revenue	469	--	469
Long term debt, less current maturities	121	--	121
Total Liabilities	5,391	1,816	3,575
Invested in capital assets	3,074	362	2,712
Restricted net position:			
Non-expendable	1	1	--
Restricted - energy programs	9,096	9,144	(48)
Unrestricted	88,622	88,993	(371)
Total Net Position	$ 100,793	$ 98,500	$ 2,293

CHANGES IN NET POSITION

Revenue from interest on cash deposits and promissory notes increased $455 thousand to $1.14 million in 2014. CGB received $20.1 million from the State in RGGI auction proceeds during the year as compared to RGGI auction proceeds of $4.7 million in 2013. Public Act 13-247, see Note 9, allowed the Commissioner of the Connecticut Department of Energy and Environmental Protection to transfer additional RGGI auction proceeds to CGB to be used to support energy efficiency financing opportunities. This increase in RGGI auction proceeds helped offset payments to the State by CGB required under Public Act 13-247.

Total expenditures for grants and programs in 2014 were $23.4 million, a decrease of $196 thousand from the prior year. Grant and program expenditures fluctuate from year to year as they are based on the achievement of contract milestones by the grantee.

General and administrative expenses decreased by $128 thousand from $2.6 million to $2.5 million.

The following table summarizes the changes in net position between June 30, 2014 and 2013 (in thousands):

	2014	*(as restated)* 2013	Increase (Decrease)
Revenues	$ 48,754	$ 43,343	$ 5,411
Operating Expenses			
Grants and programs	23,439	23,635	(196)
General and administrative expense	2,537	2,665	(128)
Total Operating Expenses	27,287	26,300	987
Operating Income	21,467	17,043	4,424
Non-Operating Revenues (Expenses)			
Interest earned	1,142	689	453
Investment loss	--	(657)	657
Capital contribution	201	238	(37)
Distribution to member	(12)	--	(12)
Payments to State of Connecticut	(6,200)	--	(6,200)
Net Change in Net Position	$ 16,598	$ 17,313	$ (715)

REQUESTS FOR INFORMATION

This financial report is designed to provide a general overview of CGB's finances. Questions concerning any of the information provided in this report or request for additional financial information should be addressed to the Office of Finance and Administration, 845 Brook Street, Rocky Hill, Connecticut 06067.

CONNECTICUT GREEN BANK

STATEMENT OF NET POSITION

JUNE 30, 2015

(With Summarized Totals for June 30, 2014)

	Total Primary Government	**Discretely** Presented Component Units: CT Solar Lease 2 LLC	CEFIA Solar Services Inc.	Eliminating Entries	2015 Total Reporting Entity	2014 Total Reporting Entity
Assets						
Current Assets						
Cash and cash equivalents	$ 39,603,682	$ 220,716	$ 69,252	$ --	$ 39,893,649	$ 71,411,034
Accounts receivable	25,916	9,239	--	--	35,155	4,547,770
Utility remittance receivable	2,518,850	--	--	--	2,518,850	3,402,401
Other receivables	313,228	--	243,000	(243,000)	313,228	303,147
Due from component units	27,489,915	--	3,025,000	(30,514,915)	0	--
Prepaid expenses and other assets	284,262	315,787	--	--	600,048	160,756
Contractor loans	3,112,663	--	--	--	3,112,663	--
Current portion of solar lease notes	803,573	--	--	--	803,573	766,086
Current portion of portfolio investments	10,264,825	--	--	--	10,264,825	652,447
Total Current Assets	84,416,913	545,741	3,337,252	(30,757,915)	57,541,991	81,243,641
Noncurrent Assets						
Portfolio investments	1,000,000	--	--	--	1,000,000	1,000,000
Bonds receivable	1,600,000	--	--	--	1,600,000	1,600,000
Solar Lease Notes, less current portion	9,015,437	--	--	--	9,015,437	9,778,315
Program loans, less current portion	30,253,119	--	--	--	30,253,119	12,750,457
Renewable Energy Certificates	933,054	--	--	--	933,054	1,069,390
Investment in component units	100	--	11,507,153	(11,507,253)	--	--
Deferred financing fees, net	--	430,203	--	--	430,203	458,883
Capital assets, net of depreciation and amortization	263,839	30,830,671	--	(4,123,423)	26,971,087	3,074,337
Asset retirement obligation,net	--	1,029,196	--	--	1,029,196	--
Deferred pension outflows	1,669,961	--	--	--	1,669,961	--
Restricted assets:	--	--	--	--	--	--
Cash and cash equivalents	4,299,005	4,500,000	--	--	8,799,005	9,513,715
Total Noncurrent Assets	49,034,515	36,790,070	11,507,153	(15,630,676)	81,701,062	39,245,097
Total Assets	$ 133,451,428	$ 37,335,811	$ 14,844,405	$ (46,388,591)	$ 139,243,053	$ 120,488,738

The accompanying notes are an integral part of these financial statements.

CONNECTICUT GREEN BANK

STATEMENT OF NET POSITION (CONTINUED)

JUNE 30, 2015
(With Summarized Totals for June 30, 2014)

	Total Primary Government	**Discretely** Presented Component Units: CT Solar Lease 2 LLC	CEFIA Solar Services Inc.	Eliminating Entries	2015 Total Reporting Entity	2014 Total Reporting Entity
Liabilities and Net Position						
Liabilities						
Current maturities of long-term debt	$ 47,103	$ 260,100	$ --	$ --	$ 307,203	$ 6,280
Accounts payable and accrued expenses	5,326,112	733,195	4,200	(243,338)	5,820,169	3,946,372
Due to component units	--	15,899,126	14,615,451	(30,514,577)	0	--
Due to outside agency	49,516	--	--	--	49,516	439,643
Custodial liability	647,964	--	--	--	647,964	408,979
Deferred revenue	1,696,785	821,752	--	--	2,518,537	469,009
Total Current Liabilities	7,767,480	17,714,174	14,619,651	(30,757,915)	9,343,390	5,270,283
Fair value of interest rate swap	--	660,073	--	--	660,073	--
Asset retirement obligation	--	1,094,125	--	--	1,094,125	--
Long-Term Debt, less current maturities	806,421	2,739,900	--	--	3,546,321	119,808
Deferred pension inflow liability	532,135	--	--	--	532,135	--
Pension liability	14,899,766	--	--	--	14,899,766	14,305,410
Total Liabilities	24,005,802	22,208,272	14,619,651	(30,757,915)	30,075,810	19,695,501
Net Position						
Invested in capital assets	263,839	30,830,671	--	(4,123,423)	26,971,087	3,074,337
Restricted Net Position						
Non-expendable	1,000	8,007,153	100	(8,007,253)	1,000	1,000
Restricted for energy programs	4,299,005	4,500,000	--	--	8,799,005	9,095,715
Unrestricted (deficit)	104,881,783	(28,210,286)	224,654	(3,500,000)	73,396,151	88,622,185
Total Net Position	109,445,626	15,127,539	224,754	(15,630,676)	109,167,243	100,793,237
Total Liabilities and Net Position	$ 133,451,428	$ 37,335,811	$ 14,844,405	$ (46,388,591)	$ 139,243,053	$ 120,488,738

The accompanying notes are an integral part of these financial statements.

CONNECTICUT GREEN BANK

STATEMENT OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION

FOR THE YEAR ENDED JUNE 30, 2015

(With Summarized Totals for the Year Ended June 30, 2014)

		Discretely Presented Component Units				
	Total Primary Government	CT Solar Lease 2 LLC	CEFIA Solar Services, Inc.	Eliminations	2015 Total Reporting Entity	2014 Total Reporting Entity
Operating Revenues						
Utility remittances	$ 27,233,987	$ --	$ --	$ --	$ 27,233,987	$ 27,779,345
Grant revenue	192,274	--	--	--	192,274	321,642
RGGI auction proceeds	16,583,545	--	--	--	16,583,545	20,074,668
Energy system sales	25,912,414	--	--	(25,895,727)	16,688	--
REC sales	1,474,488	--	--	--	1,474,488	378,444
Other income	641,763	210,869	123,000	(182,196)	793,435	200,114
Total Operating Revenues	72,038,472	210,869	123,000	(26,077,923)	46,294,417	48,754,213
Operating Expenses						
Cost of goods sold - energy systems	22,526,874	--	--	(22,526,874)	--	--
Grants and program expenditures	21,111,751	1,201,123	--	(182,196)	22,130,677	23,439,362
General and administrative expenses	2,984,178	124,748	8,450	--	3,117,376	2,536,603
Total Operating Expenses	46,622,802	1,325,871	8,450	(22,709,071)	25,248,052	25,975,965
Operating Income	25,415,669	(1,115,002)	114,550	(3,368,853)	21,046,365	22,778,248
Nonoperating Revenue (Expenses)						
Interest income - prommisory notes	2,217,368	--	--	--	2,217,368	1,043,595
Interest income - short term cash deposits	83,761	9,207	981	--	93,949	98,383
Interest expenses LT debt	(26,985)	(92,360)	--	--	(119,345)	--
Interest income - component units	58,511	--	--	(58,511)	--	--
Interest expense - component units	--	(58,511)	--	58,511	--	--
Realized loss on investments	(1,180,285)	--	--	--	(1,180,285)	(1)
Unrealized gain (loss) on interest rate swap	--	(660,073)	--	--	(660,073)	--
Provision for loan losses	(563,825)	--	--	--	(563,825)	(1,310,933)
Total Nonoperating Revenue (Expenses)	588,545	(801,737)	981	--	(212,211)	(168,956)
Change in Net Position before Payments to State of Connecticut and Capital Contributions	26,004,215	(1,916,739)	115,531	(3,368,853)	20,834,154	22,609,292
Payments to State of Connecticut	(19,200,000)	--	--	--	(19,200,000)	(6,200,000)
Capital contributions	--	13,556,783	--	(6,712,353)	6,844,430	201,334
Distributions to member	--	(104,579)	--	--	(104,579)	(12,584)
Change in Net Position	6,804,215	11,535,465	115,531	(10,081,206)	8,374,006	16,598,042
Net Position - Beginning of Year	102,641,412	3,592,073	109,223	(5,549,471)	100,793,237	84,195,195
Net Position - End of Year	$ 109,445,627	$ 15,127,538	$ 224,754	$ (15,630,677)	$ 109,167,243	$ 100,793,237

The accompanying notes are an integral part of these financial statements.

CONNECTICUT GREEN BANK

STATEMENT OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION

FOR THE YEAR ENDED JUNE 30, 2015

(With Summarized Totals for the Year Ended June 30, 2014)

		Discretely Presented Component Units				
	Total Primary Government	CT Solar Lease 2 LLC	CEFIA Solar Services, Inc.	Eliminating Entries	2015	2014
Cash Flows from Operating Activities						
Sales of energy systems	$ 20,221,847	$ --	$ --	$ (20,210,904)	$ 10,943	$ --
Sales of Renewable Energy Certificates	1,705,932	-	-	-	1,705,932	378,444
Utility company remittances	28,117,538	--	--	--	28,117,538	26,981,768
Grants	139,487	--	--	--	139,487	400,766
RGGI auction proceeds	21,078,165	--	--	--	21,078,165	17,520,889
Other income	629,748	59,196	--	--	688,944	204,322
Lease payments received	--	519,377	--	--	519,377	451,339
Grant and program expenditures	(10,626,103)	(705,110)	--	--	(11,331,214)	(7,897,133)
Grants, incentives and credit enhancements	(9,800,594)	--	--	--	(9,800,594)	(13,313,611)
Purchases of energy equipment	(19,989,550)	--	--	--	(19,989,550)	(1,656,944)
General and administrative expenditures	(3,673,879)	(128,693)	(4,250)	--	(3,806,823)	(2,354,525)
Net Cash Provided by (Used in) Operating Activities	27,802,590	(255,230)	(4,250)	(20,210,904)	7,332,206	20,715,315
Cash Flows from Non-capital Financing Activities						
Payments to State of Connecticut	(19,200,000)	--	--	--	(19,200,000)	(6,200,000)
Advances to CGB component units	(9,809,750)	(2,406,106)	(5,431,106)	17,646,961	0	--
Advances from CGB and component units	(0)	5,431,106	12,215,856	(17,646,961)	(0)	--
Net Cash Provided by (Used in) Non-capital Financing Activities	(29,009,750)	3,025,000	6,784,750	--	(19,200,000)	(6,200,000)
Cash Flows from Capital and Related Financing Activities						
Purchase of capital assets	(89,808)	(20,210,904)	--	20,210,904	(89,808)	(79,713)
Proceeds from long-term debt	932,271	3,000,000	--	--	3,932,271	122,463
Repayment of long-term debt	(232,432)	--	--	--	(232,432)	--
Interest expense	(26,985)	(62,600)	--	--	(89,585)	--
Capital contributions from/(to) component entities	--	6,712,353	(6,712,353)	--	--	--
Capital contributions from Firststar Development, LLC	--	6,844,430	--	--	6,844,430	201,434
Return of capital to Firststar Development, LLC	--	(86,336)	--	--	(86,336)	(12,584)
Net Cash Provided by (Used in) Capital and Related Financing Activities	583,046	(3,803,057)	(6,712,353)	20,210,904	10,278,541	231,600
Cash Flows from Investing Activities						
Return of principal on investments	2,332,356	--	--	--	2,332,356	7,022,954
Interest on short-term investments, cash, solard lease notes and loans	877,269	9,207	981	--	887,457	450,899

The accompanying notes are an integral part of these financial statements.

CONNECTICUT GREEN BANK

STATEMENT OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION

FOR THE YEAR ENDED JUNE 30, 2015

(With Summarized Totals for the Year Ended June 30, 2014)

	Total Primary Government	Discretely Presented Component Units: CT Solar Lease 2 LLC	Discretely Presented Component Units: CEFIA Solar Services, Inc.	Eliminating Entries	2015	2014
Cash Flows from Investing Activities (Continued)						
CPACE program loan disbursements	$ (22,181,032)	$ --	$ --	$ --	$ (22,181,032)	$ (14,700,337)
Grid Tied program loan disbursements	(1,166,205)	--	--	--	(1,166,205)	(2,375,000)
AD/CHP program loan disbursements	--	--	--	--	--	(150,000)
Alpha/Operational Demo program loan disbursements	(100,000)	--	--	--	(100,000)	(516,200)
Energy Efficiency program loan disbursements	(89,000)	--	--	--	(89,000)	(75,000)
Campus Efficiency NOW program loan disbursements	(396,662)	--	--	--	(396,662)	(315,669)
HOPBI program loan disbursements	(4,443,148)	--	--	--	(4,443,148)	--
Residential Solar Loan program disbursements	(5,486,610)	--	--	--	(5,486,610)	(805,484)
Net Cash Used in Investing Activities	(30,653,030)	9,207	981	--	(30,642,842)	(11,463,837)
Net Increase (Decrease) in Cash and Cash Equivalents	(31,277,144)	(1,024,080)	69,129	--	(32,232,095)	3,283,078
Cash and Cash Equivalents - Beginning of Year	75,179,830	5,744,796	123	--	80,924,749	77,641,671
Cash and Cash Equivalents - End of Year	$ 43,902,686	$ 4,720,716	$ 69,252	$ --	$ 48,692,654	$ 80,924,749
Reconciliation of Operating Loss to Net Cash Provided by (Used in) Operating Activities:						
Operating income (loss)	$ 25,415,669	$ --	$ --	$ --	$ 25,415,669	$ 22,221,885
Adjustments to reconcile operating loss to net cash provided by (used in) operating activities:						
Depreciation	--	--	--	--	--	141,343
Provision for loan losses	--					1,310,933
Discount on asset sales	--					235,239
Other	--					436,755
Changes in operating assets and liabilities:						
Other assets	--	--	--	--	--	--
Increase in receivables and other assets	--	--	--	--	--	(9,123,183)
Increase in accounts payable,accrued expenses, deferred revenue and other liabilities	--	--	--	--	--	7,149,287
Net Cash Provided by (Used in) Operating Activities	$ 25,415,669	$ --	$ --	$ --	$ 25,415,669	$ 22,372,259

The accompanying notes are an integral part of these financial statements.

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES

NATURE OF OPERATIONS

The Connecticut Green Bank (CGB) was established in July 2011 under Title 16, Sec. 16-245n of the General Statutes of the State of Connecticut as the successor entity of the Connecticut Clean Energy Fund. CGB, a component unit of the State of Connecticut, was created to promote energy efficiency and investment in renewable energy sources in accordance with a comprehensive plan developed by it to foster the growth, development and commercialization of renewable energy sources and related enterprises and stimulate demand for renewable energy and deployment of renewable energy sources which serve end-use customers in the State. CGB constitutes the successor agency to Connecticut Innovations Incorporated (CI), a quasi-public agency of the State of Connecticut, for the purposes of administering the Clean Energy Fund in accordance with section 4-38d of the Connecticut General Statutes and therefore the net assets of such fund were transferred to the newly created CGB as of July 1, 2011. Pursuant to Connecticut General Statute 4-38f, CGB is within CI for administrative purposes only.

On June 6, 2014 Public Act 14-94 of the State of Connecticut changed the name of the Clean Energy Finance and Investment Authority to the Connecticut Green Bank.

RESTATEMENT OF NET POSITION (2013)

A discretely component unit and total reporting entity net position have been restated as of June 30, 2013 to reflect the capitalization of certain previously expensed financing costs associated with securing financing and a reclassification of previously reported liability to net position. The effects of the above restatements as of June 30, 2013 are as follows:

	CT Solar Lease 2, LLC	Total Reporting Entity
Net position - June 30, 2014 (originally reported)	$ 3,592,073	$ --
Capitalization of financing costs	--	--
Reclassification of liability	--	--
Net position - July 1, 2014 (as restated)	$ 3,592,073	$ --

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

PRIOR-PERIOD SUMMARIZED FINANCIAL INFORMATION

The basic financial statements include certain prior-year summarized comparative information in total but not at the level of detail required for a presentation in conformity with generally accepted accounting principles. Accordingly, such information should be read in conjunction with CGB's financial statements for the year ended June 30, 2014, from which the summarized information was derived.

RECENTLY ADOPTED ACCOUNTING PRONOUNCEMENTS

In June 2012, the GASB issued Statement No. 68, Accounting and Financial Reporting for Pensions (GASB68). The primary objective of this Statement is to improve the accounting and financial reporting by state and local governments for pensions. It also improves information provided by state and local governmental employers about financial support for pensions that are provided by other entities. The provisions of this Statement are effective for financial statements for periods beginning after June 15, 2014. The implementation of this standard resulted in an adjustment to reduce CGB's beginning net position by $15,430,912 as of July 1, 2014.

In November 2013, GASB issued Statement No. 71, Pension Transaction for Contributions Made Subsequent to the Measurement Date, an amendment of GASB 68 (GASB71). The objective of this statement is to address an issue regarding application of the transition provisions of GASB 68. The issue relates to amounts associated with contributions, if any, made by a state or local government employer on non-employer contributing entity to a defined benefit pension plan after the measurement date of the government's beginning net pension liability. The provisions of this Statement are effective for financial statements for the periods beginning after June 15, 2015, The implementation of this standard resulted in an adjustment to increase CGB's beginning net position by $1,125,502 as of July 1, 2014.

PRINCIPAL REVENUE SOURCES

The Public Utility Regulatory Authority (PURA) assesses a charge per kilowatt-hour to each end-use customer of electric services provided by utility companies (excluding municipally owned entities) in the state, which is paid to CGB and is the principal source of CGB's revenue. CGB may deploy the funds for loans, direct or equity investments, contracts, grants or other actions that support energy efficiency projects and research, development, manufacture, commercialization, deployment and installation of renewable energy technologies.

CGB also received payments from the Regional Greenhouse Gas Initiative (RGGI) for the financing of energy efficiency and renewable energy projects through CGB's CPACE program.

REPORTING ENTITY

CGB, as the primary government, follows the reporting requirements of Governmental Accounting Standards Board (GASB) Statement No. 61 (*The Financial Reporting Entity Omnibus – an Amendment of GASB Statements No. 14 and No. 34*) (the Statement) regarding presentation of component units. The Statement modifies certain requirements for including component units in the reporting entity, either by blending (recording their amounts as part of the primary government), or discretely presenting them (showing their amounts separately in the reporting entity's financial statements). To qualify as a blended component unit, the unit must meet one of the following criteria: (1) have substantively the same governing body as that of the primary government, and either (A) a financial benefit or burden relationship exists between the unit and the primary government, or (B) management of the primary government (below the level of the governing body) has operational responsibility of the unit; (2) the unit provides services or benefits exclusively or almost exclusively to the primary government; or (3) the unit's total debt outstanding, including leases, is expected to

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

REPORTING ENTITY (CONTINUED)

be repaid by resources of the primary government. A unit which fails to meet the substantively the same governing requirement may still be included as a discretely presented component unit, if the primary government has appointed the voting majority of the component unit's governance or met other criteria specified in the Statement such as whether or not it would be misleading were the entity to be excluded.

CGB established four legally separate for-profit entities whose collective purpose, at the present time, is to administer the CGB's solar energy programs. CGB believes to exclude any of the entities from these financial statements would be misleading. Each entity is listed below, along with whether it is included as a blended component unit (blended) or qualifies as a discretely presented component unit (discrete) within these financial statements based on the criteria previously described.

CEFIA Holdings LLC (blended)

A Connecticut limited liability company (LLC), 99% owned by CGB (1% owned by CI), established to fund a portfolio of residential solar loans and, through its CT Solar Lease 2 program, to enable investment in solar photovoltaic and solar thermal equipment for the benefit of Connecticut homeowners, businesses, not-for-profits and municipalities (the "End Users"). CEFIA Holdings LLC acquires the initial title to the solar assets and contracts with independent solar installers to complete the installation of the solar assets and arrange for the leasing of the solar assets (or sale of energy under power purchase agreements) to the End Users. CEFIA Holdings LLC is also responsible for procuring insurance for the solar assets, operation and maintenance services as well as warranty management services for the ultimate owner of the solar assets, CT Solar Lease 2 LLC, to which CEFIA Holdings LLC sells the residential and commercial projects before the projects are placed in service. After acquiring the residential and commercial projects, CT Solar Lease 2 LLC administers the portfolio of projects with the assistance of AFC First Financial Corporation.

CT Solar Loan I LLC (blended)

A limited-liability company, wholly-owned by CEFIA Holdings LLC, CT Solar Loan I LLC was established to make loans to residential property owners for the purposes of installing solar photovoltaic equipment.

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

CEFIA Solar Services, Inc. (discrete)

A Connecticut corporation, 100% owned by CEFIA Holdings LLC, established to share in the ownership risks and benefits derived from the leasing of solar photovoltaic and solar thermal equipment and the sale of energy under power purchase agreements as managing member of CT Solar Lease 2 LLC. CEFIA Solar Services, Inc. has a one percent ownership interest in CT Solar Lease 2 LLC and is the managing member of the entity responsible for performing all management and operational functions pursuant to the Operating Agreement of CT Solar Lease 2 LLC.

CT Solar Lease 2 LLC (discrete)

A Connecticut limited-liability company, CT Solar Lease 2 LLC acquires title to the residential and commercial solar projects from the developer, CEFIA Holdings LLC, using capital from its members along with non-recourse funding from participating banks. Repayment to participating banks is predicated upon the property owners payment to CT Solar Lease 2 LLC of their obligations under leases and power purchase agreements, as well as revenue earned from production-based incentives. CT Solar Lease 2 LLC is owned ninety-nine percent (99%) by Firstar Development, LLC, a Delaware limited liability company, as the Investor Member and one percent (1%) by CEFIA Solar Services Inc., as the Managing Member.

Advances between the primary government (CGB) and its component units, or between the component units themselves, involved establishment of funds to provide for loan loss reserves as well as pay certain organizational costs. Advances were eliminated in preparing the combining and reporting entity financial statements.

Condensed combining information for the primary government (CGB) and its two blended component units (CEFIA Holdings LLC and CT Solar Loan I LLC) is presented as follows:

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

CONDENSED, COMBINING INFORMATION – STATEMENT OF NET POSITION

	CGB	CT Solar Loan I LLC	CEFIA Holdings LLC	Eliminating Entries	Total Primary Government
Assets					
Current Assets					
Cash and cash equivalents	$ 36,023,857	$ 419,061	$ 3,160,764	$ --	$ 39,603,682
Accounts receivable	25,916	--	--	--	25,916
Utility remittance receivable	2,518,850	--	--	--	2,518,850
Other receivables	313,228	--	--	--	313,228
Due from component units	25,142,651	--	19,226,458	(16,879,194)	27,489,915
Prepaid expenses and other assets	94,433	19,249	170,580	--	284,262
Contractor loans	3,112,663	--	--	--	3,112,663
Current portion of solar lease notes	803,573	--	--	--	803,573
Current portion of portfolio investments	9,194,196	1,070,629	--	--	10,264,825
Total Current Assets	77,229,367	1,508,939	22,557,801	(16,879,194)	84,416,913
Noncurrent Assets					
Portfolio investments	1,000,000	--	--	--	1,000,000
Bonds receivable	1,600,000	--	--	--	1,600,000
Solar Lease Notes, less current portion	9,015,437	--	--	--	9,015,437
Program loans, less current portion	26,846,054	3,407,066	--	--	30,253,119
Renewable Energy Certificates	933,054	--	--	--	933,054
Investment in component units	99,000	--	100	(99,000)	100
Deferred financing fees, net	--	--	--	--	--
Capital assets, net of depreciation and amortization	263,839	--	--	--	263,839
Asset retirement obligation,net	--	--	--	--	--
Deferred pension outflows	1,669,961	--	--	--	1,669,961
Restricted assets:	--	--	--	--	--
Cash and cash equivalents	3,999,005	300,000	--	--	4,299,005
Total Noncurrent Assets	45,426,349	3,707,066	100	(99,000)	49,034,515
Total Assets	$ 122,655,717	$ 5,216,004	$ 22,557,901	$ (16,978,194)	$ 133,451,428

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

CONDENSED, COMBINING INFORMATION – STATEMENT OF NET POSITION (CONTINUED)

	CGB	CT Solar Loan I LLC	CEFIA Holdings LLC	Eliminating Entries	Total Primary Government
Liabilities and Net Position					
Liabilities					
Current maturities of long-term debt	$ --	$ 47,103	$ --	$ --	$ 47,103
Accounts payable and accrued expenses	1,763,619	47,857	3,514,637	--	5,326,112
Due to component units	--	4,063,850	12,815,344	(16,879,194)	--
Due to outside agency	49,516	--	--	--	49,516
Custodial liability	292,000	--	355,964	--	647,964
Deferred revenue	9,340	--	1,687,445	--	1,696,785
Total Current Liabilities	2,114,475	4,158,810	18,373,390	(16,879,194)	7,767,480
Fair value of interest rate swap	--	--	--	--	--
Asset retirement obligation	--	--	--	--	--
Long-Term Debt, less current maturities	--	806,421	--	--	806,421
Deferred pension inflow liability	532,135	--	--	--	532,135
Pension liability	14,899,766	--	--	--	14,899,766
Total Liabilities	17,546,376	4,965,230	18,373,390	(16,879,194)	24,005,802
Net Position					
Invested in capital assets	263,839	--	--	--	263,839
Restricted Net Position					
Non-expendable	--	--	100,000	(99,000)	1,000
Restricted for energy programs	3,999,005	300,000	--	--	4,299,005
Unrestricted (deficit)	100,846,498	(49,226)	4,084,511	--	104,881,783
Total Net Position	105,109,341	250,774	4,184,511	(99,000)	109,445,626
Total Liabilities and Net Position	$ 122,655,717	$ 5,216,004	$ 22,557,901	$ (16,978,194)	$ 133,451,428

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

CONDENSED, COMBINING INFORMATION – STATEMENT OF REVENUES, EXPENSES AND CHANGES IN NET POSITION

	CGB	CT Solar Loan I LLC	CEFIA Holdings LLC	Eliminating Entries	Total Primary Government
Operating Revenues					
Utility remittances	$ 27,233,987	$ --	$ --	$ --	$ 27,233,987
Grant revenue	192,274	--	--	--	192,274
RGGI auction proceeds	16,583,545	--	--	--	16,583,545
Energy system sales	--	--	25,912,414	--	25,912,414
REC sales	1,474,488	--	--	--	1,474,488
Other income	641,577	186	--	--	641,763
Total Operating Revenues	46,125,872	186	25,912,414	--	72,038,472
Operating Expenses					
Cost of goods sold - energy systems	--	--	22,526,874	--	22,526,874
Grants and program expenditures	20,904,376	195,981	11,394	--	21,111,751
General and administrative expenses	2,954,971	263	28,944	--	2,984,178
Total Operating Expenses	23,859,346	196,244	22,567,212	--	46,622,802
Operating Income	22,266,525	(196,059)	3,345,203	--	25,415,669
Nonoperating Revenue (Expenses)					
Interest income - prommisory notes	2,031,578	185,790	--	--	2,217,368
Interest income - short term cash deposits	81,891	486	1,383	--	83,761
Interest expenses LT debt	--	(26,985)	--	--	(26,985)
Interest income - component units	58,511	--	--	--	58,511
Interest expense - component units	--	--	--	--	--
Realized loss on investments	(1,180,285)	--	--	--	(1,180,285)
Unrealized gain (loss) on interest rate swap	--	--	--	--	--
Provision for loan losses	(563,825)	--	--	--	(563,825)
Total Nonoperating Revenue (Expenses)	427,871	159,291	1,383	--	588,545
Change in Net Position before Payments to State of Connecticut and Capital Contributions	22,694,396	(36,767)	3,346,586	--	26,004,215
Payments to State of Connecticut	(19,200,000)	--	--	--	(19,200,000)
Capital contributions	--	--	--	--	--
Distributions to member	--	--	--	--	--
Change in Net Position	3,494,396	(36,767)	3,346,586	--	6,804,215
Net Position - Beginning of Year	101,614,944	287,542	837,926	(99,000)	102,641,412
Net Position - End of Year	$ 105,109,340	$ 250,775	$ 4,184,512	$ (99,000)	$ 109,445,627

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

CONDENSED, COMBINING INFORMATION – STATEMENT OF CASH FLOWS

	CGB	CT Solar Loan I LLC	CEFIA Holdings LLC	Eliminating Entries	Total Primary Government
Cash Flows from Operating Activities					
Sales of energy systems	$ --	$ --	$ 20,221,847	$ --	$ 20,221,847
Sales of Renewable Energy Certificates	1,705,932	-	-	-	1,705,932
Utility company remittances	28,117,538	--	--	--	28,117,538
Grants	139,487	--	--	--	139,487
RGGI auction proceeds	21,078,165	--	--	--	21,078,165
Other income	629,748	--	--	--	629,748
Lease payments received	--	--	--	--	--
Grant and program expenditures	(10,473,287)	(126,430)	(26,386)	--	(10,626,103)
Grants, incentives and credit enhancements	(9,800,594)	--	--	--	(9,800,594)
Purchases of energy equipment	--	--	(19,989,550)	--	(19,989,550)
General and administrative expenditures	(3,655,275)	(5,021)	(13,583)	--	(3,673,879)
Net Cash Provided by (Used in) Operating Activities	27,741,713	(131,451)	192,328	--	27,802,590
Cash Flows from Non-capital Financing Activities					
Payments to State of Connecticut	(19,200,000)	--	--	--	(19,200,000)
Advances to CGB component units	(15,728,249)	--	(1,688,425)	7,606,924	(9,809,750)
Advances from CGB and component units	--	3,205,000	4,401,924	(7,606,924)	(0)
Net Cash Provided by (Used in) Non-capital Financing Activities	(34,928,249)	3,205,000	2,713,499	--	(29,009,750)
Cash Flows from Capital and Related Financing Activities					
Purchase of capital assets	(89,808)	--	--	--	(89,808)
Proceeds from long-term debt	--	932,271	--	--	932,271
Repayment of long-term debt	--	(232,432)	--	--	(232,432)
Interest expense	--	(26,985)	--	--	(26,985)
Capital contributions from/(to) component entities	--	--	--	--	--
Capital contributions from Firststar Development, LLC	--	--	--	--	--
Return of capital to Firststar Development, LLC	--	--	--	--	--
Net Cash Provided by (Used in) Capital and Related Financing Activities	(89,808)	672,854	--	--	583,046
Cash Flows from Investing Activities					
Return of principal on investments	1,404,738	927,618	--	--	2,332,356
Interest on short-term investments, cash, solard lease notes and loans	744,977	130,909	1,383	--	877,269

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

CONDENSED, COMBINING INFORMATION – STATEMENT OF CASH FLOWS (CONTINUED)

	CGB	CT Solar Loan I LLC	CEFIA Holdings LLC	Eliminating Entries	Total Primary Government
Cash Flows from Investing Activities (Continued)					
CPACE program loan disbursements	$ (22,181,032)	$ --	$ --	$ --	$ (22,181,032)
Grid Tied program loan disbursements	(1,166,205)	--	--	--	(1,166,205)
AD/CHP program loan disbursements	--	--	--	--	--
Alpha/Operational Demo program loan disbursements	(100,000)	--	--	--	(100,000)
Energy Efficiency program loan disbursements	(89,000)	--	--	--	(89,000)
Campus Efficiency NOW program loan disbursements	(396,662)	--	--	--	(396,662)
HOPBI program loan disbursements	(4,443,148)	--	--	--	(4,443,148)
Residential Solar Loan program disbursements	(900,000)	(4,586,610)	--	--	(5,486,610)
Net Cash Used in Investing Activities	(27,126,331)	(3,528,083)	1,383	--	(30,653,030)
Net Increase (Decrease) in Cash and Cash Equivalents	(34,402,674)	218,321	2,907,210	--	(31,277,144)
Cash and Cash Equivalents - Beginning of Year	74,425,536	500,740	253,554	--	75,179,830
Cash and Cash Equivalents - End of Year	$ 40,022,862	$ 719,061	$ 3,160,764	$ --	$ 43,902,686
Reconciliation of Operating Loss to Net Cash Provided by (Used in) Operating Activities:					
Operating income (loss)	$ 22,266,525	$ (196,059)	$ 3,345,203	$ --	$ 25,415,669
Adjustments to reconcile operating loss to net cash provided by (used in) operating activities:					
Depreciation	--	--	--	--	--
Provision for loan losses	--	--	--	--	--
Discount on asset sales	--	--	--	--	--
Other	--	--	--	--	--
Changes in operating assets and liabilities:					
Other assets	--	--	--	--	--
Increase in receivables and other assets	--	--	--	--	--
Increase in accounts payable,accrued expenses, deferred revenue and other liabilities	--	--	--	--	--
Net Cash Provided by (Used in) Operating Activities	$ 22,266,525	$ (196,059)	$ 3,345,203	$ --	$ 25,415,669

NOTE 1 – NATURE OF OPERATIONS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

MEASUREMENT FOCUS, BASIS OF ACCOUNTING AND FINANCIAL STATEMENT PRESENTATION

All entities are enterprise funds. Enterprise funds are used to account for governmental activities that are similar to those found in the private sector in which the determination of net income is necessary or useful to sound financial administration.

In its accounting and financial reporting, the reporting entity follows Governmental Accounting Standards Board (GASB) Statement No. 62, *GASB Codification of Accounting and Financial Reporting Guidance Contained in Pre-November 30, 1989 FASB and AICPA Pronouncements* which incorporates into GASB guidance pre-November 30, 1989 FASB Statements and Interpretations and Accounting Principles Board (APB) Opinions and Research Bulletins which do not conflict or contradict GASB statements.

BASIS OF PRESENTATION

These financial statements are reported using the economic resources measurement focus and accrual basis of accounting. Revenues are recognized when earned, and expenses are recognized when the liability is incurred, regardless of the timing of the related cash flows.

REVENUE RECOGNITION

CGB, in addition to utility assessments and RGGI auction income, recognizes revenue from grants as expenses are incurred.

CT Solar Loan I LLC derives revenue from interest earned on residential solar loan products.

CEFIA Holdings LLC derives revenue from the sales of photovoltaic energy systems to CT Solar Lease 2, LLC. This amount was eliminated to arrive at the total reporting entity revenue.

CEFIA Solar Services, Inc. revenue consists of an administrative fee from CGB. This amount was eliminated to arrive at the total reporting entity revenue.

CT Solar Lease 2 LLC derives revenue from the following sources: operating leases, energy generation, performance based incentives (PBIs) and the sale of Solar Renewable Energy Certificates (SRECs) to third parties.

NOTE 1 – NATURE OF BUSINESS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

REVENUE RECOGNITION (CONTINUED)

Rental income from operating leases for residential and certain commercial scale solar facilities is recognized on a straight-line basis over the term of each underlying lease.

Energy generation revenue will be recognized as electricity is generated, based on actual output and contractual prices set forth in long term PPAs associated with certain commercial scale facilities.

Revenue from the sale of SRECs to third parties is recognized upon the transfer of title and delivery of the SRECs to third parties and is derived from contractual prices set forth in SREC sale agreements associated with commercial scale facilities.

OPERATING VS. NON-OPERATING REVENUE (EXPENSE)

All entities distinguish operating revenues and expenses from non-operating items. Operating revenues consist of utility customer assessments, grants for operating activities, and other revenue generated in connection with investments in clean energy programs. Operating expenses consist of operating costs, including depreciation on capital assets and grants and programs. Non-operating revenue (expense) consists of investment earnings, and other items not considered operational by management.

USE OF ESTIMATES

Management uses estimates and assumptions in preparing these financial statements in accordance with accounting principles generally accepted in the United States of America. Those estimates and assumptions affect certain reported amounts and disclosures in the financial statements. Actual results could vary from the estimates that were used.

USE OF RESTRICTED VS. NON-RESTRICTED RESOURCES

When both restricted and unrestricted amounts are available for use, the policy is to use restricted resources for their intended purposes first and then unrestricted resources.

CASH AND CASH EQUIVALENTS

Cash equivalents consist of cash and highly liquid short-term investments with an original term of 90 days when purchased and are recorded at cost, which approximates fair value.

CAPITAL ASSETS

Capital asset acquisitions exceeding $500 are capitalized at cost. Maintenance and repair expenses are charged to operations when incurred. Depreciation is computed using straight-line methods over the estimated useful lives of the assets, which range from two to thirty years. Leasehold improvements are amortized over the shorter of their useful life or the lease term.

The estimated useful lives of capital assets are as follows:

Asset	Years
Solar facilities	30 years
Furniture and equipment	5 years
Leasehold improvements	5 years
Computer hardware and software	2-3 years

For capital assets sold or otherwise disposed of, the cost and related accumulated depreciation and amortization are removed from the accounts, and any related gain or loss is reflected in income for the period.

All solar facilities are owned by CT Solar Lease 2 LLC and are stated at cost and include all amounts necessary to construct them. Systems are placed in service when they are ready for use and all necessary approvals have been received from local utility companies. Additions, renewals, and betterments that significantly extend the life of an asset are capitalized. Expenditures for warranty maintenance and repairs to solar facilities are charged to expense as incurred. Solar facilities in process represent facilities which are in various stages of construction or have not yet received the necessary utility company approvals.

IMPAIRMENT OF LONG-LIVED ASSETS

CT Solar Lease 2 LLC reviews its solar facilities for impairment whenever events or changes in circumstances indicate that the carrying value of an asset may not be recoverable. When recovery is reviewed, if the undiscounted cash flows estimated to be generated by an asset is less than its carrying amount, management compares the carrying amount of the asset to its fair value in order to determine whether an impairment loss has occurred. The amount of the impairment loss is equal to the excess of the asset's carrying value over its estimated fair value. No impairment loss was recognized during the fiscal years ending June 30, 2015 or June 30, 2014.

NOTE 1 – NATURE OF BUSINESS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

ASSET RETIREMENT OBLIGATIONS

CT Solar Lease 2 LLC (CT SL2) is required to recognize its liability related to asset retirement obligations when it has the legal obligation to retire long-lived assets. Upon the expiration of operating leases or a PPA's initial or extended terms, customers generally have the option to purchase the solar facilities at fair market value or require CT SL2 to remove the solar facilities at its expense.

Asset retirement obligations are recorded in the period in which they are incurred and reasonably estimable, including those obligations for which the timing method of settlement are conditional on a future event that may or may not be in the control of CT SL2. Retirement of assets may involve efforts to remove the solar facilities depending on the nature and location of the assets. In identifying asset retirement obligations, CT SL2 considers identification of legally enforceable obligations, changes in existing law, estimates of potential settlement dates, and the calculation of an appropriate discount rate to be used in calculating the fair value of the obligations. For those assets where a range of potential settlement dates may be reasonably estimated, obligations are recorded. CT SL2 routinely reviews and reassesses its estimates to determine if an adjustment to the value of asset retirement obligations is required.

The aggregate carrying amount of asset retirement obligations recognized by CT SL2 was $1,094,125 at June 30, 2015. There were no asset retirement obligations recognized at June 30, 2014. The following table shows changes in the aggregate carrying amount of CT SL2's asset retirement obligation for the year ended June 30, 2015:

Balance - June 30, 2014	$ -
Additional accruals	1,052,205
Accretion expense	41,920
Balance - June 30, 2015	$ 1,094,125.00

PORTFOLIO INVESTMENTS

CGB carries all investments at fair value. Fair value is defined as the price that would be received to sell an asset or paid to transfer liability by in an orderly transaction between market participants at the measurement date. As discussed in Note 4, CGB's portfolio investments are managed by CI. Fair value is determined by CI's independent valuation committee ("Committee") using United States Private Equity Valuation Guidelines promulgated by the Private Equity Investment Guidelines Group. In the absence of readily determinable market values, the Committee gives consideration to pertinent information about the companies comprising these investments, including, but not limited to, recent sales prices of the issuer's securities, sales growth, progress toward business goals and other operating data. CI has applied procedures in arriving at the estimate of the value of such securities that it believes are reasonable and appropriate. CGB management reserves the right to establish a reserve in addition to the reserve recommended by the Committee to further account for current market conditions and volatility. Due to the inherent uncertainty of valuation, those estimated values may differ significantly from the amounts ultimately realized from the investments, and the differences could be material. CGB reports gains as realized and unrealized consistent with the practice of venture capital firms. The calculation of realized gains and losses is independent of the calculation of the net change in investment value.

All of CGB's portfolio investments are uninsured against loss and unregistered, and are held in the administrator's name.

DEFERRED FINANCING FEES

Deferred financing fees of $487,563 consist of costs incurred in connection with securing the long-term debt. These costs are amortized using the straight-line method over the maximum term of the credit facility, which is through July 1, 2030. Accumulated amortization at June 30, 2015 was $57,360. Amortization expense for the year ended was $28,680.

NOTE 1 – NATURE OF BUSINESS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

NET POSITION

Net position is presented in the following three categories:

- *Net Position Invested in Capital Assets* represent capital assets, net of accumulated depreciation and amortization that are attributable to those particular assets.
- *Restricted Net Position* represent assets whose use is restricted through external restrictions imposed by creditors, grantors, contributors and the like, or through restrictions imposed by laws or through constitutional provisions or enabling legislature, and includes equity interest within CGB's component units by outside entities.
- *Unrestricted Net Position* represents assets which do not meet the definition of the two preceding categories.

GRANTS AND PROGRAMS

Expenditures for grants and programs are recorded upon the submission of invoices and other supporting documentation and approval by management. Salaries, benefits and overhead expenses are allocated to program expenses based on job functions.

RECLASSIFICATIONS

Certain amounts in the 2014 summarized information have been reclassified to conform to the 2015 presentation.

SUBSEQUENT EVENTS

TBD

NOTE 1 – NATURE OF BUSINESS AND SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

SUBSEQUENT EVENTS (CONTINUED)

CGB has performed a review of events subsequent to the statement of net position date through December XX, 2015, the date of the financial statements where available to be issued. Except as described above, no events requiring recording or disclosure in the financial statements were identified.

NOTE 2 – CHANGE IN METHOD FOR ACCOUNTING FOR PENSIONS

On July 1, 2014, CGB adopted GASB 68 and GASB 71. GASB 68 requires cost-sharing employers to recognize liabilities, deferred outflows of resources, deferred inflows of resources, and expenses for their proportionate share of the pension plan's total. As the State Employees' Retirement System (SERS) did not have a practical way to provide each of its cost-sharing employers with all of the information needed to fully restate their prior period financial statements, CGB has elected to apply the "cumulative effect" method, as discussed in GASB 68, by restating beginning net position as of July 1, 2014. As of July 1, 2014, CGB recorded an adjustment to reduce beginning net position by $15,430,912 in accordance with GASB 68, as amended.

GASB 71 requires that, at transition, a government recognize a deferred outflow of resources for its pension contributions, if any, made subsequent to the measurement date of the net pension liability and the end of the government's report period. The provisions of the Statement are required to be applied simultaneously with the provisions of GASB 68. As of July 1, 2014, CGB recorded an adjustment to increase beginning net position by $1,923,687 for contributions made to SERS from July 1, 2013 through June 30, 2014.

As of July 1, 2014, the cumulative effect of adopting GASB 68 was a $14,305,410 reduction to beginning net position. The following table shows the impact of the "cumulative effect" method of adopting and implementing GASB 68 and GASB 71 on beginning net position.

Statement of Revenue, Expenses and Changes in Net Position

Net position,beginning of period, July 1,2014 (as previously started)	$	98,500,605
Cummulative effect of adopting GASB 68 and GASB 71		(14,305,410)
Net position,beginning of period,July 1, 2014 (as restated)	$	84,195,195

NOTE 3 – FAIR VALUE MEASUREMENTS

The framework for measuring fair value provides a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The hierarchy gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). In determining fair value, CGB utilizes valuation techniques that maximize the use of observable inputs and minimize the use of unobservable inputs. CGB also considers nonperformance risk in the overall assessment of fair value.

Investments are measured at fair value utilizing valuation techniques based on observable and/or unobservable inputs. Observable inputs reflect readily obtainable data from independent sources, while unobservable inputs reflect market assumptions. These inputs are classified into the following hierarchy:

Level 1 – Unadjusted quoted prices in active markets that are accessible at the measurement date for identical assets of liabilities. CGB's Level 1 securities were valued at the closing price reported on the active markets on which the individual securities are traded.

Level 2 – Inputs other than quotes prices in active markets for identical assets and liabilities that are observable either directly or indirectly for substantially the full term of the asset or liability. Level 2 inputs include the following:

- Quotes prices for similar assets and liabilities in active markets
- Quotes prices for identical or similar assets or liabilities in markets that are not active
- Observable inputs other than quotes prices that are used in the valuation of the asset or liability (e.g., interest rate and yield curve quotes at commonly quotes intervals)

NOTE 3 – FAIR VALUE MEASUREMENTS (CONTINUED)

- Inputs that are derived principally from or corroborated by observed market data by correlation or other means

Level 3 – Unobservable inputs for the asset or liability (supported by little or no market activity). Level 3 inputs include management's own assumptions about the assumptions that market participants would use in pricing the asset or liability (including assumptions about risk).

The asset or liability's fair value measurement level within the fair value hierarchy is based on the lowest level of any input that is significant to the fair value measurement. Valuation techniques used need to maximize the use of observable inputs and minimize the use of unobservable inputs.

The following table sets forth by level, within the fair value hierarchy, CGB's fair value measurements at June 30, 2015:

	Investment assets at Fair Value as of June 30, 2015			
	Level 1	Level 2	Level 3	Total
Cash and cash equivalents	$ 48,692,653	$ --	$ --	$ 48,692,653
Portfolio investments	--	--	1,000,000	1,000,000
	$ 48,692,653	$ --	$ 1,000,000	$ 49,692,653

	Level 1	Level 2	Level 3	Total
Primary Government:				
Cash and cash equivalents	$ 43,902,686	$ --	$ --	$ 43,902,686
Portfolio investments	--	--	1,000,000	1,000,000
Discretely Presented Component Units:				
CEFIA Solar Services, Inc.	69,252	--	--	69,252
CT Solar Lease 2 LLC				
Cash and cash equivalents	4,720,716	--	--	4,720,716
	$ 48,692,653	$ --	$ 1,000,000	$ 49,692,653

NOTE 3 – FAIR VALUE MEASUREMENTS (CONTINUED)

The following table sets forth by level, within the fair value hierarchy, CGB's fair value measurements at June 30, 2014:

	Investment assets at Fair Value as of June 30, 2014			
	Level 1	Level 2	Level 3	Total
Cash and cash equivalents	$ 80,924,749	$ --	$ --	$ 80,924,749
Portfolio investments	--	--	1,000,000	1,000,000
	$ 80,924,749	$ --	$ 1,000,000	$ 81,924,749

	Level 1	Level 2	Level 3	Total
Primary Government:				
Cash and cash equivalents	$ 75,179,829	$ --	$ --	$ 75,179,829
Portfolio investments	--	--	1,000,000	1,000,000
Discretely Presented Component Units:				
CEFIA Solar Services, Inc.	123	--	--	123
CT Solar Lease 2 LLC				
Cash and cash equivalents	5,744,796	--	--	5,744,796
	$ 80,924,748	$ --	$ 1,000,000	$ 81,924,748

There were no transfers between levels during the years ended June 30, 2015 and 2014.

Furthermore, there were no changes in level 3 assets during 2015 or 2014, respectively.

NOTE 4 – CASH AND CASH EQUIVALENTS

The following is a summary of cash and cash equivalents for the reporting entity at June 30:

	2015	2014
Checking	$ 4,976,553	$ 2,257,365
Money Market	$ 2,612,096	$ --
State Treasurer's Short-Term Investment Fund	32,597,000	69,688,946
Unrestricted cash and cash equivalents	40,185,649	71,946,311
Checking - restricted	1,378,516	1,405,787
Money Market - restricted	3,500,000	3,500,000
State Treasurer's Short-Term Investment Fund - restricted	3,628,489	4,072,651
Total cash and cash equivalents	$ 48,692,654	$ 80,924,749

	Cash and cash equivalents as of June 30, 2015			
	Primary Government	CT Solar Lease 2 LLC	CEFIA Solar Services, Inc.	Total
Checking	$ 4,787,298	$ 166,135	$ 23,120	$ 4,976,553
Money Market	2,511,383	54,581	46,132	2,612,096
State Treasurer's Short-Term Investment Fund	32,597,000	--	--	32,597,000
Unrestricted Cash and Cash Equivalents	39,895,681	220,716	69,252	40,185,649
Restricted Cash				
Checking	378,516	1,000,000	--	1,378,516
Money market	--	3,500,000	--	3,500,000
State Treasurer's Short-Term Investment Fund	3,628,489	--	--	3,628,489
	$ 43,902,686	$ 4,720,716	$ 69,252	$ 48,692,654

NOTE 4 – CASH AND CASH EQUIVALENTS (CONTINUED)

	Cash and cash equivalents as of June 30, 2014			
	Primary Government	CT Solar Lease 2 LLC	CEFIA Solar Services, Inc.	Total
Checking	$ 1,012,446	$ 1,244,796	$ 123	$ 2,257,365
State Treasurer's Short-Term Investment Fund	69,688,946	--	--	69,688,946
Unrestricted Cash and Cash Equivalents	70,701,392	1,244,796	123	71,946,311
Restricted Cash				
Checking	405,786	1,000,000	--	1,405,786
Money market	--	3,500,000	--	3,500,000
State Treasurer's Short-Term Investment Fund	4,072,651	--	--	4,072,651
	$ 75,179,829	$ 5,744,796	$ 123	$ 80,924,748

STATE TREASURER'S SHORT-TERM INVESTMENT FUND

The State Treasurer's Short-Term Investment Fund is a Standard & Poors AAAm investment pool of high-quality, short-term money market instruments managed by the Cash Management Division of the State Treasurer's Office, and operates in a manner similar to Money Market Mutual Funds. It is the investment vehicle for the operating cash of the State of Connecticut Treasury, state agencies and authorities, municipalities, and other political subdivisions of the State. The value of CGB's position in the pool is the same as the value of pool shares. Regulatory oversight is provided by an investment advisory council and the State Treasurer's Cash Management Board.

INVESTMENT MATURITIES

The State Treasurer's Short-Term Investment Fund itself has no maturity date and is available for withdrawal on demand.

NOTE 4 – CASH AND CASH EQUIVALENTS (CONTINUED)

INTEREST RATE RISK

CGB manages its exposure to declines in fair value by limiting the average maturity of its cash and cash equivalents to no more than one year.

CREDIT RISK

Connecticut General Statutes authorize CGB to invest in obligations of the U.S. Treasury including its agencies and instrumentalities, commercial paper, banker's acceptance, repurchase agreements and the State Treasurer's Short-Term Investment Fund.

Investment ratings for the Fund's investment are as follows:

	Standard & Poor's
State Treasurer's Short-Term Investment Fund	AAAm

CONCENTRATION OF CREDIT RISK

CGB's investment policy does not limit the investment in any one investment vehicle. The State Treasurer's Short-term Investment Fund is not subject to this disclosure.

CUSTODIAL CREDIT RISK - DEPOSITS

In the case of deposits, this represents the risk that, in the event of a bank failure, CGB's deposits may not be returned to it. CGB does not have a deposit policy for custodial credit risk. As of June 30, 2015 and 2014, $ 11,490,434 and $6,554,413, respectively, of CGB's bank balances were exposed to custodial credit risk. Primary government consisted of $7,002,753 and $1,296,948 as of June 30, 2015 and 2014, respectively. CT Solar Lease 2, LLC consisted of $4,487,682 and $5,257,465 as of June 30, 2015 and 2014, respectively. Funds held by banks on behalf of CT Solar Lease 2 LLC include a contractual requirement to maintain $4,500,000 in deposits with financial institutions participating in the CGB Solar Lease Program which represent loan loss and lease maintenance reserves.

CUSTODIAL CREDIT RISK - INVESTMENTS

For an investment, this represents the risk that, in the event of the failure of the counterparty, CGB will not be able to recover the value of the investment. As of , the Fund has no reportable custodial risk.

NOTE 5 – PORTFOLIO INVESTMENTS

The former Connecticut Clean Energy Fund (CCEF) invested in emerging technology companies as equity and debt investments in Operational Demonstration projects. Based on a memorandum of understanding between CGB and CI, CI manages these investments on behalf of CGB.

NOTE 6 – BONDS RECEIVABLE

This amount represents two $800,000 bonds received in connection with the CGB's May 2014 sale of C-PACE Loans to Clean Fund Holdings, LLC (CFH). CFH paid CGB approximately $6.4 million in cash along with two bonds issued to CGB through Public Finance Authority (Subordinate Series 2014B-1 and 2014C-1). Each bond carries interest of 5.30% per annum with a maturity date of September 10, 2034. The bonds are secured by the C-PACE Loans sold to CFH. At June 30, 2015, management believes no valuation allowance is necessary on these bonds.

Each bond requires semi-annual interest-only payments to CGB starting September 10, 2014 and continuing to September 10, 2029. Starting March 10, 2030 and every six months thereafter, principal payments, along with the required interest is to be paid to CGB.

Principal maturities of these bonds are as follows:

Year ended June 30,	2014B-1	2014C-1	Total
2015	$ --	$ --	$ --
2016	--	--	--
2017	--	--	--
2018	--	--	--
2019	--	--	--
2020 - 2024	--	--	--
2025 - 2029	--	--	--
2030 - 2034	792,500	792,500	1,585,000
2035	7,500	7,500	15,000
	$ 800,000	$ 800,000	$ 1,600,000

NOTE 7 – SOLAR LEASE NOTES

In June of 2008 the predecessor of the CGB, the Connecticut Clean Energy Fund (CCEF) entered into a Master Lease Program Agreement with CT Solar Leasing LLC, a third party leasing company, AFC First Financial Corporation, a third party servicer, and Firstar Development LLC, the tax equity investor, to develop a residential solar PV leasing program in Connecticut. CCEF purchased a total of $13,248,685 of promissory notes issued by CT Solar Leasing LLC during the period commencing in April of 2009 and ending in February of 2012 to fund the program. Each nonrecourse promissory note is secured by the payments under a specific PV equipment lease, with a rate of interest of 5% and a term of 15 years. Future principal repayments under the program and the current loss reserve are as follows:

Future principal repayments

2016	$ 803,573
2017	846,480
2018	889,788
2019	935,311
2020	983,163
2021-2024	5,459,877
	9,918,192
Less reserve for losses:	(99,182)
	$ 9,819,010
Current portion	$ 803,573
Non-current portion	9,015,437
	$ 9,819,010

NOTE 8 – PROGRAM LOANS

Outstanding principal balances by program for the years ending June 30, 2015 and 2014 are as follows:

	2015	2014
Connecticut Green Bank		
CPACE Program benefit assessments	$ 29,379,289	$ 6,902,682
Gried-Tied Program term loans	7,722,894	6,025,782
Pre Development/Operational Demonstration program loans	836,421	2,338,046
Other program loans	1,746,443	437,031
CT Solar Loan I LLC		
Residential Solar PV Program loans-WIP	892,866	250,309
Residential Solar PV Program loans-Complete	3,584,829	530,026
	44,162,742	16,483,876
Reserve for loan losses	(3,644,796)	(3,080,972)
	$ 40,517,946	$ 13,402,904

Scheduled repayments of principal under these loans as of June 30, 2015 is as follows:

	2016	2017	2018	2019	2020	Thereafter	Total
Connecticut Green Bank							
CPACE Program benefit assessments- in construction	$ 8,050,041	$ --	$ --	$ --	$ --	$ --	$ 8,050,041
CPACE Program benefit assessments- in repayment	655,286	806,641	834,316	881,969	932,160	17,218,876	21,329,248
Gried-Tied Program term loans	--	--	--	--	--	7,722,894	7,722,894
Pre Development/ Operational Demonstration program loans	--	--	501,421	--	--	335,000	836,421
Other program loans	925,458	15,760	15,760	5,731	--	783,734	1,746,443
CT Solar Loan I LLC							
Residential Solar PV Program loans - in construction	892,866	--	--	--	--	--	892,866
Residential Solar PV Program loans - in repayment	177,763	190,025	202,807	216,562	229,005	2,568,667	3,584,829
	10,701,414	1,012,426	1,554,305	1,104,262	1,161,165	28,629,171	44,162,743
Reserve for loan losses	(436,589)	(41,120)	(543,925)	(44,335)	(46,608)	(2,532,218)	(3,644,795)
	$ 10,264,825	$ 971,306	$ 1,010,380	$ 1,059,927	$ 1,114,557	$ 26,096,953	$ 40,517,948

NOTE 8 – PROGRAM LOANS (CONTINUED)

Benefits assessments under the C-PACE program will finance energy efficiency upgrades and the installation of renewable energy equipment on non-residential property. The assessments carry interest rates ranging from 5.0% to 6.0% with terms ranging from 10 to 20 years.

The grid–tied term loan represents the financing of two projects. The first project is the 15 megawatt Dominion Bridgeport Fuel Cell Park from Project 150. Interest is paid monthly on the outstanding principal balance at a rate of 5.0% until 2022 when principal payments commence over a 48-month period. The second project is the 5 megawatt wind turbine project in Colebrook. Interest on the revolving term loan is paid quarterly at prime plus 3%. Interest on the non-revolving term loan is paid quarterly based on the project's cash flows. The minimum rate of interest on the non-revolving term loan is 10%. Principal under both loans is repaid at maturity which is 15 years from the date the project was placed in service. The prject was placed in service in November of 2015.

Pre development loans finance a clean energy facility developer's costs associated with acquiring site control, environmental assessments, impact studies, permitting costs and facility design. Repayments of principal begin when one of the following milestones is achieved: the closing of permanent financing of the project, commencement of commercial operation, or the sale of the project or its assets. Interest on repayments is at a rate of prime plus 1%. The projects financed continue to be under development and are investments of the organization that are consistent with its Comprehensive Plan and budget.

Operational demonstration program loans are residual transactions of the programs of the Connecticut Clean Energy Fund. The loans finance the development of emerging clean energy technologies. Repayment of each loan is based upon the commercial success of the technology and carries an interest rate of 6%. If commercial success is not achieved after ten years from the date of the loan agreement, the loan converts to a grant. Connecticut Innovations assists in overseeing these loans.

Other program loans represent the financing of feasibility studies for various renewable energy projects or energy efficiency upgrades and bridge loans to developers of solar PV projects for low to moderate income housing that fall inside the organization's Comprehensive Plan and Budget.

The residential solar PV loan program administered by CT Solar Loan I LLC, makes loans to residential property owners for the purpose of installing solar photovoltaic equipment. Loans carry an interest rate ranging from 6.49% to 6.75% with a term of 15 years.

NOTE 9 – FINANCING ACTIVITIES

LONG-TERM DEBT - LINE OF CREDIT – PRIMARY GOVERNMENT

During 2014, CT Solar Loan 1 LLC entered into a $4,000,000 line of credit (LOC) with Solar Mosaic, Inc. (Mosaic). The LOC was amended in June 2015 to $1,100,000. Borrowings on the LOC immediately turn into a term note with predefined repayment terms at the time of borrowing. No further borrowings are available after June 30, 2015. The LOC had $3,873,912 available at June 30, 2014. Borrowings on the LOC bear interest at 6.4586% (Base Rate) and have the option to buy-down the interest rate to 6.00% (Reduced Rate) by making a payment on the borrowing date of 2.875% of the principal amount of the loan (Rate Buy-down Amount). As of June 30, 2015 and 2014 there was $ 853,525 and $126,088, respectively, outstanding which matures in March 2029.

In connection with the LOC, CT Solar Loan 1 LLC is required to establish and maintain a collections account, debt service reserve account and a loan loss reserve account. Deposits shall be made into the collections account for all payments received by residential borrowers. The debt service reserve account is required to have no less than six months forward-looking principal and interest payments for the loans outstanding. The loan loss reserve account required a one-time deposit of $300,000 as of June 30, 2014 which was reduced to $82,500 as of June 30, 2015.

Future maturities on borrowings on the LOC are as follows:

Years ending June 30,	Principal	Interest	Total
2016	$ 47,103	$ 49,476	$ 13,527
2017	50,129	47,022	13,443
2018	52,937	43,938	13,356
2019	55,910	40,680	13,266
2020	59,058	37,240	96,298
2021 - 2025	346,592	127,414	474,006
2026 - 2029	241,796	24,495	266,291
	$ 853,525	$ 370,265	$ 890,187

NOTE 9 – FINANCING ACTIVITIES (CONTINUED)

LINE OF CREDIT –DISCRETELY PRESENTED COMPONENT UNIT – CT SOLAR LEASE 2, LLC

CT Solar Lease 2, LLC has a $26,700,000 line of credit agreement (Additional LOC) with First Niagara Bank, N.A. (First Niagara) as the Administrative Agent and Lender along with three other participating lenders. The additional LOC is broken down by lender as follows:[Need to adjust for participant withdrawal]

First Niagara Bank, N.A	$ 11,566,400
Liberty Bank	7,566,800
Webster Bank, National Association	7,566,800
	$ 26,700,000

Funds may be drawn down in no more than ten total advances by July 1, 2015. With the exception of the final advance, each advance must be in the principal amount of $2,670,000 or a whole multiple of $100,000 in excess of $2,670,000. Each loan funding will be shared by all participating lenders in accordance with their pro-rata share of the total facility commitment. As of June 30, 2015 $3,000,000 had been advanced under the Additional LOC. No advances were made as of June 30, 2014. No principal repayments were made as of June 30, 2015.

Each advance will be amortized separately. CT Solar Lease 2 LLC has the option with each advance of selecting between the LIBOR rate or the base rate which is defined as the highest of (a) the Federal Funds Effective Rate plus one-half of 1 percent, (b) First Niagara's prime rate , and (c) the LIBOR rate plus 1 percent . CT Solar Lease 2 LLC may also elect to convert an advance from one rate to the other by following the process outlined in the credit agreement.

Payments of interest with respect to any LIBOR rate advances are due on the 15th day of the month following each calendar quarter end. Payments of interest with respect to any base rate advances are due monthly. Payments of principal with respect to all advances are due on the 15th day of the month following each calendar quarter end. Principal payments on each advance will be based on a modified 15 year amortization schedule as outlined in the credit agreement.

Within one month of each advance, CT Solar Lease 2 LLC is required to enter into an interest rate swap contract with respect to a minimum amount of 75% of such advance. If one of the participating lenders is the counterparty to the swap contract, such contract will be secured by the collateral of the credit agreement; otherwise, the swap contract will be unsecured. See Note 9.

Certain obligations of CT Solar Lease 2 LLC under the credit agreement are guaranteed by CGB. This credit agreement is secured by all assets of CT Solar Lease 2 LLC as well as CEFIA Solar Services (the "Managing Member") interest in CT Solar Lease 2 LLC. There are no prepayment penalties. There are certain debt service coverage ratios CT Solar Lease 2 LLC must maintain related to each separate advance and which require the separate measurement of the net operating income with respect to the projects purchased with each advance.

NOTE 10 – INTEREST RATE SWAP AGREEMENT

CT Solar Lease 2 LLC entered into an interest rate swap agreement with First Niagara (the Swap Agreement) in September 2014 in anticipation of making its first draw down on the credit agreement. Payments made and received are based on a notional amount of $11,804,925 as of June 30, 2015 with an additional $3,195,075 in notional amounts under the Swap Agreement occurring after this date. The agreement provides for CT Solar Lease 2 LLC to receive payments based on the 1 month USD-LIBOR-BBA (0.18550% at June 30, 2015) and to make payments based on an interest rate of 2.78%. The agreement matures on December 15, 2025. The fair value of the interest rate swap agreement as of June 30, 2015 was a liability of $660,073, which is represented as the fair value of the interest rate swap on the accompanying 2015 Statement of Net Position.

NOTE 11 – PAYMENT TO STATE OF CONNECTICUT

The Connecticut Legislature passed Public Act 13-247 pertaining to the State's budget for the biennium ending June 30, 2015 and signed into law on June 19, 2013. This Act requires the Connecticut Green Bank to transfer $6,200,000 and $19,200,000 to the State's General Fund during fiscal years 2014 and 2015, respectively.

NOTE 12 – RELATED PARTY TRANSACTIONS AND OPERATING LEASES

DUE TO AFFILIATE

CGB utilizes the services of CI, as provided in the General Statutes of the State of Connecticut. CI provides services to CGB, at cost, for its operations. Such services include, but are not limited to, staff for human resources and information technology support, office space, equipment, supplies and insurance. Expenses billed to CGB by CI totaled $ 477,161 and $1,110,683 for the years ended June 30, 2015 and 2014, respectively. As of June 30, 2015 and 2014 , amounts due to CI were $ 49,516 and $439,643, respectively.

UNUSED COMMITMENT FEE

The Investor Member of CT Solar Lease 2 LLC is entitled to an annual fee due within 30 days of the end of each calendar year, calculated on a monthly basis, based on the amount of the Investor Member's unfunded capital contributions. The fee for each month is equal to 1.25 percent times the amount by which the Investor Member's contribution cap exceeds the total capital contributions funded as of the last day of the month in question divided by twelve. Amounts not paid timely accrue interest at the US Bank Prime Rate in effect on the due date plus 2 percent. The unused commitment fee totaled $252,135 and $146,183 for the years ended June 30, 2015 and 2014, respectively, and is included in accounts payable and accrued expenses on the accompanying statement of net assets.

PRIORITY RETURN

The Investor Member is the Tax-Equity Investor and is entitled to substantially all of the tax benefits of CT Solar Lease 2 LLC until January I of the year which is five years after the date the last project is installed, which is anticipated to be January 1, 2021, the Flip Date.

The investor Member of CT Solar Lease 2 LLC shall be due a cumulative, quarterly distribution equal to 0.5% of its paid-in capital contributions in respect of projects beginning at the end of the first quarter after the first project acquisition capital contribution is made and continuing until the "Flip Date." To the extent the priority return is not paid in a quarter until the Flip Date, unpaid amounts will accrue interest at the lower of 24% per annum or the highest rate permitted by law.

In accordance with the Operating Agreement all amounts and accrued interest due on the Priority Return are to be paid from net cash flow prior to certain required payments due under the Credit Agreement. The Investor Member was paid a priority return of $26,159 for the year ended June 30, 2015. The Investor Member was not paid a priority return in 2014.

NOTE 12 – RELATED PARTY TRANSACTIONS AND OPERATING LEASES (CONTINUED)

ADMINISTRATIVE SERVICES FEE

The Managing Member of CT Solar Lease 2 LLC provides administrative and management services to the Company and earned a quarterly fee initially equal to $30,000 per quarter beginning July 1, 2013. The amount of the fee will increase 2.5 percent each July 1st beginning July 1, 2014. The administrative services fee totaled $123,000 and $120,000 for the years ended June 30, 2015 and 2014, respectively, and is included in accounts payable and accrued expenses on the accompanying statement of net assets.

PREPAID PRIORITY RETURN

The investor member of CT Solar Lease 2 LLC will be paid a prepaid priority return with respect to each residential energy system project where the customer has made a prepayment to CT Solar Lease 2 LLC. The prepaid priority return is a one-time distribution to the investor member equal to 4.2055% of each prepaid project's purchase price. The prepaid priority return will be paid to the investor member on the date it makes its initial acquisition capital contribution with respect to the purchase of the prepaid project. During the years ended June 30, 2015 and 2014, the investor member was paid $72,402 and $12,584, respectively, related to the prepaid priority return.

PAYROLL TAXES AND FRINGE BENEFIT CHARGES

Pursuant to state statute, CGB is subject to fringe benefit charges for pension plan and medical plan contributions which are paid at the state level. CGB's employer payroll taxes are also paid at the state level. CGB reimburses the state for these payments. The reimbursement for was $ 3,061,004 and $2,721,651, respectively, comprising 75.80% and 76.40%, respectively, of gross salaries.

OPERATING LEASES

During 2014, CGB entered into a non-cancellable operating lease with an unrelated entity for its main office space. The lease calls for monthly escalating payments beginning at $12,567 through December 31, 2020. Rent expense related to this lease for the years ended June 30, 2015 and 2014 was $ 154,572 and $148,680, respectively.

In addition, CGB has a non-cancelable operating lease for an additional office space from an unaffiliated entity which calls for initial monthly payments of $7,333, with escalating payments through December 2020. Rent expense related to this lease for the years ended amounted to $ 97,723 and $88,998, respectively.

In addition, CGB leases office equipment on a month-to-month basis. Rent expense related to the office equipment for the years ended June 30, 2015 and June 30, 2014 $6,439 and $24,415 respectively.

Future minimum lease payments for office rentals are as follows:

Years ending June 30,	
2016	$ 250,172
2017	256,424
2018	262,672
2019	268,920
2020	275,168
Thereafter	139,146
	$ 1,452,502

NOTE 13 – CAPITAL ASSETS

Capital asset activity for reporting entity for the years ended June 30, 2015 and 2014 are as follows:

2015	Balance, July 1, 2014	Additions	Deletions	Adjustments	Balance, June 30, 2015
Capital assets being depreciated:					
Solar lease equipment	$ 1,035,159	$ 22,753,915	$ --	$ (2,777,242)	$ 21,011,832
Furniture and equipment	338,938	18,353	(134,590)	--	222,701
Computer hardware and software	88,337	57,480	(17,189)	--	128,628
Leasehold improvements	139,682	13,975	--	--	153,657
Capital assets not being depreciated:					
WIP solar lease equipment	1,759,111	4,847,060	--	(591,611)	6,014,560
Construction in progress	7,141	--	--	--	7,141
	3,368,368	27,690,783	(151,779)	(3,368,853)	27,538,519
Less accumulated depreciation and amortization:					
Solar lease equipment	9,865	309,279	--	--	319,144
Furniture and equipment	205,820	50,919	(134,590)	--	122,149
Computer hardware and software	33,845	34,250	(17,189)	--	50,906
Leasehold improvements	44,501	30,731	--	--	75,232
	294,031	425,180	(151,779)	--	567,432
Capital assets, net	$ 3,074,337	$ 27,265,603	$ --	$ (3,368,853)	$ 26,971,087

NOTE 13 – CAPITAL ASSETS (CONTINUED)

2014	Balance, July 1, 2013	Additions	Deletions	Adjustments	Balance, June 30, 2014
Capital assets being depreciated:					
Solar lease equipment	$ --	$ 1,314,350	$ --	$ (279,191)	$ 1,035,159
Furniture and equipment	335,744	3,194	--	--	338,938
Leasehold improvements	136,659	3,023	--	--	139,682
Computer hardware and software	71,470	16,867	--	--	88,337
Capital assets not being depreciated:					
WIP solar lease equipment	--	2,234,490	--	(475,379)	1,759,111
Construction in progress	--	7,141	--	--	7,141
	543,873	3,579,065	--	(754,570)	3,368,368
Less accumulated depreciation and amortization:					
Solar lease equipment	--	9,865	--	--	9,865
Furniture and equipment	146,560	59,260	--	--	205,820
Computer hardware and software	18,093	15,752	--	--	33,845
Leasehold improvements	16,715	27,786	--	--	44,501
	181,368	112,663	--	--	294,031
Capital assets, net	$ 362,505	$ 3,466,402	$ --	$ (754,570)	$ 3,074,337

NOTE 14 – GRANT PROGRAMS

CGB, the primary government, recognizes grant revenue based on expenditures or fulfillment of program requirements. For the year ended , CGB recognized related grant revenue of $143,615 under Department of Energy programs

NOTE 15 – COMMITMENTS

As of June 30, 2015, the Board of Directors designated a portion of CGB's unrestricted net position to fund financial incentives for specific commercial and residential projects in the following areas:

	2015	2014
Solar PV	$ 45,017,128	$ 24,442,941
AD/CHP programs	14,462,247	14,558,887
Multifamily/LMI Solar PV and energy efficiency programs	12,000,000	--
CPACE	15,178,559	14,294,826
Wind	1,102,888	2,800,000
Education and outreach	694,120	988,701
Alpha and operational demonstration programs	465,000	987,333
Energy efficiency programs	277,763	3,726,946
Other technologies	271,795	103,274
Fuel cells	--	1,363,388
Project 150 and pre-development programs	--	262,755
	$ 89,469,500	$ 63,529,051

These incentives are expected to be paid over the next one to six fiscal years and are contingent upon the completion of performance milestones by the recipient of the incentive.

In addition, at June 30, 2015, the Board of Directors through various resolutions has made available an additional $22,983,737 of unrestricted net position to fund the following programs for which specific commercial and residential projects have not yet been identified:

CPACE	$ 11,203,401
Solar loan programs	11,780,336
	$ 22,983,737

All commitments are those of the primary government.

NOTE 16 – PENSION PLAN

All employees of the CGB participate in the State Employees' Retirement System (SERS), which is administered by the State Employees' Retirement Commission. The CGB has no liability for pension costs other than the annual contribution. The latest actuarial study was performed on the plan as a whole, as of June 30, 2012, and does not separate information for employees of the CGB. Therefore, certain pension disclosures pertinent to CGB otherwise required pursuant to accounting principles generally accepted in the United States of America are omitted. Based upon the 2012 valuation, the Plan, as a whole, utilized the project unit credit cost method to develop employer contributions, and included the following actuarial assumptions: (1) investment return of 8% (previously 8.25%); (2) price inflation of 2.75% (previously 3%) for cost of living adjustments; (3) projected salary increases of 4% to 20%, Social Security wage base increases of 3.50% per annum; (4) payroll growth of 3.75% per annum; and (5) the RP-2000 Mortality Table. Information on the total plan funding status and progress, contribution required and trend information can be found in the State of Connecticut's Comprehensive Annual Financial Report available from the Office of the State Comptroller, 55 Elm Street, Hartford, CT 06106.

PLAN DESCRIPTION

SERS is a single-employer defined benefit public employee retirement system (PERS) established in 1939 and governed by Sections 5-152 and 5-192 of the Connecticut General Statutes. Employees are covered under one of three tiers. Tier I and Tier IIA are contributory plans, and Tier II is a noncontributory plan.

Members who joined the retirement system prior to July 1, 1984 are enrolled in Tier I. Tier I employees who retire at or after age 65 with 10 years of credited service, at or after age 55 with 25 years of service, or at age 55 with 10 years of credited service with reduced benefits are entitled to an annual retirement benefit payable monthly for life, in an amount of 2 percent of the annual average earnings (which are based on the three highest earning years of service) over $4,800 plus 1 percent of $4,800 for each year of credited service. Tier II employees who retire at or after age 60 with 25 years of service, or at age 62 with 10 years of service, or at age 65 with 5 years of service, are entitled to one and one-third percent of the average annual earnings plus one-half of one percent of the average annual earnings in excess of the salary breakpoint in the year of retirement for each year of credited service. Tier II employees between the ages of 55 and 62 with 10 years but less than 25 years of service may retire with reduced benefits. In addition, Tier II and Tier IIA members with at least five but less than ten years of actual state service who terminate their state employment July 2, 1997 or later and prior to attaining age 62 will be in deferred vested status and may commence receipt of normal retirement benefits on the first of the month on or following their sixty-fifth (65) birthday.

NOTE 16 – PENSION PLAN (CONTINUED)

Employees hired on and after July 1, 1997, will become members of Tier IIA. Tier IIA plan is essentially the existing Tier II plan with the exception that employee contributions of 2 percent of salary are required. Tier I members are vested after ten years of service, while Tier II and Tier IIA members may be vested after five years of service under certain conditions, and all three plans provide for death and disability benefits.

Employees hired on or after July 1, 2011 are covered under the Tier III plan. Tier III requires employee contributions of two percent of salary up to a $250,000 limit after which no additional contributions will be taken on earnings above this limit. The normal retirement date will be the first of any month on or after age 63 if the employee has at least 25 years of vested service or age 65 if the employee has at least 10 but less than 25 years of vested service. Tier III members who have at least 10 years of vested service can receive early reduced retirement benefits if they retire on the first of any month on or following their 58th birthday. Tier III normal retirement benefits include annual retirement benefits for life, in the amount of one and one-third percent of the five year average annual earnings plus one-half of one percent of the five year average annual earnings in excess of the salary breakpoint in the year of retirement for each year of credited service plus one and five-eighths of the five year annual average salary times years of credited service over 35 years.

The total payroll for employees of the CGB covered by SERS for the years ended was $4,013,411 and $3,121,583, respectively.

CONTRIBUTIONS MADE

CGB's contribution is determined by applying a State mandated percentage to eligible salaries and wages as follows for the years ended June 30:

	2015	2014	2013
Contributions made:			
By employees	$ 171,260	$ 139,217	$ 104,214
Percent of current year covered payroll	4.3%	4.5%	4.1%
By CGB	$ 1,974,507	$ 1,669,961	$ 1,125,649
Percent of current year covered payroll	49.2%	53.5%	44.7%

NOTE 17 – PENSION LIABILITIES, PENSION EXPENSE, DEFERRED OUTFLOWS OF RESOURCES, AND DEFERRED INFLOWS OF RESOURCES

The implementation of GASB 68 resulted in CGB reporting a net pension liability for fiscal year 2015. The Statement required CGB to recognize a net pension liability for the difference between the present value of the projected benefits for the past service known as the Total Pension Liability (TPL) and the restricted resources held in trust for the payment of pension benefits, known as the Fiduciary Net Pension (FNP). For purposes of measuring the net pension liability, deferred outflows of resources and deferred inflows of resources related to pensions, and pension expense, information about the FNP of SERS and additions to/deductions from SERS FNP have been determined on the same basis as they are reported by SERS. For this purpose, benefit payments (including refunds of employee contributions) are recognized when due and payable in accordance with the benefit term. Investments are recorded at fair value.

At June 30, 2015, CGB reported a liability of $14,899,766 for its proportionate share of the net pension liability. The net pension liability was measured as of June 30, 2014, and the total pension liability used to calculate the net pension liability was determined by the actuarial valuation as of that date based on actuarial experience studies. CGB allocation of the net pension liability was based on the 2014 covered payroll multiplied by the SERS 2014 contribution rate of 37.82 percent. At June 30, 2015, CGB's proportion was 0.09304 percent.

For the year ended June 30, 2015, CGB recognized pension expense of $1,431,032. Pension expense is reported in CGB's financial statements as part of general and administration expense and grant and program expenditures. At June 30, 2015, CGB reported deferred outflows of resources and deferred inflows of resources related to pension from the following sources:

	Deferred Outflows of Resources	Deferred Inflows of Resources
Net Difference between projected and actual earnings on pension plan investments	$ -	$ (532,135)
CGB Contributions subsequent to the measurement date	1,669,961	-
	$ 1,669,961	$ (532,135)

NOTE 17 – PENSION LIABILITIES, PENSION EXPENSE, DEFERRED OUTFLOWS OF RESOURCES, AND DEFERRED INFLOWS OF RESOURCES (CONTINUED)

The amount recognized as deferred inflows of resources, representing the net difference between projected and actual earnings, is amortized over a five-year closed period beginning in the year in which the difference occurs and will be recognized in expense as follows:

Year 1 (2016)	$ (133,033)
Year 2 (2017)	(133,033)
Year 3 (2017)	(133,033)
Year 4 (2019)	(133,033)
	$ (532,132)

Actuarial Methods and Assumption

The total pension liability in the June 30, 2014 actuarial valuation was determined based on the results of an actuarial experience study for the period July 1, 2017 through June 30, 2011. The key actuarial assumptions are summarized below:

Inflation:	2.75%
Salary increase:	4.00% -20% including inflation
Investment rate of return:	8%, net of pension plan investment expense, Including inflation
Cost of living adjustment:	2.30%-3.60% for certain tiers

Mortality rates were based on the RP-2000 Mortality Table for Males or Females, as appropriate, with adjustments for mortality improvements based on Scale AA.

Discount rate

The discount rate used to measure the total pension liability at June 30, 2015 was the long term expected rate of return, 8.00 percent. The projection of cash flows used to determine the discount rate assumed that employee contributions will be made at the current contribution rates and that employer contributions will be made equal to the difference between the projected actuarially determined contribution and member contributions. Projected future benefit payments for all current plan members were projected through the year 2015.

NOTE 17 – PENSION LIABILITIES, PENSION EXPENSE, DEFERRED OUTFLOWS OF RESOURCES, AND DEFERRED INFLOWS OF RESOURCES (CONTINUED)

Expected rate of return on investments

The long term expected rate of return on pension plan investments was determined using a log-normal distribution analysis in which best estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighing the expected future real rate of return by the target asset allocation percentage and by adding expected inflation.

The target asset allocation and best estimate of arithmetic real rates of return for each major asset class are summarized in the following table:

Asset Class	Target Allocation	Long-term Expected Real Rate of Return
Large Cap U.S.Equities	21.0%	5.8%
Developed Non-U.S. Equities	18.0%	6.6%
Emerging Marget (non-U.S.)	9.0%	8.3%
Real Estate	7.0%	5.1%
Private Equity	11.0%	7.6%
Alternative Investments	8.0%	4.1%
Fixed Income (Core)	8.0%	1.3%
High Yield Bonds	5.0%	3.9%
Emerging Market Bond	4.0%	3.7%
TIPS	5.0%	1.0%
Cash	4.0%	0.4%

NOTE 17 – PENSION LIABILITIES, PENSION EXPENSE, DEFERRED OUTFLOWS OF RESOURCES, AND DEFERRED INFLOWS OF RESOURCES (CONTINUED)

Sensitivity of CGB proportionate share of the net pension liability to changes in the discount rates

The following presents CGB's proportionate share of the net pension liability calculated using the discount rate of 8.00 percent, as well as the proportionate share of the net pension liability using a 1.00 percent increase or decrease from the current discount rate.

	1% Decrease	Discount Rate	1% Increase
	7.0%	8.0%	9.0%
CGB's proportionate share of the net pension liability	$17,774,250	$14,899,766	$12,482,360

NOTE 18 – RESTRICTED NET POSITION (PRIMARY GOVERNMENT)

Restricted net position at June 30, 2015 and 2014 consisted of the following:

	2015	2014
Non-Expendable		
Connecticut Innovations, Inc. equity interest	$ 1,000	$ 1,000
Energy Programs		
Primary Government		
CGB		
Assets restricted to fund maintenance of a fuel cell for a Connecticut municipality	$ --	$ 176,975
Assets restricted for maintaining loan loss and interest rate buydown reserves	3,999,005	4,118,740
CT Solar Loan I LLC		
Assets restricted by contractual obligations for maintaining loan loss and interest rate buydown reserves	300,000	300,000
	4,299,005	4,595,715
Discretely Presented Component Units		
CT Solar Lease 2 LLC		
Assets restricted for maintaining loan loss and interest rate buydown reserves	3,500,000	3,500,000
Assets restricted for operating and maintenance reserve	1,000,000	1,000,000
	$ 8,799,005	$ 9,095,715

CONNECTICUT GREEN BANK

OTHER STATISTICS

FOR THE YEAR ENDED JUNE 30, 2014

(With Summarized Totals for the Year Ended June 30, 2013)

NOTE 19 – RISK MANAGEMENT

CGB is subject to normal risks associated with its operations including property damage, personal injury and employee dishonesty. All risks are managed through the purchase of commercial insurance. There have been no losses exceeding insurance coverage, and there have been no decreases in insurance coverage over the last three years.

NOTE 20 – RENEWABLE ENERGY CERTIFICATES (PRIMARY GOVERNMENT)

CGB owns Class 1 Renewable Energy Certificates (RECs) that are generated by certain commercial renewable energy facilities for which CGB provided the initial funding. Through its Residential Solar Incentive Program, CGB owns the rights to future RECs generated by facilities installed on residential properties. On March 23, 2015 CGB entered into a contract to sell a total of 98,553 RECs generated during the period 2014 to 2016. As of June 30, 2015 CGB sold 23,553 RECs generated in 2014. CGB has committed to sell 30,000 RECs generated or to be generated in 2015 for $52.00 per REC and 45,000 RECS to be generated in 2016 for $49.50 a REC. Based on historical performance, management believes that the RECs it will receive from funded commercial facilities and residential facilities will exceed the commitments to sell RECs under this agreement.

RECs trade on the New England Power Pool (NEPOOL) market. The market price of Connecticut Class 1 RECs as of June 30, 2015 ranged from $50.50 to $49.00. CGB's inventory as of June 30, 2015 has been priced at its cost.

STATISTICAL SECTION
(unaudited)

FINANCIAL STATISTICS

CONNECTICUT GREEN BANK

STATISTICAL SECTION INTRODUCTION

This part of the Connecticut Green Bank's (CGB) comprehensive annual financial report presents detailed information as a context for understanding what the information about the primary government and the discretely presented component units in the financial statements, note disclosures, and required supplementary information says about the benefits of CGB's investments.

FINANCIAL STATISTICS

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Financial Trends 63-66

These schedules contain trend information to help the reader understand how CGB's financial performance and well-being have changed over time.

Revenue Capacity 67-68

These schedules contain information to help the reader assess CGB's most significant local revenue sources.

Debt Capacity 69

These schedules present information to help the reader assess the affordability of the government's current level of outstanding debt and the CGB's ability to issue additional debt in the future.

Demographic and Economic Information 70

These schedules offer demographic and economic indicators to help the reader understand the environment within which CGB's financial activities take place.

Operating Information 71-73

These schedules contain service and infrastructure data to help the reader understand how the information in CGB's financial report relates to the services CCB provides and the activities it performs.

CONNECTICUT GREEN BANK

NET POSITION BY COMPONENT
Last Four Fiscal Years

	June 30,			
	2012	2013	2014	2015
Primary Government				
Invested in capital assets, net of related debt	$ 91,329	$ 362,505	$ 289,932	$ 263,839
Restricted Net Position				
Non-expendable	--	1,000	1,000	1,000
Restricted - energy programs	176,974	5,036,656	4,595,715	4,299,005
Unrestricted	80,920,002	93,717,230	97,754,765	104,881,783
	81,188,305	99,117,391	102,641,412	109,445,626
CT Solar Lease 2 LLC				
Invested in capital assets, net of related debt	--	--	3,538,975	30,830,671
Restricted Net Position				
Non-expendable	--	100	1,294,801	8,007,153
Restricted - energy programs	--	4,500,000	4,500,000	4,500,000
Unrestricted (deficit)	--	(1,616,886)	(5,741,703)	(28,210,286)
	--	2,883,214	3,592,073	15,127,539
CEFIA Solar Services, Inc.				
Restricted Net Position				
Non-expendable	--	100	100	100
Restricted - energy programs	--	--	--	--
Unrestricted (deficit)	--	--	109,123	224,654
	--	100	109,223	224,754
Eliminations	--	(3,500,100)	(5,549,471)	(15,630,676)
Total Net Position	$ 81,188,305	$ 98,500,605	$ 100,793,237	$ 109,167,243

CONNECTICUT GREEN BANK

CHANGES IN NET POSITION
Last Four Fiscal Years

	Year Ended June 30,			
	2012	2013	2014	2015
Primary Government				
Operating Revenues	$ 39,753,684	$ 43,343,093	$ 52,301,283	$ 72,038,472
Operating Expenses				
Grants and program expenditures	31,122,355	23,634,465	22,948,676	21,111,751
General and administrative expenses	1,387,854	1,811,227	2,408,715	2,984,178
Cost of Goods Sold	--	--	2,794,270	22,526,874
Total Operating Expenses	32,510,209	25,445,692	28,151,661	46,622,802
Operating Income (Loss)	7,243,475	17,897,401	24,149,622	25,415,669
Non-Operating Revenue and (Expenses)				
Interest on solar lease notes	589,007	583,575	1,034,953	2,217,368
Interest on short-term investments	140,786	103,928	98,383	83,761
Interest income	--	--	57,407	58,511
Interest expense	--	--	--	(26,985)
Realized gain (loss) on investments	--	(1,034,605)	(350,000)	(1,180,285)
Unrealized gain (loss) on investments	434,702	378,059	349,999	--
Provision for loan losses	--	--	(1,310,933)	(563,825)
Net Non-Operating Revenues	1,164,495	30,957	(120,191)	588,545
Income (Loss) Before Transfers, Capital Contributions and Member (Distributions)	8,407,970	17,928,358	24,029,431	26,004,215
Capital Contributions	--	1,000	--	--
Transfers to State of Connecticut	--	--	(6,200,000)	(19,200,000)
Increase in Net Position	$ 8,407,970	$ 17,929,358	$ 17,829,431	$ 6,804,215

CONNECTICUT GREEN BANK

CHANGES IN NET POSITION
Last Four Fiscal Years

	Year Ended June 30,			
	2012	2013	2014	2015
CT Solar Lease 2 LLC				
Operating Revenues	$ --	$ --	$ 1,770	$ 210,869
Operating Expenses				
Grants and program expenditures	--	--	600,186	1,201,123
General and administrative expenses	--	853,480	127,511	124,748
Total Operating Expenses	--	853,480	727,697	1,325,871
Operating Loss	--	(853,480)	(725,927)	(1,115,002)
Non-Operating Revenue and (Expenses)				
Interest on short-term investments	--	--	8,642	9,207
Interest expense		--	(57,407)	(150,871)
Unrealized gain (loss) on investments	--	--	--	(660,073)
Net Non-Operating Revenues	--	--	(48,765)	(801,737)
Income (Loss) Before Transfers, Capital Contributions and Member (Distributions)	--	(853,480)	(774,692)	(1,916,739)
Capital Contributions	--	3,736,694	1,496,135	13,556,783
Distributions to Members	--	--	(12,584)	(104,579)
Increase in Net Position	$ --	$ 2,883,214	$ 708,859	$ 11,535,465

CONNECTICUT GREEN BANK

CHANGES IN NET POSITION
Last Four Fiscal Years

	Year Ended June 30,			
	2012	2013	2014	2015
CEFIA Solar Services, Inc.				
Operating Revenues	$ --	$ --	$ 120,000	$ 123,000
Operating Expenses				
General and administrative expenses	--	--	10,877	8,450
Total Operating Expenses	--	--	10,877	8,450
Operating Loss	--	--	109,123	114,550
Non-Operating Revenue and (Expenses)				
Interest on short-term investments	--	--	--	981
Net Non-Operating Revenues	--	--	--	981
Income (Loss) Before Transfers, Capital Contributions and Member (Distributions)	--	--	109,123	115,531
Capital Contributions	--	100	--	--
Increase in Net Position	$ --	$ 100	$ 109,123	$ 115,531

CONNECTICUT GREEN BANK

OPERATING REVENUE BY SOURCE
Last for Fiscal Years Ending June 30,

	Total Operating Revenues	Utility Remittances		RGGI Auction Proceeds		Grant Revenue		Sales of Energy Equipment		Other Revenues	
		Revenue	% of Annual	Revenue	% of Annual	Revenue	% of Annual	Revenue	% of Annual	Revenue	% of Annual
Primary Government											
2012	$ 39,753,684	$ 27,025,088	67.98 %	$ 2,052,748	5.16 %	$ 10,435,251	26.25 %	$ --	-- %	$ 240,597	0.61 %
2013	43,343,093	27,621,409	63.73 %	4,744,657	10.95 %	10,035,250	23.15 %	--	-- %	941,777	2.17 %
2014	52,301,283	27,779,345	53.11 %	20,074,668	38.38 %	321,642	0.61 %	3,548,840	6.79 %	576,788	1.10 %
2015	72,038,471	27,233,987	37.80 %	16,583,545	23.02 %	192,274	0.27 %	25,912,414	35.97 %	2,116,251	2.94 %
CT Solar Lease 2 LLC											
2012	$ --	$ --	-- %	$ --	-- %	$ --	-- %	$ --	-- %	$ --	-- %
2013	--	--	-- %	--	-- %	--	-- %	--	-- %	--	-- %
2014	1,770	--	-- %	--	-- %	--	-- %	--	-- %	1,770	100.00 %
2015	210,869	--	-- %	--	-- %	--	-- %	--	-- %	210,869	100.00 %
CEFIA Solar Services, Inc.											
2012	$ --	$ --	-- %	$ --	-- %	$ --	-- %	$ --	-- %	$ --	-- %
2013	$ --	$ --	-- %	$ --	-- %	$ --	-- %	$ --	-- %	$ --	-- %
2014	120,000	--	-- %	--	-- %	--	-- %	--	-- %	120,000	100.00 %
2015	123,000	--	-- %	--	-- %	--	-- %	--	-- %	123,000	100.00 %
Eliminations											
2012	$ --	$ --	-- %	$ --	-- %	$ --	-- %	$ --	-- %	$ --	-- %
2013	--	--	-- %	--	-- %	--	-- %	--	-- %	--	-- %
2014	(3,668,840)	--	-- %	--	-- %	--	-- %	(3,548,840)	96.73 %	(120,000)	3.27 %
2015	(26,077,923)	--	-- %	--	-- %	--	-- %	(25,895,727)	99.30 %	(182,196)	0.70 %
Total Reporting Entity											
2012	$ 39,753,684	$ 27,025,088	67.98 %	$ 2,052,748	5.16 %	$ 10,435,251	26.25 %	$ --	-- %	$ 240,597	0.61 %
2013	43,343,093	27,621,409	63.73 %	4,744,657	10.95 %	10,035,250	23.15 %	--	-- %	941,777	2.17 %
2014	48,754,213	27,779,345	56.98 %	20,074,668	41.18 %	321,642	0.66 %	--	-- %	578,558	1.19 %
2015	46,294,417	27,233,987	58.83 %	16,583,545	35.82 %	192,274	0.42 %	16,687	0.04 %	2,267,924	4.90 %

CONNECTICUT GREEN BANK

SIGNIFICANT SOURCES OF OPERATING REVENUE
Last Four Fiscal Years

	Year Ended June 30,							
	2012		2013		2014		2015	
	Revenue	% of Total	Revenue	% of Total	Revenue	% of Total	Revenue	% of Total
Utility Remittances*								
Eversource	$ 22,037,771	81.55 %	$ 22,144,093	80.17 %	$ 22,322,100	80.36 %	$ 21,899,541	80.41 %
United Illuminating	4,987,317	18.45 %	5,477,316	19.83 %	5,457,245	19.64 %	5,334,446	19.59 %
Total	$ 27,025,088	100.00 %	$ 27,621,409	100.00 %	$ 27,779,345	100.00 %	$ 27,233,987	100.00 %
RGGI Auction Proceeds								
Energy Efficiency	--	-- %	--	-- %	12,598,510	62.76 %	10,952,389	66.04 %
Renewables	$ 2,052,748	100.00 %	$ 4,744,657	100.00 %	$ 7,476,158	37.24 %	$ 5,631,156	33.96 %
Total	$ 2,052,748	100.00 %	$ 4,744,657	100.00 %	$ 20,074,668	100.00 %	$ 16,583,545	100.00 %
Grant Revenue								
Federal ARRA Grants	$ 8,738,726	83.75 %	$ 8,376,681	83.47 %	$ --	-- %	$ --	-- %
DOE Grants	1,645,525	15.77 %	1,622,569	16.17 %	321,642	100.00 %	143,614	74.69 %
Private Foundation	50,000	0.48 %	36,000	0.36 %	--	-- %	48,660	25.31 %
Total	$ 10,434,251	100.00 %	$ 10,035,250	100.00 %	$ 321,642	100.00 %	$ 192,274	100.00 %

** Revenue based on Statutory rate of 1 mil per Kwh generated by the utility*

CONNECTICUT GREEN BANK

OUTSTANDING DEBT BY TYPE
Last Four Fiscal Year

Fiscal Year	Primary Government		CT Solar Lease 2 LLC		CEFIA Solar Services,Inc.		Total Entity	
	Line of Credit		Line of Credit		Line of Credit		Line of Credit	
	Advances	Available	Advances	Available	Advances	Available	Advances	Available
2015	$ 853,525	$ -	$ 3,000,000	$ 23,700,000	$ -	$ -	$ 3,853,525	$ 23,700,000
2014	$ 126,088	$ 3,873,912	$ -	$ 26,700,000	$ -	$ -	$ 126,088	$ 30,573,912
2013	$ -	$ -	$ -	$ 26,700,000	$ -	$ -	$ -	$ 26,700,000
2012	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

CONNECTICUT GREEN BANK

DEMOGRAPHIC AND ECONOMIC INFORMATION

Demographic and Economic Statistics - For the State of Connecticut

Last Four Calendar Years

Calendar Year	Population [1]	Median Age [1]	Per Capita Income [1]	Median Household Income [1]	Population 3 Years and Over Enrolled in Public School [1]	Unemployment Rate [2]
2015	n/a	n/a	n/a	n/a	n/a	5.1%
2014	3,592,053	40.3	99,110	69,899	752,070	6.3
2013	3,583,561	40.2	97,650	69,461	754,442	7.2
2012	3,572,213	40.0	97,051	69,519	751,096	8.1
2011	3,558,172	39.8	96,502	69,243	747,438	8.3

Sources: (1) US Census Bureau
(2) US Department of Labor

Principal Employers - For the State of Connecticut

Current and Prior Calendar Years

	2014			2013		
Employer [1]	Employees	Rank	Percentage of Total State Employment [2]	Employees	Rank	Percentage of Total State Employment [2]
State of Connecticut	54,230	1	3.05%	53,951	1	3.10%
United Technologies	25,000	2	1.40	27,000	2	1.55
Yale New Haven Health System	18,869	3	1.06	18,639	3	1.07
Hartford Healthcare	18,597	4	1.05	16,951	4	0.98
Yale University	14,787	5	0.83	14,750	5	0.85
Wal-Mart Stores Inc.	9,289	6	0.52	8,761	7	0.50
General Dynamics Electric Boat	8,896	7	0.50	8,817	6	0.51
Foxwoods Resort Casino	7,600	8	0.43	7,667	8	0.44
The Travelers Cos. Inc.	7,400	9	0.42	7,400	9	0.43
Mohegan Sun	7,300	10	0.41	7,300	10	0.42

Sources: (1) Hartford Business Journal, Book of Lists 2014
(2) US Department of Labor

CONNECTICUT GREEN BANK

FTEs BY FUNCTION
Last Four Fiscal Years

	June 30,			
	2012	2013	2014	2015
Program Services				
Statutory & Infrastructure	9.00	7.00	7.00	8.00
Residential	1.00	3.00	5.00	6.00
Commercial & Industrial	--	2.00	4.00	2.00
Institutional	1.00	1.00	1.00	1.00
Subtotal Program Services	11.00	13.00	17.00	17.00
Administrative & Support				
Executive	4.00	4.00	4.00	4.00
Finance	1.00	3.00	4.00	5.00
Accounting	2.20	2.75	3.50	5.30
Legal & Policy	2.00	2.00	2.00	3.00
Marketing	5.00	5.00	5.00	6.00
Operations	3.85	4.00	3.80	3.50
Subtotal Administrative & Support	18.05	20.75	22.30	26.80
Total FTEs by Function	29.05	33.75	39.30	43.80

CONNECTICUT GREEN BANK

OPERATING INDICATORS BY FUNCTION
Last Four Fiscal Years

	June 30,			
	2012	2013	2014	2015
Clean Energy Investment *($s in Millions)*				
CGB Dollars Invested	$ 4.8	$ 19.6	$ 46.3	$ 95.1
Private Dollars Invested	10.1	91.2	132.1	257.7
Total Project Investment	15.0	110.5	176.7	361.0
Number of Clean Energy Projects	418	1,119	2,488	7,966
Annual Energy Savings of Clean Energy ***(MMBtu)***	9,312	60,186	495,568	710,008
Installed Capacity of Clean Energy ***(MW)***				
Anaerobic Digesters	--	--	5.8	3.0
Biomass	--	--	--	0.6
CHP	--	0.7	3.0	0.9
Fuel Cell	--	14.8	--	--
Hydro	--	--	--	0.5
Solar PV	2.9	8.0	20.3	68.9
Wind	--	--	--	5.0
Total	2.9	23.5	29.1	79.0
Lifetime Production of Clean Energy ***(MWh)***				
Anaerobic Digesters	--	--	605,491	315,360
Biomass	--	--	--	14,257
CHP	--	81,008	354,780	104,668
Fuel Cell	--	1,166,832	--	--
Hydro	--	--	--	12,594
Solar PV	68,470	189,874	483,435	1,638,283
Wind	--	--	--	118,260
Total	68,470	1,437,714	1,443,707	2,203,422
Jobs Created by Year				
Direct Jobs *(# of Jobs)*	88	578	606	1,820
Indirect and Induced Jobs *(# of Jobs)*	142	1,162	973	2,926
Lifetime CO2 Emission Reductions				
Emission Reductions *(Tons)*	35,502	177,210	250,661	925,732
Home Equivalents *(# of Homes)*	326	2,216	2,302	7,938
Cars Off the Road Equivalents *(# of Cars)*	236	3,280	1,670	5,765
Acres of Trees Planted Equivalents *(# of Acres)*	474	1,653	3,342	11,524

CONNECTICUT GREEN BANK

CAPITAL ASSETS STATISTICS BY FUNCTION
Last Four Fiscal Years

	June 30,			
	2012	2013	2014	2015
Capital assets being depreciated:				
Solar lease equipment	$ --	$ --	$ 1,035,159	$ 21,011,832
Furniture and equipment	13,049	335,744	338,938	222,701
Computer hardware and software	28,460	136,659	88,337	128,628
Leasehold improvements	56,224	71,470	139,682	153,657
Capital assets not being depreciated:				
WIP solar lease equipment	--	--	1,759,111	6,014,560
Construction in progress	--	--	7,141	7,141
	97,733	543,873	3,368,368	27,538,519
Less accumulated depreciation and amortization:				
Solar lease equipment	--	--	9,865	319,144
Furniture and equipment	626	146,560	205,820	122,149
Computer hardware and software	3,807	18,093	33,845	50,906
Leasehold improvements	1,971	16,715	44,501	75,232
	6,404	181,368	294,031	567,432
Capital assets, net	$ 91,329	$ 362,505	$ 3,074,337	$ 26,971,087

NON-FINANCIAL STATISTICS

CONNECTICUT GREEN BANK

NON-FINANCIAL STATISTICS INTRODUCTION

This part of the Connecticut Green Bank's (CGB) comprehensive annual financial report presents detailed non-financial information as a context for understanding the methods management uses to measure CGB's success and CGB's efforts to transform the clean energy market in using its financial resources.

NON-FINANCIAL STATISTICS

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CONNECTICUT GREEN BANK

1. STATEMENT OF THE CONNECTICUT GREEN BANK

[Date]

Re: Statement of the Connecticut Green Bank on the Non-Financial Statistics Contents of the Comprehensive Annual Financial Report for FY 2015 – Background and Market, Measures of Success, and Market Transformation

Dear Reader:

This is the "Non-Financial Statistics" section of the Comprehensive Annual Financial Report for FY 2015.

In this section, you will find the following information:

- **Background and Market** – an overview of the organization's governance, including engagement of its members at the board and committee levels, along with ethics compliance and financial interest disclosure requirements. You will also be able to see the level of investment, deployment and public benefits that are being created within our local communities, including distressed communities and low income census tracts. And last, you will see how the organization has made steady progress in terms of ensuring that Connecticut's small businesses and minority enterprises have an opportunity to bid on a portion of the purchases of goods and services that the organization procures.

- **Measures of Success** – as outlined in the organization's Comprehensive Plan,[1] we are reporting on the following measures of success:

    - **Objective Function** – how we are maximizing the amount of clean energy produced or energy saved per dollar of Connecticut Green Bank capital at risk;

    - **Attract Capital** – how we are classifying project status (i.e., from approved to completed) with respect to the number of projects, level of investment by both the Connecticut Green Bank and the end-use consumer or private investor, and the private to public leverage ratio being achieved by sector.

    - **Deploy Capital** – how we are classifying project status with respect to the amount of clean energy deployed (i.e., MW), estimate of clean energy produced over the life of the projects (i.e., MWh), estimate of the annual amount of energy savings (i.e., MMBtu), and the variety of renewable energy technologies we have invested in by sector.

    - **Green Bank** – how we are building a balance sheet as a result of our financing focus in terms of asset management (i.e., current vs. non-current assets), ratio of public funds invested in grants and subsidies versus credit enhancements, loans, and leases, and the general credit quality of residential borrowers in our financing programs.

[1] http://goo.gl/GhRL9t

- **Public Benefits** – how our investment activities are resulting in economic (i.e., jobs) and environmental (i.e., GHG emission reductions and equivalencies) benefits.

- **Market Transformation** – an overview of the program logic model for the organization in terms of its goals:

  - **Attract and Deploy** – to attract and deploy capital to finance the clean energy policy goals for Connecticut;

  - **Affordable and Accessible** – to develop and implement strategies that bring down the cost of clean energy to make it more accessible and affordable to consumers; and

  - **From Reliance to Markets** – to reduce the market's reliance on grants, rebates, and other subsidies and move it towards innovative low-cost financing of clean energy deployment.

  The program logic model serves as a foundation for evaluating clean energy deployment through subsidy and financing programs of the Connecticut Green Bank. As we begin to evaluate our programs, the reader will see that we have applied the program logic model to the subsidy (i.e., Residential Solar Investment Program) and financing (i.e., CT Solar Loan, CT Solar Lease, and C-PACE) programs.

The assembly of the "Non-Financial Statistics" section of the Comprehensive Annual Financial Report is a process of continuous improvement. For example, the reader can compare FY 2014 with FY 2015 to see that more information is being disclosed to better communicate the level of impact the Connecticut Green Bank is making. We plan to include in future reports topics of relevance, such as the Community Reinvestment Act which seeks to encourage depository institutions to help meet the credit needs of the communities in which they operate, as well as information on how we engage with the local, regional, national, and international banking and investing communities.

It should be noted that the Connecticut Green Bank has contracted with $\text{Marcum}_{\text{LLP}}$ to provide an independent analysis of the "Non-Financial Statistics" section of the Comprehensive Annual Financial Report for FY 2015. Marcum's review will include the following:

- **Data Collection Systems** – an assessment of the process for how the organization collects data for its programs to determine robustness and appropriateness of the systems being used and the accuracy, comprehensiveness, and reasonableness of estimations being used;

- **Project Status** – an assessment of the process for how the organization determines the stage a project is in order to determine whether or not projects are being appropriately classified from the submission of an application all of the way to the commissioning of a

completed project with legal contracts and accounting payment tracking data systems; and

- **Project Reporting** – an assessment of the data being reported through the CAFR to ensure that the data is an accurate representation of the project status and the overall benefits to society resulting from the investments made by the organization.

Marcum will provide an opinion as to whether the information in the "Non-Financial Statistics" section of the CAFR is a fair and accurate presentation of the results being achieved by the investments of the Connecticut Green Bank. Future assessments by Marcum will go deeper and look at real-time project-level performance data (e.g., metering equipment, utility bill data, etc.) to ensure that estimates are reasonable with what is actually occurring on the projects.

With respect to the Market Transformation section that outlines the Program Logic Model for the Connecticut Green Bank and its programs and products, it presents a preliminary overview of how we are seeking to better understand the impact of the green bank model. We anticipate more work will be done in 2016 to further develop the logic model to evolve how we are evaluating the impact of our investments.

Through an annual audit process of its Comprehensive Annual Financial Report, the Connecticut Green Bank seeks to not only disclose how we are using the financial resources of the organization, but to also communicate how the use of those financial resources are resulting in a positive impact on society through the deployment of clean energy.

CONNECTICUT GREEN BANK

2. BACKGROUND AND MARKET – GOVERNANCE

Board of Directors

Pursuant to Section 16-245n of the General Statutes of Connecticut, the powers of the Connecticut Green Bank are vested in and exercised by the Board of Directors that is comprised by eleven voting and two non-voting members each with knowledge and expertise in matters related to the purpose of the organization (see Table 1).

Table 1. Composition of the Board of Directors of the Connecticut Green Bank for FY 2015

Position	Name	Status	Voting
Commissioner of DECD (or designee)	Catherine Smith	Ex Officio	Yes
Commissioner of DEEP (or designee)	Rob Klee	Ex Officio	Yes
State Treasurer (or designee)	Bettina Ferguson	Ex Officio	Yes
Finance of Renewable Energy	Reed Hundt	Appointed	Yes
Finance of Renewable Energy	Kevin Walsh	Appointed	Yes
Labor Organization	John Harrity	Appointed	Yes
R&D or Manufacturing	Mun Choi	Appointed	Yes
Investment Fund Management	Norma Glover	Appointed	Yes
Environmental Organization	Matthew Ranelli	Appointed	Yes
Finance or Deployment	Tom Flynn	Appointed	Yes
Residential or Low Income	Pat Wrice	Appointed	Yes
President of the Green Bank	Bryan Garcia	Ex Officio	No
Board of Connecticut Innovations	(unfilled)[2]	Ex Officio	No

The Board of Directors of the Connecticut Green Bank is governed through statute, as well as an Ethics Statement and Ethical Conduct Policy, Resolutions of Purposes, Bylaws, Joint Committee Bylaws, and Comprehensive Plan. The Comprehensive Plan for the Connecticut Green Bank provides a multiyear strategy to support the vision and mission of the organization and the public policy objective of delivering consumers cheaper, cleaner, and more reliable sources of energy while creating jobs and supporting local economic development. An Employee Handbook and Operating Procedures have also been approved by the Board of Directors and serve to guide the staff to ensure that it is following proper contracting, financial assistance, and other requirements.

The Board of Directors of the Connecticut Green Bank is comprised of eleven (11) ex officio and appointed voting members, and two (2) ex officio non-voting members. The leadership of the Board of Directors, includes:

- **Chair** – Catherine Smith, Commissioner of DECD (designated as the Chair of the Connecticut Green Bank by Governor Malloy)
- **Vice Chair** – Rob Klee, Commissioner of DEEP (voted in by his peers of the Connecticut Green Bank Board of Directors)
- **Secretary** – Matthew Ranelli, Partner at Shipman and Goodwin (voted in by his peers of the Connecticut Green Bank Board of Directors)

[2] It should be noted that Catherine Smith and Mun Choi currently serve on the Connecticut Innovations Board of Directors.

CONNECTICUT GREEN BANK

2. BACKGROUND AND MARKET – GOVERNANCE

For FY 2015, the Board of Directors of the Connecticut Green Bank met nine (9) times, including five (5) regularly scheduled meetings and four (4) special meetings. There was an attendance rate of 73% by the Board of Directors and 66 approved resolutions. For a link to the materials from the Board of Directors meetings that is publicly accessible – click here.

Committees of the Board of Directors
There are four (4) committees of the Board of Directors of the Connecticut Green Bank, including:

- Audit, Compliance, and Governance
- Budget and Operations
- Deployment
- Joint Committee of the Energy Efficiency Board and the Connecticut Green Bank

Audit, Compliance and Governance Committee
The Audit, Compliance and Governance Committee (ACG Committee) of the Connecticut Green Bank is comprised of three (3) ex officio and appointed voting members. The leadership of the ACG Committee, includes:

- **Chair** – Matthew Ranelli, Partner and Shipman and Goodwin (designated as the Chair by Catherine Smith)
- **Members**[3] – John Harrity and Pat Wrice (designated as a member of the Committee by Catherine Smith)

For FY 2015, the ACG Committee of the Connecticut Green Bank met four (4) times, including three (3) regularly scheduled meetings and one (1) special meeting. There was an attendance rate of 92% by the Audit, Compliance and Governance Committee and 6 approved resolutions. For a link to the materials from the ACG Committee meetings that is publicly accessible – click here.

Budget and Operations Committee
The Budget & Operations Committee (B&O Committee) of the Connecticut Green Bank is comprised of three (3) ex officio and appointed voting members. The leadership of the B&O Committee, includes:

- **Chair** – Rob Klee, Commissioner of DEEP (designated as the Chair by Catherine Smith)
- **Members**[4] – Mun Choi and Norma Glover (designated as a member of the Committee by Catherine Smith)

For FY 2015, the B&O Committee of the Connecticut Green Bank met four (4) times, including three (3) regularly scheduled meetings and one (1) special meeting. There was an attendance rate of 92% by the Budget and Operations Committee and 3 approved resolutions. For a link to the materials from the B&O Committee meetings that is publicly accessible – click here.

[3] Note – the Chair and/or Vice Chair of the Board of Directors of the Connecticut Green Bank can attend the Audit, Compliance, and Governance Committee meeting to establish a quorum
[4] Note – the Chair and/or Vice Chair of the Board of Directors of the Connecticut Green Bank can attend the Audit, Compliance, and Governance Committee meeting to establish a quorum

Deployment Committee

The Deployment Committee of the Connecticut Green Bank is comprised of four (4) ex officio and appointed voting members. The leadership of the Deployment Committee, includes:

- **Chair**[5] – Reed Hundt, CEO of the Coalition for Green Capital (designated as the Chair by Catherine Smith)
- **Members**[6] – Bettina Ferguson (ex officio per bylaws), Matthew Ranelli, and Pat Wrice (designated as a member of the Committee by Catherine Smith)

For FY 2015, the Deployment Committee of the Connecticut Green Bank met nine (9) times, including three (3) regularly scheduled meetings and six (6) special meeting. There was an attendance rate of 83% by the Deployment Committee and 24 approved resolutions. For a link to the materials from the Deployment Committee meetings that is publicly accessible – click here.

Joint Committee

Pursuant to Section 16-245m(d)(2) of the Connecticut General Statutes, there is hereby created a Joint Committee of the Energy Efficiency Board (EEB) and the Connecticut Green Bank. Per bylaws established and approved by the EEB and the Connecticut Green Bank, the Joint Committee is comprised of four (4) appointed and voting members, one (1) ex officio and voting member, and four (4) ex officio and non-voting members. The leadership of the Joint Committee, includes:

- **Chair** – Eric Brown, Attorney with CBIA (voted in by his peers of the EEB and the Connecticut Green Bank)
- **Vice Chair** – Diane Duva, DEEP (voted in by her peers of the EEB and the Connecticut Green Bank)
- **Secretary** – Bryan Garcia, Connecticut Green Bank, and Craig Diamond, Connecticut Energy Efficiency Fund (voted in by their peers of the EEB and the Connecticut Green Bank)
- **Members**[7] – Bryan Garcia (non-voting), Norma Glover, Bert Hunter (non-voting), and John Harrity (designated as members of the Committee by Catherine Smith)

For FY 2015, the Joint Committee of the EEB and the Connecticut Green Bank met four (4) times, including four (4) regularly scheduled meetings. There was an attendance rate of 90% by the Joint Committee and 2 approved resolutions. For a link to the materials from the Joint Committee meetings that is publicly accessible – click here.

Statement of Financial Interest

It is required by state ethics laws and a determination of the Governor's standard that senior-level staff (i.e., Director level and above) and members of the Board of Directors annually file a Statement of Financial Interest (SFI). The Governor's standard is the following:

[5] Matthew Ranelli, Partner and Shipman and Goodwin for 11/14/14 & 11/21/14 only*
[6] Bettina Ferguson, Reed Hundt, Rob Klee, Patricia Wrice, & Catherine Smith for 11/14/14 & 11/21/14 only*
[7] Note – these members are representatives from the Connecticut Green Bank.

2. BACKGROUND AND MARKET – GOVERNANCE

> Governor Malloy has established a standard which requires "filing of Annual Statements of Financial Interests by all persons in the Executive Branch and Quasi-Public Agencies who exercise (i) significant policy-making, regulatory or contractual authority; (ii) significant decision-making and/or supervisory responsibility for the review and/or award of State contracts; or (iii) significant decision-making and/or supervisory responsibility over staff that monitor State contracts."

These statements include information such as names of all associated business, income over $1,000 and a list of all real property as well as any creditors. SFIs that have been filed are available to the public under the Freedom of Information Act. The SFIs serve two purposes. First, the financial disclosure provides a checklist or reminder to the official/employee to be mindful of potential conflicts of interest. Second, the statements serve as a tool to maximize public confidence in governmental decision making.

With respect to the 2015 SFI filing – required by May 1, 2015 – the Connecticut Office of State Ethics received the following from the Connecticut Green Bank (see Table 2):

Table 2. Summary of State of Financial Interest Filings with the Office of State Ethics for FY 2015

	Number of SFIs Submitted	% Submitted on Time
Senior Staff	12	100%
Board of Directors	11	100%

The Connecticut Green Bank received a Certificate of Excellence Ethics Compliance from the Connecticut Office of State Ethics.

2. BACKGROUND AND MARKET – COMMUNITIES

Fiscal Year 2015 Approved/Closed/Completed Projects

Communities across Connecticut are demonstrating leadership in their support of green energy. The Connecticut Green Bank distributes reports to communities on an annual basis to provide them with a breakdown of their performance. There are many leaders of green energy deployment across the state, and we have assembled the "Top 5" in energy, environment, and economy for both FY 2015 as well as FY 2012 through FY 2015. Cities and towns like Bridgeport and Colebrook have supported large green energy installations like a fuel cell park and wind power, while others like Hampton, Durham, Killingworth, and Woodbridge are deploying solar PV at rapid scales through initiatives such as Solarize Connecticut.

Table 3. The "Top 5" Energy, Environment, and Economy Metrics for FY 2015[8]

Municipality	Watts /Capita
Colebrook	3,386.3
Woodbridge	148.5
Haddam	138.7
Killingworth	132.6
Voluntown	130.7

Municipality	Lifetime CO2 Emissions (tons)
Colebrook	61,789
Bristol	24,089
New Britain	22,846
Bridgeport	21,677
Waterbury	18,218

Municipality	Investment /Capita
Colebrook	$15,252.94
Milford	$540.55
Bristol	$136.05
Hamden	$113.81
Bridgeport	$71.04

Table 4. Clean Energy Performance by Municipality (FY 2015)

Municipality	# Projects	Average Investment (Project Cost)	Median Investment (Project Cost)	Total Investment (Project Cost)	Investment /Capita	MW	Watts /Capita	Annual MMBTU	Total Jobs	Lifetime CO2 Emissions (tons)
Andover	8	$36,180	$29,617	$289,444	$87.63	0.1	17.4	203	5	708
Ansonia	26	$41,619	$25,049	$1,082,091	$56.22	0.2	12.9	851	14	3,057
Ashford	30	$50,992	$34,967	$1,529,749	$354.35	0.4	87.2	1,238	20	4,636
Avon	54	$51,418	$37,923	$2,776,583	$153.42	0.6	35.0	2,097	41	7,984
Barkhamsted	10	$33,308	$32,496	$333,078	$87.68	0.1	21.0	259	5	985
Beacon Falls	15	$32,505	$28,875	$487,576	$80.60	0.1	17.9	352	8	1,337
Berlin	67	$35,365	$34,808	$2,369,484	$119.27	0.5	25.2	1,678	37	6,165
Bethany	21	$36,324	$33,885	$762,804	$137.12	0.2	31.1	561	12	2,130
Bethel	34	$31,737	$33,323	$1,079,044	$58.06	0.2	12.6	760	17	2,888
Bethlehem	13	$35,006	$30,411	$455,074	$126.16	0.1	26.2	306	7	1,162
Bloomfield	82	$29,337	$28,610	$2,405,605	$117.43	0.5	26.6	1,790	37	6,718
Bolton	23	$33,648	$28,616	$773,905	$155.40	0.2	37.3	602	12	2,286
Branford	38	$34,027	$32,503	$1,293,021	$46.14	0.3	10.2	947	20	3,609
Bridgeport	115	$89,102	$27,000	$10,246,697	$71,04	2.6	17.7	315,504	147	21,677
Bridgewater	3	$31,858	$33,885	$95,573	$55.34	0.0	11.4	64	1	242
Bristol	178	$46,224	$31,103	$8,227,870	$136.05	2.0	32.3	6,433	108	24,089
Brookfield	60	$62,784	$40,530	$3,767,014	$228.97	0.7	39.9	5,571	53	7,153
Brooklyn	45	$36,433	$37,829	$1,639,467	$199.69	0.4	46.1	1,229	25	4,658
Burlington	87	$40,940	$39,312	$3,561,792	$382.95	0.8	89.1	2,687	54	10,209

[8] It should be noted that both Bridgeport and Colebrook are in the "Top 5" in several categories as a result of large investments in the Dominion Bridgeport Fuel Cell Park and Colebrook Wind Project respectively.

CONNECTICUT GREEN BANK

2. BACKGROUND AND MARKET – COMMUNITIES

Municipality	# Projects	Average Investment (Project Cost)	Median Investment (Project Cost)	Total Investment (Project Cost)	Investment /Capita	MW	Watts /Capita	Annual MMBTU	Total Jobs	Lifetime CO2 Emissions (tons)
Canaan	12	$39,460	$38,154	$473,518	$383.73	0.1	76.5	306	7	1,163
Canterbury	26	$38,424	$36,494	$999,037	$194.67	0.2	41.3	688	15	2,612
Canton	25	$32,506	$28,342	$812,646	$78.96	0.2	17.2	621	13	2,178
Chaplin	7	$33,405	$31,726	$233,837	$101.45	0.1	22.7	170	4	645
Cheshire	80	$35,516	$33,935	$2,841,271	$97.10	0.6	21.8	2,107	45	7,874
Chester	3	$35,450	$39,234	$106,351	$26.63	0.0	5.8	76	2	288
Clinton	30	$38,004	$35,265	$1,140,122	$85.98	0.3	18.9	812	18	3,084
Colchester	44	$35,543	$33,885	$1,563,897	$97.33	0.3	19.5	1,041	24	3,858
Colebrook	5	$4,530,124	$36,464	$22,650,619	$15,252.94	5.0	3386.3	93	2	61,789
Columbia	25	$36,496	$33,885	$912,401	$166.34	0.2	34.8	618	14	2,349
Cornwall	5	$31,414	$33,885	$157,070	$110.61	0.0	22.9	105	2	400
Coventry	47	$70,775	$38,880	$3,326,413	$267.50	0.9	71.3	2,887	39	10,926
Cromwell	55	$69,435	$32,760	$3,818,919	$272.68	0.4	27.6	5,738	67	4,760
Danbury	90	$35,611	$33,885	$3,204,953	$39.62	0.7	8.1	2,157	50	8,088
Darien	10	$47,309	$48,221	$473,091	$22.82	0.1	4.5	303	7	1,153
Deep River	14	$81,248	$31,483	$1,137,476	$245.73	0.3	71.5	1,170	13	4,078
Derby	31	$30,023	$29,160	$930,711	$72.14	0.2	15.4	650	15	2,449
Durham	20	$32,066	$31,785	$641,327	$86.81	0.1	19.5	466	10	1,771
East Granby	46	$36,550	$34,920	$1,681,322	$326.60	0.4	72.7	1,259	26	4,613
East Haddam	18	$44,863	$29,657	$807,534	$88.49	0.2	19.3	587	11	2,165
East Hampton	38	$38,670	$34,808	$1,469,441	$113.39	0.3	22.7	966	23	3,626
East Hartford	93	$29,007	$28,342	$2,697,633	$52.63	0.6	11.0	1,852	42	6,960
East Haven	59	$29,798	$30,030	$1,758,054	$60.09	0.4	13.5	1,311	27	4,859
East Lyme	87	$33,451	$32,157	$2,910,279	$151.90	0.6	33.9	2,207	45	8,099
East Windsor	35	$36,739	$34,132	$1,285,876	$115.20	0.3	23.9	864	19	3,282
Eastford	6	$28,417	$29,118	$170,501	$97.49	0.0	26.2	149	3	565
Easton	18	$81,633	$34,982	$1,469,389	$196.18	0.4	59.5	1,445	17	5,491
Ellington	51	$44,581	$33,885	$2,273,611	$145.73	0.5	32.8	2,163	33	6,299
Enfield	109	$37,045	$28,114	$4,037,901	$90.43	1.0	21.3	3,298	57	11,730
Essex	29	$31,734	$25,373	$920,298	$137.71	0.2	27.2	2,333	15	2,237
Fairfield	88	$37,383	$32,540	$3,289,740	$55.38	0.8	13.5	2,664	48	9,854
Farmington	125	$29,871	$28,665	$3,733,831	$147.35	0.9	37.3	3,103	57	11,660
Franklin	8	$37,925	$39,561	$303,400	$157.86	0.1	34.7	216	5	822
Glastonbury	72	$41,016	$33,677	$2,953,178	$85.78	0.6	18.4	1,964	44	7,794
Goshen	11	$38,191	$37,800	$420,100	$141.16	0.1	30.4	294	6	1,116
Granby	38	$32,652	$29,874	$1,240,782	$109.98	0.3	23.1	844	19	3,205
Greenwich	17	$34,595	$33,885	$588,107	$9.61	0.1	2.0	388	9	1,476
Griswold	98	$38,590	$37,485	$3,781,848	$316.45	0.8	67.8	2,655	58	9,986
Groton	15	$37,203	$36,720	$558,049	$13.91	0.1	2.8	370	9	1,406
Guilford	64	$37,457	$38,070	$2,397,246	$107.14	0.5	23.9	1,735	37	6,593
Haddam	135	$32,745	$32,560	$4,420,539	$529.66	1.2	138.7	3,865	68	14,263
Hamden	112	$61,945	$27,545	$6,937,822	$113.81	1.0	16.7	8,463	112	12,569
Hampton	15	$55,079	$31,520	$826,190	$443.47	0.2	128.5	799	10	2,948
Hartford	63	$42,228	$23,256	$2,660,375	$21.32	0.7	5.3	2,335	35	8,121
Hartland	8	$27,415	$27,485	$219,324	$103.75	0.1	26.9	185	3	701
Harwinton	23	$35,826	$33,885	$823,998	$146.05	0.2	33.3	614	13	2,314
Hebron	37	$33,646	$33,600	$1,244,918	$128.53	0.3	26.5	832	19	3,162
Kent	5	$32,623	$33,885	$163,117	$54.76	0.0	12.8	124	3	471
Killingly	50	$31,715	$29,940	$1,585,771	$91.29	0.4	21.4	1,225	24	4,576
Killingworth	82	$41,435	$38,500	$3,397,636	$520.71	0.9	132.6	2,877	52	10,657
Lebanon	19	$29,149	$31,588	$553,826	$75.78	0.1	17.5	425	8	1,573
Ledyard	43	$36,141	$32,760	$1,554,068	$103.25	0.3	21.3	1,091	24	3,957
Lisbon	24	$38,256	$37,440	$918,136	$211.65	0.2	43.7	627	15	2,471
Litchfield	17	$44,723	$48,000	$760,288	$89.80	0.2	18.9	519	12	1,971
Lyme	10	$37,879	$33,430	$378,790	$157.44	0.1	37.1	289	6	1,098

CONNECTICUT GREEN BANK

2. BACKGROUND AND MARKET – COMMUNITIES

Municipality	# Projects	Average Investment (Project Cost)	Median Investment (Project Cost)	Total Investment (Project Cost)	Investment /Capita	MW	Watts /Capita	Annual MMBTU	Total Jobs	Lifetime CO2 Emissions (tons)
Madison	18	$37,060	$37,462	$667,076	$36.51	0.1	7.7	455	11	1,729
Manchester	85	$35,153	$28,734	$2,987,992	$51.30	0.7	12.8	2,525	42	9,270
Mansfield	31	$31,787	$30,810	$985,412	$37.13	0.2	7.6	657	15	2,498
Marlborough	16	$38,990	$32,338	$623,833	$97.41	0.1	21.0	435	10	1,654
Meriden	114	$41,037	$30,945	$4,678,167	$76.86	1.1	17.4	3,823	65	13,078
Middlebury	15	$36,496	$33,885	$547,447	$72.27	0.1	15.4	405	9	1,434
Middlefield	24	$37,121	$34,125	$890,895	$201.33	0.2	44.3	636	14	2,416
Middletown	137	$34,387	$33,885	$4,710,989	$98.87	1.0	21.4	3,339	72	12,541
Milford	177	$161,125	$33,476	$28,519,098	$540.55	4.2	79.6	137,515	85	14,771
Monroe	41	$36,779	$34,808	$1,507,931	$77.41	0.3	17.6	1,111	23	4,220
Montville	94	$33,099	$31,678	$3,111,302	$158.98	0.7	35.3	2,374	49	8,509
Morris	7	$27,695	$28,080	$193,865	$81.18	0.0	16.3	126	3	480
Naugatuck	60	$39,429	$30,199	$2,365,722	$74.25	0.4	12.3	1,317	39	4,819
New Britain	111	$51,624	$22,759	$5,730,310	$78.28	1.9	25.3	6,424	68	22,846
New Canaan	29	$40,776	$36,090	$1,182,517	$59.91	0.2	12.2	779	19	2,958
New Fairfield	43	$41,023	$37,300	$1,763,968	$127.08	0.4	26.9	1,224	27	4,607
New Hartford	56	$38,115	$34,005	$2,134,417	$306.23	0.5	70.2	1,617	33	6,025
New Haven	57	$26,768	$25,768	$1,525,795	$11.76	0.3	2.5	1,047	24	3,935
New London	31	$99,343	$28,114	$3,079,630	$111.50	0.8	28.6	3,025	37	9,719
New Milford	56	$41,255	$37,118	$2,310,283	$82.09	0.5	16.6	1,512	36	5,744
Newington	103	$37,931	$30,614	$3,906,900	$127.84	0.9	28.4	2,898	58	10,681
Newtown	40	$44,837	$42,656	$1,793,464	$65.07	0.4	13.1	1,248	28	4,462
Norfolk	9	$40,034	$31,320	$360,302	$210.83	0.1	47.2	262	6	994
North Branford	26	$36,765	$35,540	$955,897	$66.35	0.2	14.9	697	15	2,647
North Canaan	6	$36,438	$36,354	$218,628	$65.95	0.0	13.8	149	3	565
North Haven	91	$34,246	$33,370	$3,116,424	$129.35	0.7	29.2	2,290	48	8,681
North Stonington	19	$55,240	$39,585	$1,049,569	$198.14	0.3	50.5	920	13	3,299
Norwalk	38	$33,520	$32,693	$1,273,753	$14.88	0.3	3.1	873	20	3,317
Norwich	62	$10,799	$9,487	$669,560	$16.54	0.0	0.0	758	21	277
Old Lyme	43	$38,323	$33,885	$1,647,871	$216.74	0.4	49.7	1,246	26	4,656
Old Saybrook	51	$30,184	$28,980	$1,539,359	$150.30	0.3	33.8	1,131	24	4,267
Orange	38	$35,353	$34,074	$1,343,408	$96.26	0.3	21.6	979	21	3,720
Oxford	31	$42,697	$42,840	$1,323,608	$104.36	0.3	22.8	938	20	3,565
Plainfield	66	$32,957	$32,073	$2,175,137	$141.20	0.5	31.3	1,564	33	5,943
Plainville	85	$56,623	$30,030	$4,812,913	$271.67	1.2	69.7	5,050	63	15,213
Plymouth	64	$39,844	$34,839	$2,549,991	$208.28	0.5	43.4	1,721	39	6,539
Pomfret	21	$33,954	$30,983	$713,041	$167.89	0.2	39.5	545	11	2,069
Portland	31	$36,890	$38,220	$1,143,588	$120.28	0.2	25.3	780	17	3,091
Preston	17	$40,122	$32,868	$682,080	$144.32	0.2	31.7	486	11	1,848
Prospect	26	$33,381	$33,885	$867,910	$92.28	0.2	20.5	626	13	2,378
Putnam	32	$95,506	$28,175	$3,056,187	$318.88	0.7	77.4	9,905	60	9,138
Redding	10	$45,198	$43,929	$451,977	$49.35	0.1	10.3	306	7	1,162
Ridgefield	29	$42,888	$38,824	$1,243,760	$50.48	0.3	10.6	850	19	3,229
Rocky Hill	57	$32,087	$31,800	$1,828,963	$92.80	0.4	20.4	1,311	28	4,961
Roxbury	4	$29,476	$28,808	$117,903	$52.12	0.0	12.9	94	2	358
Salem	22	$39,518	$36,630	$869,401	$209.44	0.2	42.7	575	13	2,186
Salisbury	17	$32,024	$33,885	$544,404	$145.52	0.1	29.3	390	9	1,352
Scotland	3	$32,611	$33,440	$97,834	$56.68	0.0	14.1	79	2	299
Seymour	33	$26,753	$26,775	$882,864	$53.38	0.2	11.5	621	13	2,342
Sharon	13	$39,149	$29,453	$508,931	$182.94	0.1	38.2	345	8	1,311
Shelton	93	$39,184	$33,885	$3,644,100	$92.12	0.7	18.2	4,499	58	8,852
Sherman	7	$36,488	$37,200	$255,413	$71.32	0.1	14.7	170	4	647
Simsbury	99	$33,234	$31,300	$3,290,188	$139.94	0.8	33.0	2,518	50	9,548
Somers	21	$80,486	$35,414	$1,690,203	$147.69	0.4	36.7	1,441	20	5,179
South Windsor	106	$34,057	$32,286	$3,609,996	$140.42	0.8	30.3	2,622	56	9,601

CONNECTICUT GREEN BANK

2. BACKGROUND AND MARKET – COMMUNITIES

Municipality	# Projects	Average Investment (Project Cost)	Median Investment (Project Cost)	Total Investment (Project Cost)	Investment /Capita	MW	Watts /Capita	Annual MMBTU	Total Jobs	Lifetime CO2 Emissions (tons)
Southbury	39	$39,641	$37,868	$1,545,990	$77.67	0.3	16.7	1,081	24	4,106
Southington	150	$36,045	$33,958	$5,406,786	$125.54	1.2	27.2	3,829	84	14,439
Sprague	12	$29,220	$24,602	$350,644	$117.51	0.1	28.7	278	5	1,055
Stafford	30	$31,059	$30,314	$931,773	$77.09	0.2	16.7	704	15	2,484
Stamford	67	$52,976	$33,885	$3,549,414	$28.94	0.7	5.5	5,728	55	8,277
Sterling	26	$32,271	$30,919	$839,042	$219.07	0.2	51.8	643	13	2,444
Stonington	69	$33,879	$32,638	$2,337,621	$126.05	0.5	29.6	1,779	35	6,885
Stratford	119	$33,670	$27,710	$4,006,696	$77.98	0.9	17.5	3,282	60	11,079
Suffield	106	$39,288	$39,075	$4,164,512	$264.67	0.9	57.2	3,012	65	11,094
Thomaston	24	$33,444	$33,205	$802,652	$101.77	0.2	21.8	557	12	2,116
Thompson	35	$37,079	$29,835	$1,297,758	$137.21	0.3	29.6	908	20	3,448
Tolland	78	$36,437	$34,214	$2,842,110	$188.82	0.6	42.5	2,076	44	7,888
Torrington	101	$35,386	$33,794	$3,573,946	$98.23	0.7	20.5	2,518	56	9,172
Trumbull	69	$36,192	$33,885	$2,497,219	$69.33	0.6	15.3	1,817	38	6,794
Union	8	$28,964	$29,576	$231,715	$271.33	0.1	69.2	203	4	728
Vernon	60	$32,240	$30,791	$1,934,384	$66.29	0.4	15.1	1,427	30	5,421
Voluntown	18	$67,917	$33,677	$1,222,503	$469.65	0.3	130.7	1,103	14	4,191
Wallingford	2	$30,486	$30,486	$60,972	$1.35	0.0	0.2	30	1	115
Warren	3	$26,176	$27,706	$78,528	$53.75	0.0	12.2	58	1	220
Washington	6	$41,263	$35,278	$247,578	$69.19	0.1	14.5	180	4	639
Waterbury	153	$41,714	$29,453	$6,382,266	$57.83	1.5	13.4	5,083	94	18,218
Waterford	59	$36,642	$33,885	$2,161,860	$110.77	0.5	23.4	1,554	33	5,632
Watertown	67	$45,911	$33,885	$3,076,032	$136.63	0.7	33.3	2,633	42	9,232
West Hartford	132	$27,888	$25,773	$3,653,366	$57.74	0.8	13.1	2,762	58	10,397
West Haven	100	$27,302	$27,263	$2,730,247	$49.14	0.6	11.3	2,037	41	7,737
Westbrook	25	$29,788	$29,797	$744,708	$107.34	0.2	25.4	592	11	2,173
Weston	39	$48,625	$43,904	$1,896,363	$186.30	0.4	42.8	1,439	30	5,371
Westport	29	$92,148	$37,773	$2,672,302	$101.26	0.3	11.6	4,958	46	3,783
Wethersfield	72	$31,447	$29,983	$2,264,185	$84.90	0.5	19.0	1,694	35	6,249
Willington	15	$46,026	$40,163	$690,392	$114.28	0.2	24.8	490	10	1,849
Wilton	8	$41,437	$44,301	$331,495	$18.35	0.1	4.0	236	5	895
Winchester	17	$39,163	$38,824	$665,772	$59.22	0.1	11.7	425	10	1,616
Windham	42	$34,883	$32,463	$1,465,104	$57.98	0.3	12.3	1,017	24	3,843
Windsor	109	$35,634	$32,130	$3,884,052	$310.77	0.9	68.1	2,879	58	10,485
Windsor Locks	83	$37,766	$32,374	$3,096,794	$106.62	0.7	24.9	2,529	45	8,918
Wolcott	56	$41,323	$34,808	$2,314,069	$138.73	0.5	29.2	1,581	36	6,007
Woodbridge	40	$107,922	$37,698	$4,316,886	$480.19	1.3	148.5	4,356	48	16,443
Woodbury	17	$39,754	$37,485	$675,817	$67.75	0.1	14.3	530	11	1,760
Woodstock	60	$38,837	$38,178	$2,330,215	$292.59	0.5	64.8	1,688	35	6,358
Grand Total	**7,966**	**$45,557**	**$32,760**	**$362,818,387**	**$101.59**	**79.0**	**22.1**	**710,008**	**4,753**	**927,036**

Approved/Closed/Completed Projects Fiscal Year 2012 - 2015

Table 5. The "Top 5" Energy, Environment, and Economy Metrics for FY 2012 - 2015[9]

Municipality	Watts /Capita
Colebrook	3,405.3
Hampton	187.3
Durham	165.5
Killingworth	159.7
Woodbridge	158.1

Municipality	Lifetime CO2 Emissions (tons)
Bridgeport	103,005
Colebrook	62,137
New Britain	36,093
Bristol	27,458
Middletown	25,492

Municipality	Investment /Capita
Colebrook	$15,347.05
Ansonia	$1,375.09
Bridgeport	$711.63
Hampton	$711.48
Durham	$665.79

Table 6. Clean Energy Performance by Municipality (FY 2012-2015)

Municipality	# Projects	Average Investment (Project Cost)	Median Investment (Project Cost)	Total Investment (Project Cost)	Investment /Capita	MW	Watts /Capita	Annual MMBTU	Total Jobs	Lifetime CO2 Emissions (tons)
Andover	15	$34,308	$31,671	$514,614	$155.80	0.1	32.3	363	8	1,314
Ansonia	39	$678,694	$26,238	$26,469,082	$1,375.09	1.9	97.5	70,086	20	4,022
Ashford	67	$42,857	$33,885	$2,871,401	$665.14	0.7	154.4	2,179	41	8,211
Avon	71	$55,835	$38,621	$3,964,294	$219.05	0.8	42.1	4,825	61	9,550
Barkhamsted	16	$32,634	$31,632	$522,146	$137.44	0.1	30.9	380	8	1,445
Beacon Falls	23	$32,690	$29,040	$751,881	$124.30	0.2	27.4	537	12	2,039
Berlin	86	$34,926	$35,149	$3,003,617	$151.19	0.6	31.5	2,092	47	7,699
Bethany	43	$36,554	$34,920	$1,571,807	$282.55	0.3	61.5	1,124	24	4,213
Bethel	49	$31,419	$31,213	$1,539,513	$82.84	0.3	17.9	1,076	24	4,089
Bethlehem	23	$33,666	$30,240	$774,323	$214.67	0.2	43.4	507	12	1,927
Bloomfield	92	$29,727	$29,480	$2,734,841	$133.50	0.6	30.1	2,023	42	7,604
Bolton	31	$36,875	$33,796	$1,143,122	$229.54	0.3	51.1	825	18	3,133
Branford	52	$33,098	$31,948	$1,721,120	$61.41	0.4	13.6	1,259	27	4,795
Bridgeport	157	$653,740	$27,000	$102,637,131	$711.63	19.2	132.9	396,085	1,333	103,005
Bridgewater	4	$33,563	$36,283	$134,253	$77.74	0.0	15.3	86	2	326
Bristol	215	$44,098	$31,568	$9,481,056	$156.77	2.2	36.9	7,320	127	27,458
Brookfield	84	$55,326	$38,719	$4,647,419	$282.48	0.8	51.2	6,177	67	9,458
Brooklyn	62	$35,387	$33,641	$2,193,988	$267.23	0.5	60.2	1,605	34	6,086
Burlington	108	$40,318	$38,738	$4,354,329	$468.16	1.0	107.9	3,253	67	12,359
Canaan	17	$38,636	$36,146	$656,816	$532.27	0.1	102.8	412	10	1,563
Canterbury	33	$37,019	$35,458	$1,221,637	$238.04	0.3	50.1	834	18	3,168
Canton	70	$33,037	$28,102	$2,312,593	$224.70	0.5	53.3	1,857	36	6,759
Chaplin	26	$30,643	$28,495	$796,721	$345.65	0.2	81.7	611	12	2,320
Cheshire	148	$35,060	$33,885	$5,188,927	$177.33	1.2	41.4	3,965	81	14,933
Chester	21	$30,127	$26,250	$632,670	$158.41	0.1	35.3	458	10	1,739
Clinton	54	$33,832	$34,012	$1,826,919	$137.78	0.4	31.1	1,335	28	5,073
Colchester	78	$34,554	$32,457	$2,695,210	$167.74	0.5	32.9	1,742	42	6,520
Colebrook	8	$2,848,796	$38,107	$22,790,369	$15,347.05	5.1	3405.3	184	4	62,137
Columbia	66	$32,731	$31,054	$2,160,217	$393.84	0.5	89.9	1,620	33	6,077
Cornwall	12	$32,140	$35,016	$385,683	$271.61	0.1	55.4	255	6	969
Coventry	102	$49,743	$33,867	$5,073,813	$408.03	1.3	104.5	4,249	66	16,011
Cromwell	71	$60,956	$32,130	$4,327,844	$309.02	0.5	34.8	6,076	76	6,002

[9] Ibid

CONNECTICUT GREEN BANK

2. BACKGROUND AND MARKET – COMMUNITIES

Municipality	# Projects	Average Investment (Project Cost)	Median Investment (Project Cost)	Total Investment (Project Cost)	Investment /Capita	MW	Watts /Capita	Annual MMBTU	Total Jobs	Lifetime CO2 Emissions (tons)
Danbury	128	$36,084	$33,885	$4,618,755	$57.10	0.9	11.5	3,902	72	11,502
Darien	20	$42,825	$41,288	$856,510	$41.31	0.2	8.0	535	13	2,031
Deep River	21	$66,797	$31,722	$1,402,734	$303.03	0.4	80.8	1,309	16	4,606
Derby	32	$29,469	$28,485	$943,012	$73.09	0.2	15.6	660	15	2,487
Durham	150	$32,792	$31,500	$4,918,866	$665.79	1.2	165.5	3,965	76	15,063
East Granby	57	$36,563	$35,954	$2,084,081	$404.83	0.5	89.6	1,540	32	5,680
East Haddam	39	$52,462	$32,760	$2,046,024	$224.20	0.5	53.4	1,577	27	6,006
East Hampton	58	$38,129	$35,149	$2,211,470	$170.65	0.4	34.7	1,468	34	5,533
East Hartford	109	$28,941	$28,114	$3,154,589	$61.55	0.7	12.9	2,156	49	8,115
East Haven	74	$29,285	$27,165	$2,167,065	$74.07	0.5	16.4	1,646	34	5,925
East Lyme	105	$34,353	$32,400	$3,607,110	$188.27	0.8	41.2	2,662	55	9,825
East Windsor	53	$64,360	$34,808	$3,411,090	$305.60	0.9	79.5	3,151	42	10,929
Eastford	13	$32,644	$27,445	$424,371	$242.64	0.1	60.4	343	7	1,302
Easton	48	$51,206	$31,618	$2,457,872	$328.15	0.7	90.0	2,207	33	8,305
Ellington	71	$41,449	$33,469	$2,942,896	$188.62	0.7	42.3	2,646	43	8,135
Enfield	201	$33,367	$28,114	$6,706,705	$150.19	1.5	34.5	5,241	98	19,006
Essex	33	$31,842	$25,373	$1,050,772	$157.23	0.2	31.1	2,419	17	2,564
Fairfield	197	$33,075	$30,791	$6,515,867	$109.69	1.6	26.9	5,308	99	19,716
Farmington	149	$31,091	$31,007	$4,632,606	$182.82	1.1	45.3	3,758	71	14,147
Franklin	13	$37,227	$36,720	$483,948	$251.79	0.1	56.9	355	7	1,347
Glastonbury	147	$35,279	$30,013	$5,185,970	$150.64	1.2	33.5	3,683	79	14,209
Goshen	14	$37,648	$35,843	$527,065	$177.11	0.1	39.6	382	8	1,451
Granby	54	$33,562	$32,130	$1,812,340	$160.64	0.4	33.8	1,238	28	4,705
Greenwich	84	$28,731	$27,649	$2,413,371	$39.45	0.5	8.6	1,700	37	6,457
Griswold	115	$38,006	$37,050	$4,370,673	$365.72	0.9	77.4	3,044	67	11,397
Groton	24	$33,297	$33,335	$799,124	$19.92	0.2	4.0	522	12	1,983
Guilford	98	$36,923	$36,553	$3,618,449	$161.72	0.8	35.3	2,564	56	9,742
Haddam	152	$32,979	$31,930	$5,012,736	$600.62	1.3	154.0	4,278	77	15,834
Hamden	214	$45,409	$25,671	$9,717,625	$159.41	1.6	26.6	10,558	156	19,995
Hampton	32	$41,421	$29,250	$1,325,488	$711.48	0.3	187.3	1,155	19	4,299
Hartford	77	$52,137	$24,098	$4,014,535	$32.17	0.9	6.9	3,868	56	10,654
Hartland	15	$29,714	$31,320	$445,706	$210.84	0.1	50.4	364	7	1,313
Harwinton	32	$34,827	$33,943	$1,114,467	$197.53	0.2	44.1	821	18	3,069
Hebron	53	$33,624	$32,414	$1,782,067	$183.98	0.4	40.0	1,256	27	4,773
Kent	10	$31,714	$32,093	$317,141	$106.46	0.1	25.3	244	5	928
Killingly	72	$32,148	$30,537	$2,314,658	$133.26	0.5	30.4	1,731	36	6,497
Killingworth	94	$43,770	$38,500	$4,114,406	$630.56	1.0	159.7	3,475	61	12,838
Lebanon	66	$30,182	$29,920	$1,992,037	$272.58	0.5	64.2	1,551	31	5,779
Ledyard	58	$34,666	$32,309	$2,010,604	$133.59	0.4	27.7	1,400	31	5,130
Lisbon	32	$36,918	$36,644	$1,181,362	$272.33	0.2	57.2	816	19	3,188
Litchfield	30	$40,073	$40,338	$1,202,178	$142.00	0.3	30.1	827	19	3,142
Lyme	13	$35,944	$32,974	$467,272	$194.21	0.1	46.3	361	7	1,373
Madison	64	$33,283	$30,492	$2,130,096	$116.60	0.5	25.5	1,511	34	5,740
Manchester	167	$30,786	$26,818	$5,141,233	$88.28	1.3	21.6	4,187	76	15,757
Mansfield	123	$29,895	$27,144	$3,677,122	$138.53	0.8	30.6	2,655	57	10,016
Marlborough	22	$38,877	$32,338	$855,293	$133.56	0.2	28.2	585	13	2,222
Meriden	132	$53,341	$31,304	$7,040,954	$115.68	1.2	19.2	11,419	110	14,414
Middlebury	21	$36,673	$35,000	$770,128	$101.67	0.2	21.5	555	12	2,005
Middlefield	33	$37,156	$32,760	$1,226,144	$277.09	0.3	60.6	869	19	3,302
Middletown	177	$75,377	$32,500	$13,341,679	$280.01	2.7	57.6	41,604	196	25,492
Milford	244	$124,898	$31,517	$30,475,077	$577.63	4.6	87.3	138,872	116	19,798
Monroe	53	$35,708	$34,808	$1,892,516	$97.16	0.4	21.6	1,367	29	5,194
Montville	123	$33,199	$32,130	$4,083,489	$208.65	0.9	45.9	3,102	64	11,078
Morris	12	$36,100	$35,511	$433,196	$181.41	0.1	34.8	269	7	1,023
Naugatuck	77	$38,165	$30,723	$2,938,701	$92.23	0.5	15.9	1,701	48	6,234

CONNECTICUT GREEN BANK

2. BACKGROUND AND MARKET – COMMUNITIES

Municipality	# Projects	Average Investment (Project Cost)	Median Investment (Project Cost)	Total Investment (Project Cost)	Investment /Capita	MW	Watts /Capita	Annual MMBTU	Total Jobs	Lifetime CO2 Emissions (tons)
New Britain	125	$70,683	$23,313	$8,835,321	$120.69	2.9	40.0	10,723	96	36,093
New Canaan	42	$42,351	$38,812	$1,778,728	$90.12	0.4	18.0	1,154	28	4,385
New Fairfield	65	$39,825	$37,216	$2,588,652	$186.49	0.5	39.3	1,781	40	6,724
New Hartford	67	$37,155	$33,885	$2,489,389	$357.16	0.6	81.2	1,867	39	6,973
New Haven	95	$25,902	$24,492	$2,460,676	$18.96	0.5	3.9	1,667	38	6,234
New London	38	$84,983	$26,284	$3,229,368	$116.92	0.8	29.7	3,124	39	10,096
New Milford	76	$40,819	$37,243	$3,102,255	$110.24	0.6	22.9	2,086	48	7,925
Newington	121	$36,476	$30,000	$4,413,645	$144.42	1.0	32.0	3,263	66	12,066
Newtown	96	$37,226	$34,400	$3,573,735	$129.67	0.8	30.3	2,779	56	10,279
Norfolk	15	$38,682	$34,475	$580,230	$339.51	0.1	71.6	397	9	1,507
North Branford	37	$35,131	$34,503	$1,299,846	$90.22	0.3	20.5	958	20	3,641
North Canaan	9	$35,555	$34,626	$319,998	$96.53	0.1	20.7	222	5	845
North Haven	118	$33,743	$32,819	$3,981,640	$165.26	0.9	36.2	2,864	62	10,751
North Stonington	30	$47,054	$38,354	$1,411,622	$266.49	0.3	65.4	1,175	19	4,266
Norwalk	76	$125,536	$32,326	$9,540,733	$111.45	3.6	42.3	144,874	150	7,680
Norwich	107	$13,251	$9,200	$1,417,902	$35.02	0.2	3.7	1,887	36	2,125
Old Lyme	59	$38,419	$36,015	$2,266,740	$298.14	0.5	67.7	1,690	35	6,340
Old Saybrook	73	$31,538	$30,240	$2,302,261	$224.79	0.5	48.2	1,610	36	6,088
Orange	59	$35,917	$34,425	$2,119,091	$151.84	0.5	32.5	1,495	33	5,587
Oxford	42	$42,193	$42,630	$1,772,125	$139.72	0.4	30.2	1,244	27	4,726
Plainfield	89	$33,175	$32,016	$2,952,578	$191.66	0.7	42.5	2,121	45	8,059
Plainville	104	$52,102	$30,030	$5,418,639	$305.86	1.4	77.3	5,487	73	16,872
Plymouth	76	$37,922	$33,885	$2,882,045	$235.40	0.6	49.5	1,966	44	7,468
Pomfret	42	$31,022	$29,531	$1,302,930	$306.79	0.3	72.0	992	20	3,769
Portland	81	$31,348	$29,185	$2,539,216	$267.06	0.6	62.2	1,917	39	7,411
Preston	25	$38,393	$32,414	$959,813	$203.09	0.2	44.5	682	15	2,593
Prospect	35	$32,844	$33,885	$1,149,535	$122.23	0.3	27.3	833	18	3,166
Putnam	48	$72,648	$27,720	$3,487,116	$363.85	0.8	88.6	10,266	67	10,464
Redding	25	$42,665	$43,680	$1,066,634	$116.47	0.2	23.8	708	16	2,690
Ridgefield	46	$40,218	$34,005	$1,850,028	$75.09	0.4	16.1	1,283	28	4,872
Rocky Hill	70	$31,647	$31,517	$2,215,281	$112.40	0.5	24.7	1,585	34	6,001
Roxbury	25	$34,573	$33,580	$864,332	$382.11	0.2	100.7	738	13	2,805
Salem	29	$37,054	$33,885	$1,074,576	$258.87	0.2	53.8	740	17	2,752
Salisbury	28	$33,241	$33,843	$930,759	$248.80	0.2	49.7	638	15	2,292
Scotland	6	$31,281	$33,663	$187,687	$108.74	0.0	25.2	144	3	536
Seymour	37	$27,679	$27,563	$1,024,124	$61.92	0.2	13.2	713	16	2,688
Sharon	25	$39,000	$36,150	$975,009	$350.47	0.2	74.0	667	15	2,535
Shelton	133	$36,897	$33,885	$4,907,352	$124.05	1.0	25.4	5,432	77	12,395
Sherman	15	$35,808	$37,200	$537,115	$149.99	0.1	29.8	360	8	1,314
Simsbury	122	$39,101	$31,299	$4,770,274	$202.90	0.9	39.3	3,919	75	11,390
Somers	33	$64,534	$35,414	$2,129,607	$186.09	0.5	45.0	1,747	26	6,344
South Windsor	146	$33,938	$32,805	$4,954,979	$192.73	1.1	41.3	3,548	77	13,072
Southbury	55	$39,495	$37,868	$2,172,221	$109.13	0.5	23.3	1,503	33	5,709
Southington	213	$189,697	$35,300	$40,405,361	$938.15	4.4	101.5	121,944	119	21,676
Sprague	19	$32,495	$29,224	$617,405	$206.91	0.1	47.9	463	10	1,760
Stafford	85	$31,206	$29,850	$2,652,511	$219.45	0.6	49.8	2,003	41	7,422
Stamford	123	$41,849	$29,835	$5,147,466	$41.97	1.0	8.4	7,351	80	12,639
Sterling	28	$34,382	$32,849	$962,702	$251.36	0.2	56.4	701	15	2,662
Stonington	107	$33,188	$32,252	$3,551,063	$191.48	0.8	43.6	2,621	54	10,084
Stratford	168	$31,972	$27,000	$5,371,240	$104.53	1.2	23.2	4,257	81	14,675
Suffield	131	$38,867	$38,241	$5,091,526	$323.58	1.1	70.2	3,676	79	13,618
Thomaston	30	$34,047	$34,376	$1,021,397	$129.50	0.2	27.5	703	16	2,672
Thompson	52	$34,400	$28,412	$1,788,792	$189.13	0.4	42.0	1,289	28	4,898
Tolland	105	$37,768	$34,670	$3,965,632	$263.46	0.9	57.1	2,787	61	10,589
Torrington	119	$35,049	$33,794	$4,170,810	$114.64	0.9	23.8	2,915	65	10,678

CONNECTICUT GREEN BANK

2. BACKGROUND AND MARKET – COMMUNITIES

Municipality	# Projects	Average Investment (Project Cost)	Median Investment (Project Cost)	Total Investment (Project Cost)	Investment /Capita	MW	Watts /Capita	Annual MMBTU	Total Jobs	Lifetime CO2 Emissions (tons)
Trumbull	133	$40,853	$33,800	$5,433,458	$150.85	1.3	34.8	4,369	79	15,449
Union	12	$29,906	$29,576	$358,877	$420.23	0.1	100.6	290	6	1,059
Vernon	92	$30,698	$29,717	$2,824,230	$96.79	0.6	21.6	2,057	44	7,754
Voluntown	20	$65,325	$33,885	$1,306,503	$501.92	0.4	137.4	1,160	16	4,407
Wallingford	2	$30,486	$30,486	$60,972	$1.35	0.0	0.2	30	1	115
Warren	7	$32,406	$28,665	$226,842	$155.26	0.0	30.9	146	3	556
Washington	17	$34,704	$32,536	$589,976	$164.89	0.1	34.8	415	9	1,533
Waterbury	181	$39,393	$28,473	$7,130,098	$64.60	1.6	14.9	5,612	105	20,226
Waterford	83	$35,993	$32,970	$2,987,414	$153.07	0.6	32.1	2,100	46	7,709
Watertown	87	$43,280	$33,930	$3,765,345	$167.24	0.9	39.8	3,107	53	11,033
West Hartford	261	$28,248	$24,313	$7,344,546	$116.09	1.6	24.8	5,178	116	19,484
West Haven	140	$30,012	$27,113	$4,201,615	$75.62	0.9	16.6	3,033	63	11,351
Westbrook	30	$28,062	$26,953	$841,856	$121.34	0.2	28.5	670	13	2,432
Weston	51	$48,072	$44,247	$2,451,673	$240.86	0.6	54.2	1,816	38	6,803
Westport	98	$47,275	$29,316	$4,632,989	$175.55	0.8	29.8	6,514	76	9,692
Wethersfield	89	$31,218	$28,675	$2,778,396	$104.18	0.6	23.0	2,086	44	7,555
Willington	20	$41,807	$38,329	$836,149	$138.41	0.2	29.9	589	13	2,223
Wilton	22	$37,590	$40,238	$826,986	$45.79	0.2	9.9	578	13	2,198
Winchester	25	$35,144	$33,885	$878,606	$78.15	0.2	15.8	578	14	2,194
Windham	81	$35,904	$27,200	$2,908,231	$115.10	0.6	23.9	2,467	42	7,438
Windsor	139	$51,018	$32,130	$7,091,556	$567.42	1.1	84.7	7,525	114	13,043
Windsor Locks	95	$36,776	$32,130	$3,456,910	$119.02	0.8	27.5	2,769	51	9,826
Wolcott	72	$40,598	$34,808	$2,923,028	$175.24	0.6	36.9	1,994	45	7,576
Woodbridge	51	$92,225	$37,393	$4,703,475	$523.19	1.4	158.1	4,637	54	17,510
Woodbury	25	$38,999	$34,692	$974,968	$97.74	0.2	20.7	735	15	2,540
Woodstock	85	$41,287	$34,986	$3,509,434	$440.66	0.7	88.8	2,308	53	8,713
Grand Total	**11,991**	**$55,643**	**$31,775**	**$667,106,442**	**$186.79**	**134.5**	**37.7**	**1,275,106**	**8,300**	**1,390,583**

2. BACKGROUND AND MARKET – COMMUNITIES

DISTRESSED COMMUNITIES[10]

Connecticut's "distressed communities" are particularly affected by the state's high energy prices. On average, Connecticut's neediest households owe $2,560 more in annual energy bills than they can afford[11]. CGB financing products and marketing efforts seek to bring lower and more predictable energy costs to homes and businesses in distressed communities.

Table 7. Overview of Distressed and Not Distressed Municipalities, Population, and Households in Connecticut

	Distressed %	Not Distressed	Distressed	Total
# Towns	15%	144	25	169
Population	31%	2,450,890	1,123,207	3,574,097
Households	32%	914,889	422,869	1,337,758

CGB has steadily increased its percentage of projects deployed each year in distressed municipalities. This has led to over $200 million in clean energy projects in these communities, creating over 2,600 jobs.

[10] Distressed Communities as defined by the Department of Economic and Community Development (DECD). DECD Methodology: Weighted components are summed to measure the rank of the 169 towns. For each component, every town is ranked from 1 to 169, with the best town scoring 1 and worst 169. The top 25 towns with highest total scores are designated distressed municipalities.

DECD's components and weights:

1. Per capita income for 2013, weight 1;
2. % of poverty in population for 2013, weight 1;
3. Unemployment rate for 2014, weight 2;
4. % change in population from 2000 to 2010, weight 1;
5. % change in employment from 2004 to 2014, weight 1;
6. % change in per capita income from 2000 to 2013, weight 1;
7. % of house stock built before 1939 in 2013, weight 1/3;
8. % population with high school degree and higher in 2013, weight 1; and
9. Per Capita Adjusted Equalized Net Grand List in 2015-2016, weight 1.

According to C.G.S. Section 32-9p, a distressed municipality should be based on "high unemployment and poverty, aging housing stock and low or declining rates of growth in job creation, population, and per capita income."

DECD additionally included 1) Level of Per Capita Income, 2) % of population with high school degree and higher and 3) Per Capita Adjusted Equalized Net Grand List (AENGL) to arrive at its ranking.

Data sources: Census 2000, Census 2010, 2009-2013 Census American Community Survey (ACS) 5-year Estimates, DOL, DOE
Prepared by DECD Research
September 1, 2015

http://www.ct.gov/ecd/cwp/view.asp?a=1105&q=251248

[11] Home Energy Affordability in Connecticut, http://www.operationfuel.org/wp-content/uploads/Connecticut-2014-HEAG-Final.pdf.

Table 8. Project Performance – Clean Energy Approved, Closed, and Completed Projects in Connecticut (FY 2015)[12]

	# Projects	Investment (Project Cost)	Investment /Capita*	MW	Watts /Capita*	Annual MMBTU	Total Jobs	Lifetime CO2 Emissions (tons)
Not Distressed	6,211	$287,577,441	$117.34	61.4	25.0	335,915	3,651	719,117
Distressed	1,755	$75,240,947	$67.14	17.6	15.7	374,092	1,102	207,920
Grand Total	7,966	$362,818,387	$101.59	79.0	22.1	710,008	4,753	927,036
% Distressed	22%	21%		22%				

Table 9. Project Performance – Clean Energy Approved, Closed, and Completed Projects in Connecticut (FY 2012-2015)

	# Projects	Investment (Project Cost)	Investment /Capita*	MW	Watts /Capita*	Annual MMBTU)	Total Jobs	Lifetime CO2 Emissions (tons)
Not Distressed	9,671	$452,880,383	$184.78	94.2	38.4	726,194	5,695	1,045,619
Distressed	2,320	$214,226,059	$191.17	40.3	36.0	548,912	2,605	344,964
Grand Total	11,991	$667,106,442	$186.79	134.5	37.7	1,275,106	8,300	1,390,583
% Distressed	19%	32%		30%				

* Calculated using the 2015 distressed community designations

[12] The Connecticut Green Bank tracks projects through three phases as they move through the pipeline to construction completion and operation – Approved, Closed, and Completed. Approved signifies that the appropriate authority within the Connecticut Green Bank, whether President & CEO, Deployment Committee, or Board of Directors, has approved the Connecticut Green Bank's investment in the project. Closed indicates all financial and legal documents have been executed and any additional funding has been secured. Completion indicates all construction and installation is complete and the project is operational.

2. BACKGROUND AND MARKET – INCOME

In addition to looking at funding and clean energy deployment in distressed municipalities, CGB works to ensure that low to moderate income (LMI) census tracts across the entire state are benefiting from its programs. CGB defines low to moderate income as 100% or less of area median income. Tables 10 through 14 group CGB's projects based upon the average income of their census tract.

Table 10. Projects by Area Median Income – Clean Energy Deployment in the Residential Sector (FY 2015)

	FY 2015			
Income Bands	**# Projects**	**Projects /1,000 Households**	**Installed Capacity (MW)**	**Watts /Household**
<60% AMI	313	1.5	1.8	8.6
60%-80% AMI	549	3.8	3.5	24.7
80%-100% AMI	1,587	4.7	10.9	32.6
100%-120% AMI	2,377	8.2	17.6	60.8
>120% AMI	3,052	8.1	24.4	64.6
Grand Total	**7,878**	**5.8**	**58.4**	**42.9**

Table 11. Projects by Area Median Income –Clean Energy Deployment in the Residential Sector (FY 2012-2015)

	FY 2012 -2015			
Income Bands	**# Projects**	**Projects /1,000 Households**	**Installed Capacity (MW)**	**Watts /Household**
<60% AMI	417	2.0	2.4	11.1
60%-80% AMI	718	5.0	4.5	31.3
80%-100% AMI	2,286	6.8	15.5	46.1
100%-120% AMI	3,489	1.2	25.2	87.0
>120% AMI	4,955	1.3	38.4	101.7
Grand Total	**11,865**	**8.7**	**86.0**	**63.3**

Through such products and initiatives as the LMI solar incentive, it's partnership with Posigen, and its affordable multifamily housing energy financing products, CGB has focused on increasing its penetration in the LMI market. Tables 12 through 14 illustrate that CGB has made progress on this goal but still has work to do.

Table 12. Projects by Area Median Income – Number of Clean Energy Projects Above or Below 100% (FY 2012-2015)

# Projects	100% or Below AMI	Over 100% AMI	Grand Total	100% or Below AMI
FY 2012	77	341	418	18%
FY 2013	206	906	1,112	19%
FY 2014	689	1,768	2,457	28%
FY 2015	2,449	5,429	7,878	31%
Grand Total	**3,421**	**8,444**	**11,865**	**29%**

Table 13. Deployment – Clean Energy Installed Capacity (MW) Above or Below 100% (FY 2012-2015)

MW	100% or Below AMI	Over 100% AMI	Grand Total	100% or Below AMI
FY 2012	0.5	2.4	2.9	18%
FY 2013	1.3	6.6	7.9	16%
FY 2014	4.2	12.6	16.9	25%
FY 2015	16.3	42.1	58.4	28%
Grand Total	**22**	**64**	**86.0**	**26%**

Table 14. Investment – Clean Energy Investment Above or Below 100% Area Median Income (FY 2012-2015)

Investment (Project Cost)	100% or Below AMI	Over 100% AMI	Grand Total	100% or Below AMI
FY 2012	$2,493,277	$12,471,136	$14,964,413	17%
FY 2013	$5,986,087	$29,465,132	$35,451,219	17%
FY 2014	$19,160,825	$55,867,165	$75,027,989	26%
FY 2015	$74,406,841	$190,877,381	$265,284,222	28%
Grand Total	**$102,047,030**	**$288,680,814**	**$390,727,843**	**26%**

CONNECTICUT GREEN BANK

2. BACKGROUND AND MARKET
SMALL TO MINORITY OWNED BUSINESS PROCUREMENT

The State of Connecticut's Supplier Diversity Program was established to ensure Connecticut small businesses have an opportunity to bid on a portion of the State's purchases. The program requires agencies and political subdivisions to set aside 25% of their annual budgets for construction, housing rehabilitation, and purchasing goods and services (after approved exemptions by the Department of Administrative Services) to be awarded to certified small businesses, with 25% of this amount to be awarded to certified minority business enterprises.

Table 15. Small Business Procurement (FY 2012-2015)

Year	Small Business		
	Goal	Actual	Percentage
FY 2012	$ 59,775.00	$ 39,520.00	66%
FY 2013	$ 62,598.00	$ 59,340.00	95%
FY 2014	$ 135,320.00	$ 120,560.00	89%
FY 2015	$ 221,750.00	$ 251,980.00	113%

Table 16. Minority Business Enterprise Procurement (FY 2012-2015)

Year	Minority Business Enterprises		
	Goal	Actual	Percentage
FY 2012	$ 14,944.00	$ 31,474.00	211%
FY 2013	$ 15,649.00	$ 52,308.00	334%
FY 2014	$ 33,830.00	$ 88,427.00	261%
FY 2015	$ 55,438.00	$ 153,319.00	277%

3. MEASURES OF SUCCESS – OBJECTIVE FUNCTION

The Objective Function (OF) is one of the metrics of success for the Connecticut Green Bank.[13] The OF is defined as "the amount of clean energy generated (and/or saved) per dollar of ratepayer funds at risk." The OF is essentially a "bang for the buck" metric – getting more societal benefit with less public resources at risk. Success for the CGB would be reflected in a steady increase in the numerical value of this metric. The calculation of the OF is based on the formula:

$$\frac{(Energy\ Generated\ or\ Saved,\ or\ Other\ Environmental\ Benefit) * (1 \pm \%\ Realized)}{Subsidies + Program\ and\ Administrative\ Costs + Credit\ Enhancements + Amount\ of\ Financing - Revenue}$$

The numerator of the OF includes an estimate of the amount of clean energy produced or energy saved in MMBtu's or KWh's over a specified period of time, including from year one through the life of a project. In some cases, the numerator may include a realization rate which improves the estimate. The numerator of the OF can also be modified to look at other important societal benefits like maximizing the reduction of greenhouse gas emissions, increasing jobs, etc. [14]

The denominator of the OF includes the dollar value of the resources the Connecticut Green Bank utilizes to support a project or program. This might include subsidies, administrative costs, credit enhancements (e.g., LLR's and IRB's), and financing, minus revenues (e.g., renewable energy credit sales). The Connecticut Green Bank uses the state's cost of capital as its discount rate (i.e., 3%).

One of the limitations of the current OF model is that it does not account for the return by customers of funds from the financing programs back to the Connecticut Green Bank. In the OF (Version 2.0), the denominator will be modified to recognize the benefits of using resources as financing versus subsidies.

Programs and Project Tables

The OF has been calculated for various programs and projects invested in by the Connecticut Green Bank (see Table 17) since its inception in July of 2011.

Table 17. Objective Function (Expected MMBtu of Clean Energy Generated and/or Saved Over the Lifetime per $1 of Connecticut Green Bank Funds at Risk) for Programs and Projects

Name	Designation	Type	Objective Function (MMBtu/$1)
CHP Projects	Program	Financing	4.93
Fuel Cell - Bridgeport	Project	Financing	0.68
Anaerobic Digester Projects	Program	Financing	0.32
Smart-E Loan	Program	Financing	0.22
RSIP	Program	Subsidy	0.16
Wind - Colebrook	Project	Financing	0.14
Solar Lease (Commercial)	Program	Financing	0.11
C-PACE Loan	Program	Financing	0.09
Solar Lease (Residential)	Program	Financing	0.04
Solar Loan	Program	Financing	0.03

[13] http://www.ctcleanenergy.com/documents/5a_Objective%20Function%20Protocol_Version%201.0_Memo_061314.pdf

[14] For example, from the EPA's Clean Power Plan perspective, the objective function could be modified to look at "maximizing the amount of CO_2 emissions reduced per dollar of ratepayer funds at risk".

As mentioned, the OF could be modified to look at greenhouse gas emission reductions (see Table 18).

Table 18. Objective Function (Expected Pounds of CO_2 Emissions Avoided Over the Lifetime per $1 of Connecticut Green Bank Funds at Risk) for Programs and Projects[15]

Name	Designation	Type	Objective Function (Lbs. of CO_2/$1)
RSIP	Program	Subsidy	49.5
Wind - Colebrook	Project	Financing	43.9
Smart-E Loan	Program	Financing	40.5
Solar Lease (Commercial)	Program	Financing	33.6
Fuel Cell - Bridgeport	Project	Financing	27.2
C-PACE Loan	Program	Financing	25.0
Solar Lease (Residential)	Program	Financing	13.3
Solar Loan	Program	Financing	10.4

Several observations come from looking at the OF from the energy (i.e., MMBtu) and environment (i.e., GHG emissions) perspectives, including:

1. **Project Opportunities** – where large project opportunities (i.e., Fuel Cell – Bridgeport, Wind - Colebrook) present themselves and need capital from the Connecticut Green Bank to attract private capital to enable the project to move forward, then the Connecticut Green Bank should give strong consideration to investing in the project – if financial resources are available and the return is commensurate with the risk.

2. **Waste Heat to Energy** – Projects that not only produce clean electricity but also produce clean waste heat that can be used onsite have strong OF's. Continuously finding ways to utilize waste heat will improve the OF with respect to energy savings.

3. **Program developments** – Future developments to program financial structures are likely to further increase OF values across our programs. For example, as the C-PACE program sells down loans and increases private capital investment, the objective function for this program is likely to increase dramatically over the next few years. Also as the Connecticut Green Bank continues to lower subsidies, as mandated by Public Act 15-194, the OF value for RSIP is also likely to increase dramatically.

Some of the results above show higher OF's for subsidy programs (e.g., RSIP) than financing programs (e.g., C-PACE). It deserves to be restated – that the OF does not yet appropriately value financing programs versus subsidy programs whereby the former use of funds are intended to be returned to the Connecticut Green Bank while the latter use of funds are gone.

[15] Note that the anaerobic digester and CHP projects were not included in this table as estimates of GHG emissions avoided were difficult to come by. These values will likely be incorporated into future OF analyses. Also estimates of energy efficiency CO_2 avoidance for C-PACE and Smart-E projects were calculated using emissions data from the DOE's Energy Index for Commercial Buildings and the EPA's home energy use estimates from their Greenhouse Gas Equivalencies Calculator.

3. MEASURES OF SUCCESS – OBJECTIVE FUNCTION

Programs and Project Figures

The OF can also be combined with the level of total investment in clean energy to further visualize market impact in terms of clean energy produced or energy saved (see Figure 1) or greenhouse gas emissions reduced (see Figure 2) from the use of public-private investment. These are for projects that began in July 2011 and ended in June 2015.

Figure 1. Cumulative Objective Function (MMBtu/$1) vs. Total Investment per Program or Project

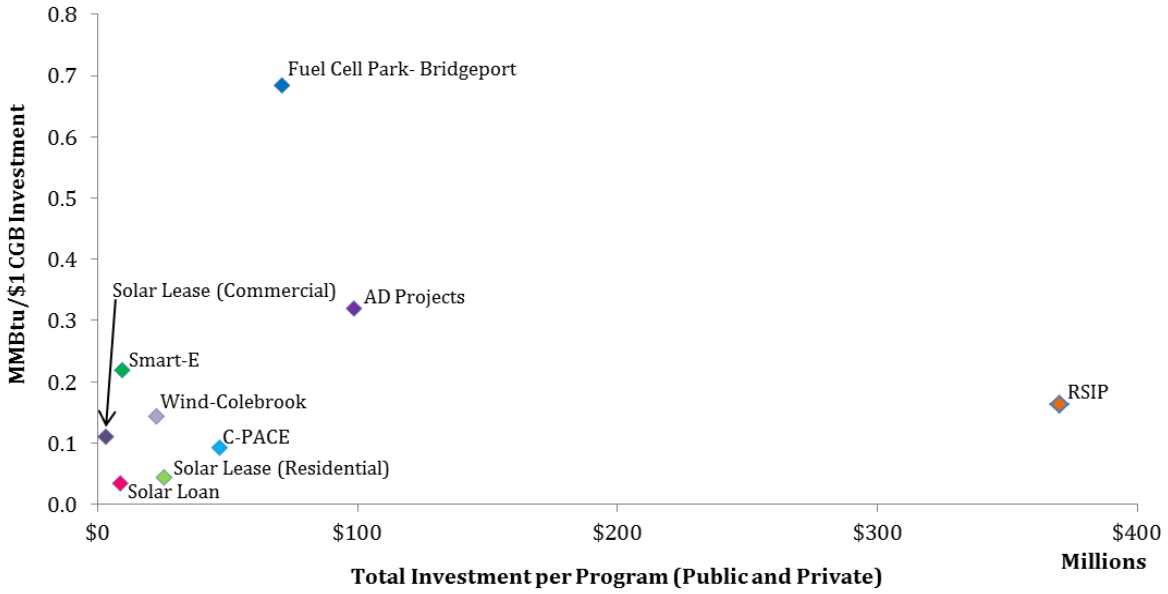
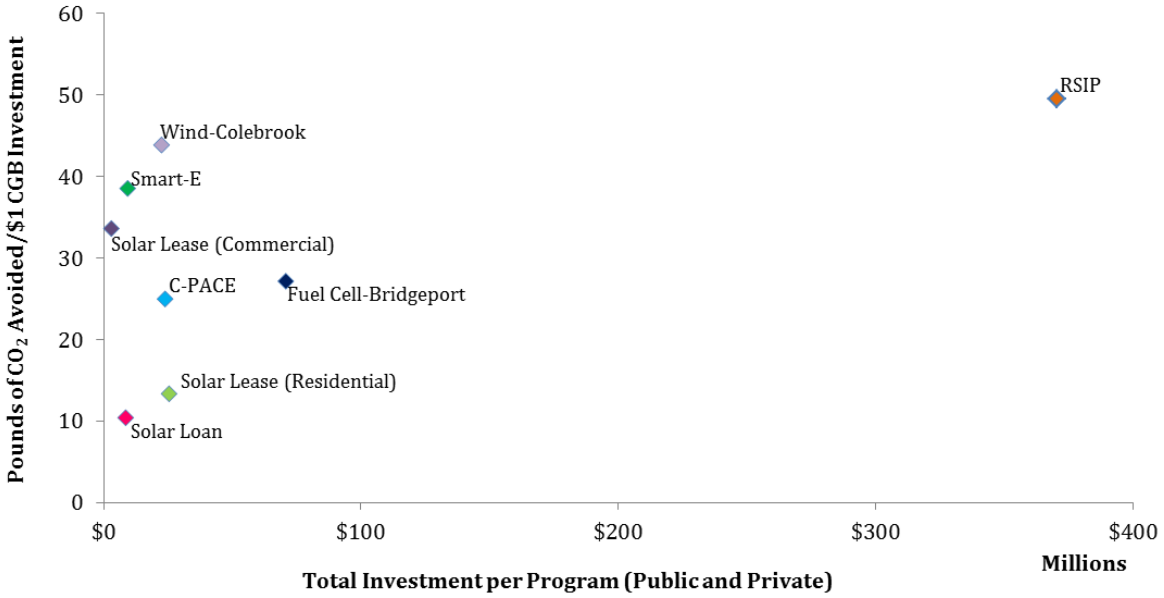


Figure 2. Cumulative Objective Function (Pounds of CO_2/$1) vs. Total Investment per Program or Project



3. MEASURES OF SUCCESS – OBJECTIVE FUNCTION

Several observations come from looking at the OF from the energy and environment perspectives alongside the level of public and private capital investment, including:

1.) **Energy vs. Environment** – In many cases when comparing CGB programs using OF values, the programs rank quite differently across the MMBtu/$1 and CO_2/$1 metrics. These differences can potentially indicate how individual programs may have advantages in providing certain societal benefits over others.

2.) **Residential Products** – The Solar Lease (Residential), Solar Loan, and Smart-E Loan programs all have Loan Loss Reserve dollars incorporated into their OF calculations. These dollars have a minimal risk of permanently being spent which increases the societal benefit of those dollars but this level of risk is not adequately captured using this iteration of the Objective Function (Version 1.0). As of today, there have been 0 defaults for these residential products which have produced 1,393 loans and leases valued at $38.5 million.

Since the Connecticut Green Bank's programs are often meant to target a discrete sector of the economy, OF values should not be the sole metric to determine program success. That said, in tracking the objective function values across Connecticut Green Bank's programs into the future, we aim to show that limited public dollars can be used to increasingly leverage private investment through financing mechanisms under the Green Bank model, while also demonstrating scaled deployment of clean energy across the state.

Loan Portfolio Figures

When applying the Objective Function to financing programs, one can begin to see the potential for how the combination of energy efficiency and renewable energy can help increase its value. This supports the impetus behind Connecticut's Comprehensive Energy Strategy, while also demonstrating the opportunity for renewable energy to bring along energy efficiency to "scale-up" green energy investment and deployment across the state. The Figures below highlight the impact of leveraging public funds with private capital investment, specifically as it applies to the Smart-E Loan Program (Figures 3 and 4) and C-PACE (Figures 5 and 6), as the more private capital that is "in the deal" the greater the amount of energy savings or green energy produced per dollar of Connecticut Green Bank capital.

3. MEASURES OF SUCCESS – OBJECTIVE FUNCTION

Figure 3. Smart- E Loan Program: Objective Function (MMBtu/$1) vs. Total Investment per Project

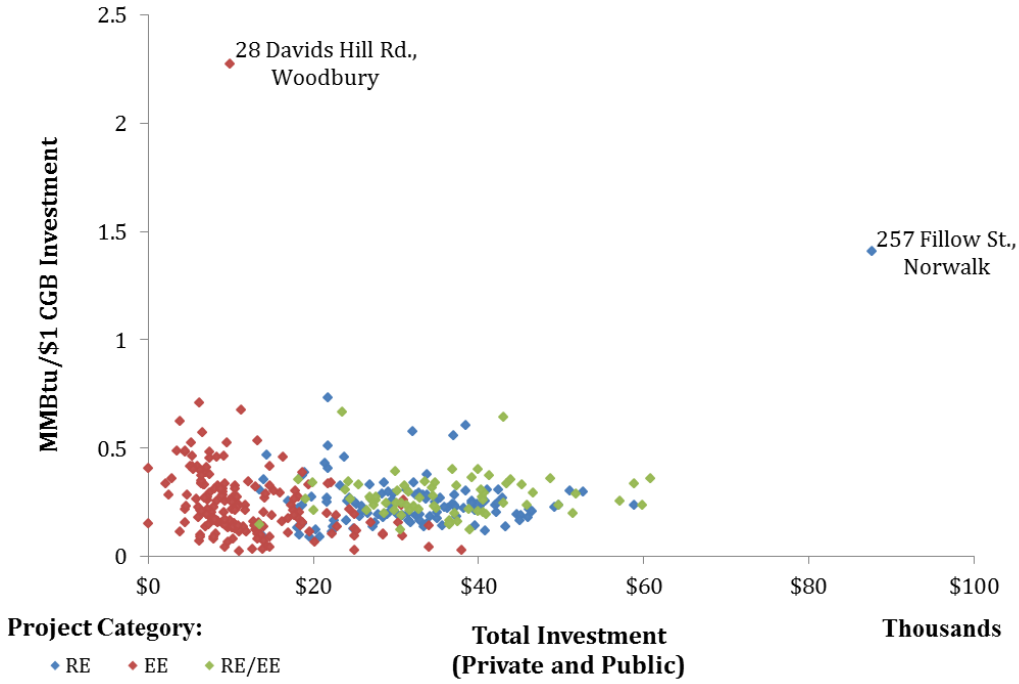
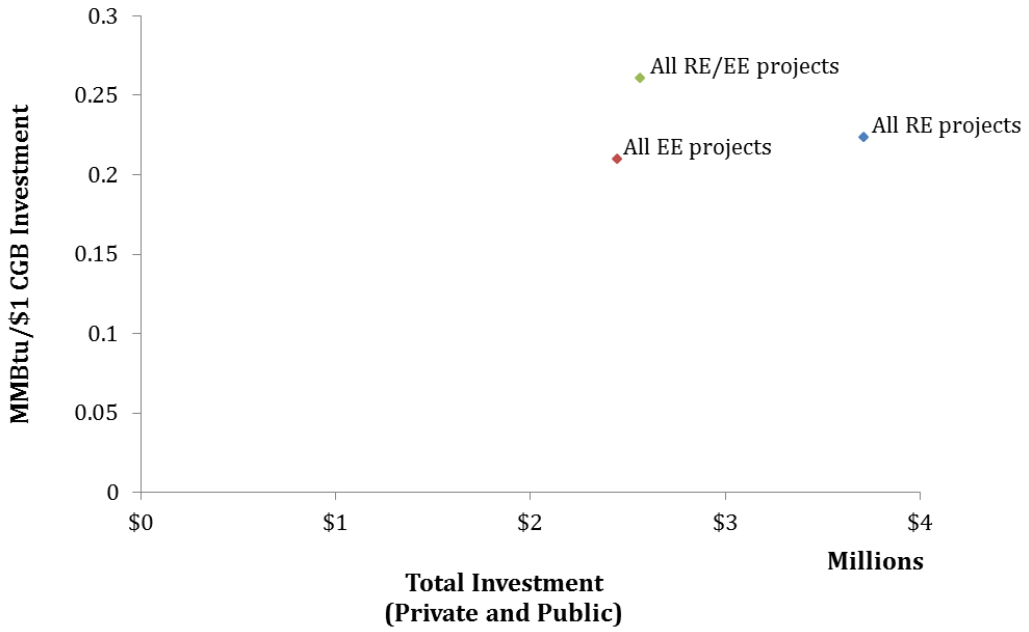


Figure 4. Smart-E Loan: Objective Function (MMBtu/$1) vs. Total Portfolio for EE and RE Projects



3. MEASURES OF SUCCESS – OBJECTIVE FUNCTION

Figure 5. C-PACE Loan Program: Objective Function (MMBtu/$1) vs. Total Investment per Project

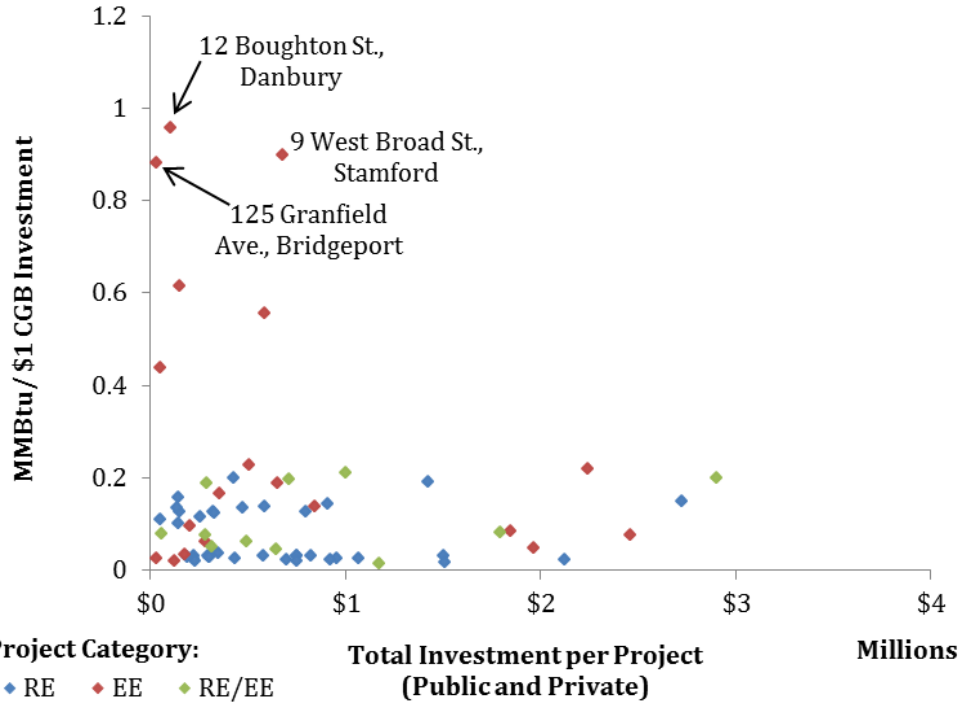
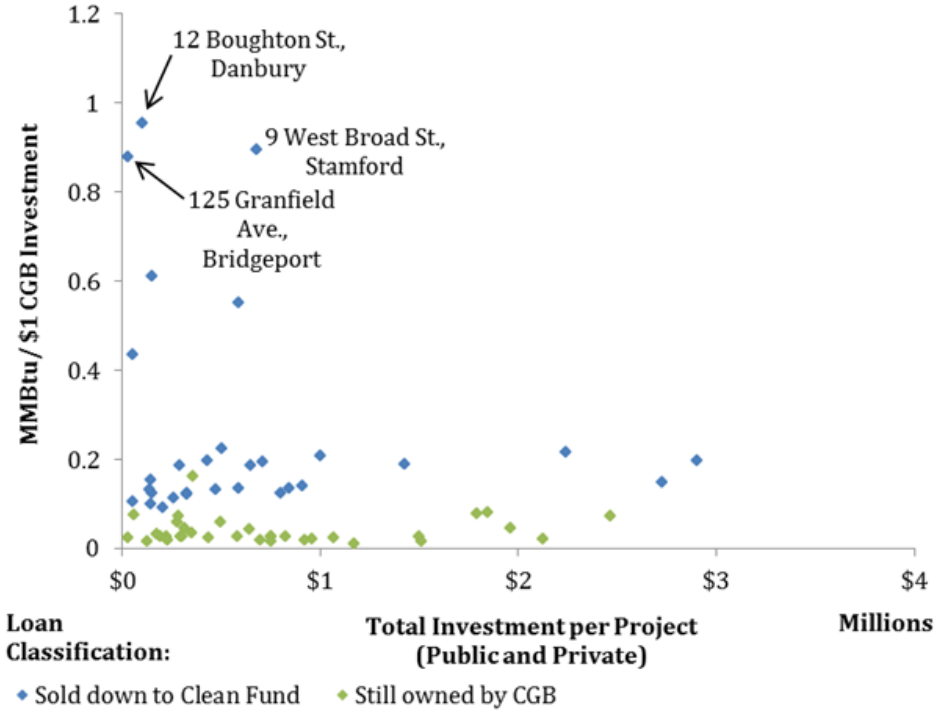


Figure 6. C-PACE Loan Program: Objective Function (MMBtu/$1) vs. Total Investment per Project with Sell-Down to Clean Fund



CONNECTICUT GREEN BANK

3. MEASURES OF SUCCESS – ATTRACT CAPITAL

Project Status

The Connecticut Green Bank tracks projects through three phases as they move through the pipeline to construction completion and operation – Approved, Closed, and Completed. Approved signifies that the appropriate authority within the Connecticut Green Bank, whether President & CEO, Deployment Committee, or Board of Directors, has approved the Connecticut Green Bank's investment in the project. Closed indicates all financial and legal documents have been executed and any additional funding has been secured. Completion indicates all construction and installation is complete and the project is operational. The table highlights the fact that projects can take some time to move through this pipeline (see Table 19). The full energy, economic, and environmental benefits from these projects begin to be fully realized after they are completed.

Table 19. Clean Energy Project Status (FY 2012-2015)

# PROJECTS	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	5	2	18	781	806
Closed	3	1	86	4,258	4,348
Completed	410	1,116	2,384	2,927	6,837
Total	418	1,119	2,488	7,966	11,991

Clean Energy Investment

The Connecticut Green Bank's vision is to lead the green bank movement by accelerating private investment in clean energy deployment for Connecticut to achieve economic prosperity, create jobs, promote energy security, and address climate change. The Green Bank tracks its progress towards this vision as "E3" metrics – Energy, Economic, and Environmental. Investment represents the total amount of private and public funding for clean energy projects, shown in Table 20 below.

Table 20. Clean Energy Investment by Source - Public and Private (FY 2012-2015)

	2012	2013	2014	2015	Grand Total
Total CGB Investment	$4,818,389	$19,551,561	$46,273,068	$95,129,679	$165,772,696
Total Private Investment	$10,146,025	$91,229,732	$132,137,911	$257,671,860	$491,185,528
Total Project Investment	$14,964,413	$110,491,753	$176,745,827	$360,997,462	$663,199,456

Leverage Ratio

One of the main goals of the Connecticut Green Bank is to attract and deploy private capital to finance the green energy goals for Connecticut. To that end, the greater the leverage ratio of private to public funds, the better. The leverage ratios for the Connecticut Green Bank are increasing over time. Not only that, but a greater percentage of public funds being used are in the form of loans and leases rather than subsidies and grants.

Table 21. Leverage Ratio of Private to Public Funds by Sector

Leverage Ratio of Public to Private Funds by Sector	2012	2013	2014	2015	Grand Total
Commercial & Industrial[16]	n/a	0.2:1	1.2:1	0.2:1	0.4:1
Institutional	n/a	n/a	0.6:1	2.8:1	2.3:1
Residential	n/a	0.3:1	2.1:1	3.0:1	2.9:1
Statutory & Infrastructure	2.1:1	5.1:1	3.5:1	5.5:1	4.6:1
Total	**2.1:1**	**4.7:1**	**2.9:1**	**2.8:1**	**3:1**

[16] Leverage ratio does not reflect private funding warehouse created in fiscal year 2016. Green Bank C-PACE assets will be transferred to this warehouse, shifting the leverage ratio towards private funding.

CONNECTICUT GREEN BANK

3. MEASURES OF SUCCESS – DEPLOY CAPITAL

Clean Energy Produced and Energy Saved

The Connecticut Green Bank's vision is to lead the green bank movement by accelerating private investment in clean energy deployment for Connecticut to achieve economic prosperity, create jobs, promote energy security, and address climate change. The Connecticut Green Bank tracks its progress towards this vision as "E3" metrics – Energy, Economic, and Environmental. The data below show the energy benefits in terms of capacity (megawatts [MW]), clean energy production (lifetime megawatt hours [MWh]), and annual energy savings (MMBTU) – see Tables 22 through 24.

Table 22. Installed Capacity (MW) of Clean Energy (FY 2012-2015)

MW	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	0.0	0.0	5.8	12.5	18.4
Closed	0.0	14.8	3.6	41.6	60.0
Completed	2.8	8.7	19.7	24.9	56.1
Total	**2.9**	**23.5**	**29.1**	**79.0**	**134.5**

Table 23. Lifetime Production (MWh) of Clean Energy (FY 2012-2015)

MWh (lifetime)	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	964	107	606,849	623,377	1,231,297
Closed	411	1,166,832	369,193	987,773	2,524,210
Completed	67,095	270,775	467,664	592,271	1,397,805
Total	**68,470**	**1,437,714**	**1,443,707**	**2,203,422**	**5,153,313**

Table 24. Annual Energy Savings (MMBtu) of Clean Energy (FY 2012-2015)

MMBTU (annual)	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	132	15	257,965	481,481	739,592
Closed	56	0	145,003	133,091	278,150
Completed	9,157	60,171	92,600	95,436	257,364
Total	**9,345**	**60,186**	**495,568**	**710,008**	**1,275,106**

Renewable Energy Technology Deployment

The Connecticut Green Bank takes a technology agnostic approach to its financing products, with any commercially available technology that meets eligibility guidelines (see Table 25).

Table 25. Renewable Energy Technology Deployment (FY 2012-2015)

RENEWABLE ENERGY TECHNOLOGY*	Residential Sector		Commercial & Industrial Sector		Institutional Sector		Statutory & Infrastructure Sector		Total	
	MW	MWh (lifetime)	MW	MWh (lifetime)	MW	MWh (lifetime)	MW	MWh (lifetime)	MW	MWh (lifetime)
Anaerobic Digesters	0.0	0	0.0	0	0.0	0	8.8	920,851	8.8	920,851
Biomass	0.0	0	0.6	14,257	0.0	0	0.0	0	0.6	14,257
CHP	0.0	0	0.1	1,782	0.0	0	4.6	538,674	4.6	540,456
Fuel Cell	0.0	0	0.0	0	0.0	0	14.8	1,166,832	14.8	1,166,832
Hydro	0.0	0	0.5	12,594	0.0	0	0.0	0	0.5	12,594
Solar PV	14.8	352,678	12.1	286,834	2.1	49,613	83.8	1,991,097	100.2**	2,380,063
Wind	0.0	0	0.0	0	0.0	0	5.0	118,260	5.0	118,260
Total	**14.8**	**352,678**	**13.3**	**315,466**	**2.1**	**49,613**	**104.3**	**4,435,555**	**134.5**	**5,153,313**

**approved/closed/completed in FY2012 - FY2015*
***Residential solar projects that receive financing also receive an incentive under the Residential Solar Incentive Program so they are counted in each sector's results. They have been removed from the total to avoid double counting.*

The Connecticut Green Bank's efforts have led to a significant amount of solar PV deployment in the state (75% of all green energy projects deployed is from solar PV). When comparing deployment to green energy production, solar PV produces the most energy (45% of all green energy production), fuel cells also contribute a large proportion given the efficiency of the technology (nearly 25% of all green energy production).

Assets – Current and Non-Current

The Connecticut Green Bank's success in shifting to a financing model from a subsidy model is evident in the change in assets since its inception. The growth of the Green Bank's financing programs has led to a steady increase in non-current assets over time as more and more loans and leases are closed.

Table 26: Current and Non-Current Assets (FY 2013-2015)

	June 30,			
	2012	2013	2014	2015
Current Assets				
Cash and Cash Equivalents	$ 64,672,910	$ 68,105,014	$ 71,411,034	$ 39,893,649
Receivables	3,305,301	4,545,661	8,253,318	2,867,233
Prepaid Expenses	350,302	194,056	160,756	600,048
Contractor Loans	--	--	--	3,112,663
Current portion of solar lease notes	670,645	704,032	766,086	803,573
Current portion of program loans	--	--	652,447	1,631,012
Total Current Assets	68,999,158	73,548,763	81,243,641	48,908,178
Non-Current Assets				
Portfolio Investments	2,155,525	1,000,000	1,000,000	1,000,000
Bonds Receivable	--	--	1,600,000	1,600,000
Solar Lease Notes - Less current portion	11,064,879	10,536,136	9,778,315	9,015,437
Program Loans - Less current portion	--	3,788,094	12,750,457	38,886,932
Renewable Energy Certificates	1,324,614	1,217,491	1,069,390	933,054
Deferred Financing Fees, net	--	326,758	458,883	430,203
Capital Assets, Net of Depreciation and Amortization	91,329	362,505	3,074,337	26,971,087
Asset retirement obligation, net	--	--	--	1,029,196
Restricted Assets:				
Cash and Cash Equivalents	8,540,684	9,536,656	9,513,715	8,799,005
Total Non-Current Assets	23,177,031	26,767,640	39,245,097	88,664,914
Total Assets	$ 92,176,189	$ 100,316,403	$ 120,488,738	$ 137,573,092

Ratio of Public Funds Invested

As the first Green Bank in the country, the Connecticut Green Bank seeks to use limited public resources to attract private capital investment in clean energy. The Connecticut Green Bank does this by moving away from the subsidy-based model of supporting clean energy and towards a financing model. As highlighted below (see Table 27), the Connecticut Green Bank has quickly moved towards this model, with fewer and fewer funds devoted to subsidies. This trend has developed even as total investment in clean energy has increased to over $660 million in total from 2012 through 2015, enabling the Connecticut Green Bank to do more at a faster pace while managing ratepayer resources more efficiently.

CONNECTICUT GREEN BANK

3. MEASURES OF SUCCESS – GREEN BANK

Table 27. Ratio of Capital Invested as Subsidies, Credit Enhancements, and Loans and Leases (FY 2012-2015)

GREEN BANK FUNDS INVESTED*	2012	2013	2014	2015	Grand Total
Subsidies *(Grants)*	$4,818,389	$12,515,416	$21,350,737	$37,432,650	$76,117,191
% Green Bank Funds Invested in Subsidies	100%	64%	37%	38%	42%
Credit Enhancements *(LLR & IRBS)*	$0	$184,611	$223,139	$3,277,132	$3,684,882
% Green Bank Funds Invested in Credit Enhancements	0%	1%	0%	3%	2%
Loans and Leases *(includes sell downs)*	$0	$6,851,534	$36,365,882	$57,761,257	$100,978,673
% Green Bank Funds Invested in Loans and Leases	0%	35%	63%	59%	56%
Total	$4,818,389	$19,551,561	$57,939,758	$98,471,039	$180,780,746

** Approved/Closed/Completed in FY2012 – FY2015*

Credit Quality of Residential Borrowers

The credit quality of Green Bank's residential borrowers reflects the relatively high FICO scores in the state; 78% of single family house households have a FICO of 680 or higher. The Green Bank has recently begun to focus on ensuring that credit challenged customers have access to energy financing products through such initiatives as its partnership with Posigen and bringing the Connecticut Housing Investment Fund, which has experience serving this market, into the Smart-E program.

Table 28. Credit Quality of Residential Borrowers by product (FY 2012-2015)

Fiscal Year 2012 – 2015 Loans/Leases Closed or Approved	Credit Score Ranges				
	Below 640	640-679	680-719	720+	Grand Total
Smart-E	3	42	74	391	510
Solar Lease	4	60	135	1,149	1,349
Solar Loan	0	0	37	242	279
Grand Total	**7**	**102**	**246**	**1,782**	**2,137**
	0%	**5%**	**12%**	**83%**	

3. MEASURES OF SUCCESS – PUBLIC BENEFITS

Jobs Created

The Connecticut Green Bank's vision is to lead the green bank movement by accelerating private investment in clean energy deployment for Connecticut to achieve economic prosperity, create jobs, promote energy security, and address climate change. The Connecticut Green Bank tracks its progress towards this vision as "E3" metrics – Energy, Economic, and Environmental. The data below highlights the economic benefits of the Connecticut Green Bank's projects (see Tables 29 through 30). Investment represents the total amount of private and public funding for clean energy projects and direct and indirect and induced jobs quantifies the resulting job creation[17].

Table 29. Direct Job-Years Created (FY 2012-2015)

Direct Jobs	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	1	0	2	240	243
Closed	0	340	61	935	1,336
Completed	87	238	543	645	1,513
Total	**88**	**578**	**605**	**1,820**	**3,092**

Table 30. Indirect and Induced Job-Years Created (FY 2012-2015)

Indirect & Induced Jobs	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	2	0	3	384	389
Closed	1	779	97	1,505	2,381
Completed	139	383	873	1,038	2,433
Total	**142**	**1,162**	**973**	**2,926**	**5,203**

[17] Jobs estimates are based on multipliers determined as a result of work performed by Navigant Consulting for the Connecticut Renewable Energy and Energy Efficiency Economy Baseline Study completed in March 2009 and subsequently updated in 2010. This Navigant Study was an independent, third party analysis of Connecticut's clean energy economy. Data were acquired as a result of primary research. Navigant performed a census of over 300 companies, institutions, and organizations identified as active players in Connecticut's renewable energy and energy efficiency economy. Seventy-four (74) key renewable energy and energy efficiency companies were interviewed; 95 additional key companies were researched in detail. All renewable companies in Connecticut were identified and analyzed. Key energy efficiency companies were identified and analyzed, with the overall market size estimated by extrapolation. Company interviews included questions about customers, supply chain, number of jobs, corresponding salaries, and revenue. Detailed interview questionnaires are available in the Methodology section of the Baseline Study, pages 58-81.

http://www.ctcleanenergy.com/Portals/0/Phase%201%20Deliverable%20Final%20Full.pdf

DECD has approved of the methodology for estimating the economic development benefits (i.e., job-years created) from the investment in clean energy projects.

http://ctcleanenergy.com/Portals/0/board-materials/4_DECD%20Findings_Economic%20Development%20Estimates_FY%202013%20Results_CEFIA_121613.pdf

3. MEASURES OF SUCCESS – PUBLIC BENEFITS

CO2 Emission Reductions and Equivalencies

The data below highlight the environmental benefits of these projects as a reduction in carbon (CO2) emissions and standard equivalencies[18] (see Tables 31 through 34).

Table 31. Lifetime CO2 Emissions Reductions (FY 2012-2015)

Lifetime CO2 Emission Reductions (Tons)	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	500	55	704	106,360	107,619
Closed	213	78,761	7,473	512,279	598,726
Completed	34,789	98,394	242,484	307,093	682,760
Total	**35,502**	**177,210**	**250,661**	**925,732**	**1,389,105**

[18] All emissions reductions from renewable energy projects are determined using ISO-New England information, because that is where the energy will be displaced. This produces results that may be significantly different from emissions savings based on a comparison to national averages. In addition, the generation characteristics of each technology have an impact on the emissions reduction that can be expected. Solar-powered systems will produce only during the daylight hours, which normally coincide with the peak demand period for the utilities. The generating fleet during this time may include peaking plants and reserve plants, which will have lower efficiencies than the "baseload" plants which run 24 hours per day. Consequently, emissions are higher, and the renewable energy systems look better by comparison. The calculations are based on the results of the 2007 New England Marginal Emission Rate Analysis (http://www.iso-ne.com/genrtion_resrcs/reports/emission/2007_mea_report.pdf). The appropriate marginal emissions rates for Connecticut are used to determine the net avoided emissions for each of the technologies evaluated.

a. PV systems are analyzed using the average of the Marginal Emission Rates (in Lbs/MWh) for "On-Peak Ozone Season" and "On-Peak Non-Ozone Season". The underlying assumptions are that PV systems will be operating primarily during the on-peak periods, and that their output in the five months of the "Ozone Season" (May – September) is about the same as in the seven months of the "Non-Ozone Season."
b. Fuel cells are also evaluated using the "Annual Average (all hours) Marginal Emission Rates", because they are expected to produce power continually as "base load" generators. Fuel Cell emissions assume that 50% of the thermal output ("waste heat") is used to displace natural gas used for heating. This is conservative, since 50% thermal utilization is the minimum standard for CCEF's acceptance of a fuel cell project.

Emissions estimates for anaerobic digester, wind, and energy efficiency projects were not estimated.

To determine the exact avoided CO2 for CHP projects one needs to know what the CHP system is displacing (i.e. boiler, grid, etc.), as well as the efficiencies, in order to determine the existing CO2 emissions and then do the calculation to get the avoided emissions. For general purposes a typical 3.7 MW system operating on natural gas would generate about 13,000 tons of CO2 annually and 195,000 tons over its 15-year life. Typically avoiding 35-50% CO2 overall from the existing infrastructure. Not factoring in the utility transmission and distribution losses.

It should be noted that a methodology for estimating the environmental protection benefits from the investment in clean energy projects (i.e., GHG emissions reduced) has not yet been proposed to or approved by DEEP. The Connecticut Green Bank is currently looking into the EPA's AVERT (Avoided Emissions and Generation Tool) for future estimations of emissions reductions - http://www3.epa.gov/avert/

Table 32. Lifetime CO2 Emissions Reduction Energy for Home Equivalents (FY 2012-2015)

Energy for # of Homes	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	5	1	6	977	989
Closed	2	1,311	69	4,141	5,523
Completed	319	904	2,227	2,820	6,270
Total	**326**	**2,216**	**2,302**	**7,938**	**12,782**

Table 33. Lifetime CO2 Emissions Reduction Cars Off the Road Equivalents (FY 2012-2015)

Cars off the Road	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	3	0	5	715	724
Closed	1	2,625	51	3,004	5,682
Completed	232	655	1,615	2,045	4,547
Total	**236**	**3,281**	**1,671**	**5,765**	**10,953**

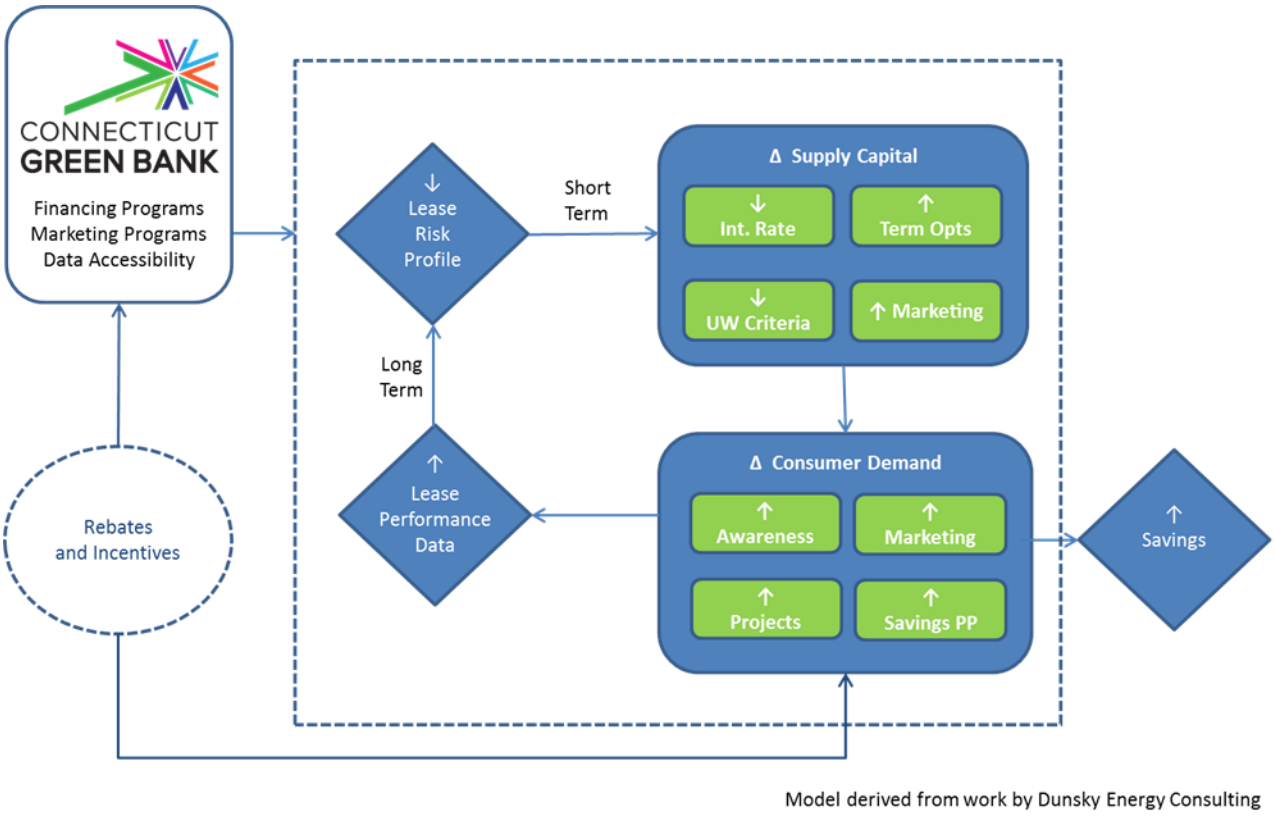
Table 34. Lifetime CO2 Emissions Reduction Acres of Trees Planted Equivalents (FY 2012-2015)

Planting # Acres of Trees	FY 2012	FY 2013	FY 2014	FY 2015	Total
Approved	7	1	9	1,418	1,435
Closed	3	340	100	6,011	6,454
Completed	464	1,312	3,233	4,095	9,104
Total	**474**	**1,653**	**3,342**	**11,524**	**16,993**

4. MARKET TRANSFORMATION – PROGRAM LOGIC MODEL

The Connecticut Green Bank has developed, based on work by Dunsky Energy Consulting, a Program Logic Model (PLM) that presents the green bank model of attracting and deploying private capital through financing (see Figure 7). This PLM serves as a foundation for evaluating clean energy deployment through subsidy and financing programs of the Connecticut Green Bank.

Figure 7. Connecticut Green Bank Program Logic Model – Including Subsidies and Financing



In the green bank model, to support the acquisition of green energy, program administrators use their resources to support or create financing programs that deliver up to 100% upfront capital for the project with an immediate or nearly immediate cash flow positive position for the customer. The Green Bank can enter the Financing Model (the dotted line box) at any point:

- Creating and/or applying credit enhancements (e.g., loan loss reserves) to reduce the risk profile of financed projects
- Increasing the supply of capital by attracting and/or directly deploying affordable private capital into the market
- Increasing consumer demand by deploying innovative marketing programs to accelerate the uptake of financing programs.
- Providing accessibility to clean energy loan performance data (i.e. repayment status, delinquencies, and/or defaults) that improves understanding of associated risk-return profiles.

4. MARKET TRANSFORMATION – PROGRAM LOGIC MODEL

For example, early in the C-PACE program, the Green Bank began to directly provide up front capital to increase the number of transactions. As another example, through Solarize Connecticut, the Green Bank has played an active role in marketing. The volume of loans and leases for residential solar PV in Connecticut saw a dramatic increase as consumers were made more aware of the accessibility and affordability of the financing programs.

Over time, the Green Bank's activities in support of the market actors should improve understanding of clean energy finance and lead to an increased supply of capital into the market. This should encourage lending offerings that are more accessible and affordable to more customers through lower interest rates, different term options, flexible underwriting, and increased marketing activity to their customers.

In the long term, it is anticipated that the market will become less reliant on subsidies and become more focused on financed energy improvements that reduce net operating costs or are immediately cash flow positive (i.e., a reduction in energy costs by ensuring that debt service payments are less than energy savings).
The figure above presents an overview of the developing Program Logic Model of the Connecticut Green Bank. It will be used as an evaluation framework with associated indicators for assessing the performance and value of its programs (i.e., metrics of success outlined in the Comprehensive Plan).

The Program Logic Model will be used to plan, implement, monitor, and report on the Connecticut Green Bank's progress towards the achievement of its goals, including:

- Attracting and deploying capital to finance the clean energy goals for Connecticut;
- Developing and implementing strategies that bring down the cost of clean energy in order to make it more accessible and affordable to consumers; and
- Reducing the market reliance on grants, rebates, and other subsidies and move towards innovative low-cost financing of clean energy deployment.

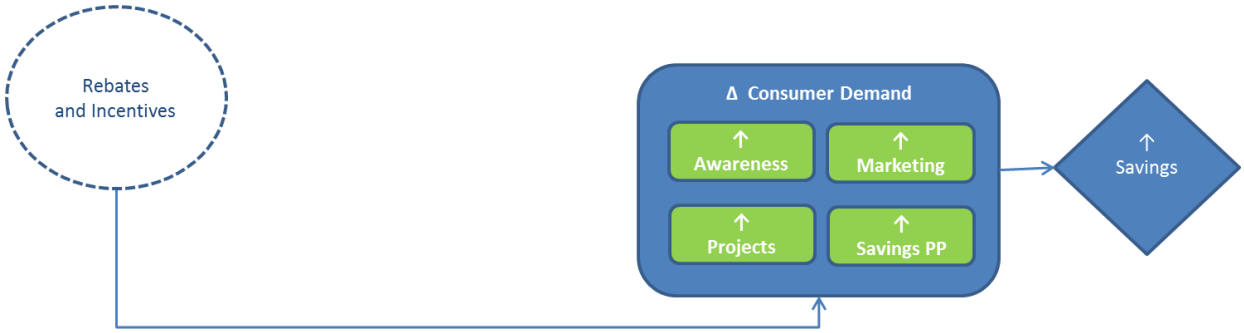
The Program Logic Model will test assumptions to help improve program implementation by assessing causal links between program activities and expected outputs and outcomes. It will help facilitate communication and coordination with the program administrators of the Connecticut Energy Efficiency Fund (i.e., electric and natural gas distribution companies) by developing information to help optimize the subsidy-financing balance. It will also support reporting to other internal and external stakeholders of the Connecticut Green Bank.

CONNECTICUT GREEN BANK

4. MARKET TRANSFORMATION – COST EFFECTIVENESS OF SUBSIDIES CASE OF THE RESIDENTIAL SOLAR INVESTMENT PROGRAM

The Connecticut Green Bank contracted with Cadmus Group, Inc., to conduct a cost-effectiveness analysis of its Residential Solar Investment Program (RSIP).[19] As the Connecticut Green Bank's only subsidy program, we are applying the Program Logic Model that focuses on rebates and incentives as the financial driver for customer action rather than financing (see Figure 8).

Figure 8. Program Logic Model for the Residential Solar Investment Program



RSIP Growth and Cost Trends

To provide perspective on program growth, cost and incentive trends, Table 35 illustrates the increase in RSIP project volume while installed costs and incentives have decreased from fiscal years 2012 through 2015, grouped by non-Solarize projects, Solarize[20] projects and RSIP in total.

Table 35. RSIP Volume, Capacity and Cost Data by Fiscal Year[21]

	Non-Solarize				Solarize				RSIP Total			
Fiscal Year	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)
2012	418	2,882	5.30	1.70					418	2,882	5.30	1.70
2013	788	5,486	4.69	1.48	327	2,444	3.82	1.48	1,115	7,930	4.35	1.48
2014	1,679	12,136	4.33	1.19	723	5,118	3.85	1.20	2,402	17,253	4.12	1.19
2015	6,252	46,867	3.92	0.69	1,051	8,864	3.89	0.77	7,303	55,731	3.91	0.71
Total	**9,137**	**67,370**	**4.18**	**0.94**	**2,101**	**16,425**	**3.87**	**1.03**	**11,238**	**83,795**	**4.08**	**0.96**

[19] Per Section 106 of Public Act 11-80 (and revised through Public Act 15-194), the Connecticut Green Bank administers the Residential Solar Investment Program.

[20] Solarize is a community-based marketing program (visit www.solarizect.com for more information)

[21] Based on RSIP Market Watch data as of June 30, 2015, end of FY 2015. Cost data includes all reported installed costs without including those projects where financing costs for some third party ownership installers are included as part of the total system cost. Installed capacity data is provided in kW-STC. At the end of FY 2015, RSIP was partway through incentive Step 7.

CONNECTICUT GREEN BANK

4. MARKET TRANSFORMATION – COST EFFECTIVENESS OF SUBSIDIES CASE OF THE RESIDENTIAL SOLAR INVESTMENT PROGRAM

Tables 36, 37 and 38 provide program growth and cost trend data by installer for fiscal years 2015 and for 2012-2015 combined, grouped by non-Solarize and Solarize projects, and RSIP in total. Data points provided include # Projects, Installed Capacity (kW), Installed Cost ($/W), and Incentive ($/W). Installed costs vary widely and depend on many factors including equipment/panel quality and efficiency, type of installation (e.g., roof-mount, ground-mount, pole-mount), project location, site and installation characteristics and other factors.

Table 36. RSIP FY 2015 Volume, Capacity and Cost Data by Installer[22]

FY 2015	Non-Solarize				Solarize				RSIP Total			
Installer	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)
31Solar	11	77	3.85	0.99					11	77	3.85	0.99
A Better Way Solar	1	10	3.37	0.59					1	10	3.37	0.59
Aegis Electrical Systems, LLC	163	1,328	4.10	0.67					163	1,328	4.10	0.67
AllGreenIT, Inc.	28	258	3.56	0.65	105	819	3.51	0.88	133	1,077	3.52	0.83
Apex Solar Energy	2	11	3.56	0.78					2	11	3.56	0.78
Atlantic Solar	1	6	4.41	1.11					1	6	4.41	1.11
BeFree Green Energy, LLC	52	485	3.83	0.67	264	2,430	3.68	0.80	316	2,915	3.71	0.78
Bonner Electric	7	63	3.95	0.77					7	63	3.95	0.77
Boston Solar	13	116	3.75	0.47					13	116	3.75	0.47
Burrington Solar Edge	1	6	3.88	0.72					1	6	3.88	0.72
CatchinRays 2 LLC	41	327	4.03	0.69					41	327	4.03	0.69
Centurion Solar	5	29	3.99	0.76					5	29	3.99	0.76
Chabot Electric	1	6	3.09	0.59					1	6	3.09	0.59
Connecticut Solar Electric, LLC	1	6	3.42	0.71					1	6	3.42	0.71
Consulting Engineering Services, Inc.	3	20	3.21	0.83					3	20	3.21	0.83
CS Energy Systems, Inc.	2	26	3.77	0.78					2	26	3.77	0.78
CT Electrical, LLC	4	24	6.28	0.66					4	24	6.28	0.66
CT Solar Power, LLC	5	39	3.89	0.75					5	39	3.89	0.75
C-TEC Solar LLC	131	1,070	4.19	0.74	217	1,752	4.09	0.69	348	2,822	4.13	0.71
DCS	3	25	3.83	0.82	1	7	3.50	0.61	4	32	3.75	0.77
Direct Energy Solar	230	1,979	3.84	0.67	35	311	3.69	0.74	265	2,290	3.82	0.68
Dow Solar	1	5	9.87	0.64					1	5	9.87	0.64
Earthlight Technologies	59	525	4.26	0.68	53	437	4.03	0.86	112	962	4.15	0.77
Eastern CT Solar	2	21	3.43	0.65					2	21	3.43	0.65
Encon, Inc.	48	388	4.29	0.90	144	1,059	4.08	0.70	192	1,447	4.13	0.75
Evergreen Energy, LLC	8	61	3.68	0.72	1	9	3.48	0.61	9	70	3.66	0.71

[22] Based on RSIP Market Watch data as of June 30, 2015. Cost data includes all reported installed costs without including those projects where financing costs for some third party ownership installers are included as part of the total system cost. Installed capacity data is provided in kW-STC. At the end of FY 2015, RSIP was partway through incentive Step 7.

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FY 2015	Non-Solarize				Solarize				RSIP Total			
Installer	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)
Giuffrida Electric Company, Inc.	1	3	5.19	0.80					1	3	5.19	0.80
GM Industries, Inc.	2	25	7.40	0.85					2	25	7.40	0.85
Green Earth Energy	5	43	4.34	0.60					5	43	4.34	0.60
Harness the Sun	3	26	3.58	0.65	1	8	3.75	0.97	4	34	3.63	0.73
Intina Energy	2	16	3.58	0.99					2	16	3.58	0.99
JD Solar Solutions, LLC	53	454	3.64	0.77					53	454	3.64	0.77
Litchfield Hills Solar, LLC	26	214	4.33	0.73					26	214	4.33	0.73
Made in USA Solar LLC	3	27	5.08	0.87					3	27	5.08	0.87
Modern Solar Company	1	10	4.51	0.93					1	10	4.51	0.93
Next Step Living	109	683	6.40	0.80					109	683	6.40	0.80
Northeast Smart Energy LLC	1	22	3.70	0.55					1	22	3.70	0.55
PosiGen	58	369	4.55	0.81					58	369	4.55	0.81
PurePoint Energy, LLC	36	295	4.80	0.76	19	165	4.62	0.54	55	459	4.74	0.69
R. Pelton Builders	22	186	3.87	0.72					22	186	3.87	0.72
Real Goods Solar, Inc	86	666	4.08	0.81	57	423	3.67	1.03	143	1,089	3.91	0.90
Roof Diagnostics Solar and Electric of CT	600	4,179	3.51	0.60					600	4,179	3.51	0.60
Ross Solar Group	120	1,218	4.18	0.73	110	1,116	4.05	0.70	230	2,335	4.12	0.71
Shippee Solar and Construction LLC	37	314	3.61	0.71	14	113	3.94	0.61	51	426	3.70	0.68
Skyline Solar	9	70	4.56	0.67					9	70	4.56	0.67
SolarCity	3,055	22,139	5.21	0.64	5	29	5.18	0.57	3,060	22,168	5.21	0.64
Summer Hill Solar	6	43	3.00	0.93					6	43	3.00	0.93
Sundoor Solar	1	11	4.00	0.72					1	11	4.00	0.72
Sungevity, Inc.	318	2,402	4.06	0.75					318	2,402	4.06	0.75
Sunlight Solar Energy, Inc.	64	515	4.13	0.68	24	180	3.99	0.82	88	695	4.09	0.72
Sun-Wind Solutions, LLC	6	60	3.72	0.73					6	60	3.72	0.73
Super Green Solutions	8	70	3.64	0.62					8	70	3.64	0.62
Today Electronics USA	1	9	3.82	0.74					1	9	3.82	0.74
Trinity Solar	724	5,379	3.55	0.65					724	5,379	3.55	0.65
Tuscany Design Build, Inc.	2	15	4.27	0.40					2	15	4.27	0.40
US Energy Concierge	13	72	4.40	0.93					13	72	4.40	0.93
Verengo Solar	44	335	3.68	1.06					44	335	3.68	1.06
Waldo Renewable Electric, LLC	13	87	4.38	0.72	1	6	3.82	0.49	14	93	4.34	0.70
FY 2015 Total	**6,252**	**46,867**	**4.55**	**0.67**	**1,051**	**8,864**	**3.89**	**0.77**	**7,303**	**55,731**	**4.46**	**0.68**

4. MARKET TRANSFORMATION – COST EFFECTIVENESS OF SUBSIDIES CASE OF THE RESIDENTIAL SOLAR INVESTMENT PROGRAM

Table 37. RSIP FY 2012-2015 Volume, Capacity and Cost Data by Installer[23]

FY 2012 - 2015	Non-Solarize				Solarize				RSIP Total			
Installer	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)
31Solar	25	191	3.96	1.06					25	191	3.96	1.06
A Better Way Solar	1	10	3.37	0.59					1	10	3.37	0.59
Aegis Electrical Systems, LLC	294	2,280	4.30	0.95					294	2,280	4.30	0.95
All Electric Const. & Comm. LLC	2	18	3.74	0.84					2	18	3.74	0.84
AllGreenIT, Inc.	60	488	3.84	1.04	140	1,114	3.55	0.95	200	1,602	3.63	0.98
Alteris, Inc.	1	5	3.00	1.05					1	5	3.00	1.05
American Solar Partners	3	16	3.55	1.74					3	16	3.55	1.74
Apex Solar Energy	3	15	3.49	0.90					3	15	3.49	0.90
Atlantic Solar	1	6	4.41	1.11					1	6	4.41	1.11
BeFree Green Energy, LLC	90	788	4.32	1.04	387	3,464	3.73	1.03	477	4,252	3.84	1.03
Bella Casa Verde	2	15	4.37	1.13					2	15	4.37	1.13
Bonner Electric	13	117	4.11	1.01					13	117	4.11	1.01
Boston Solar	13	116	3.75	0.47					13	116	3.75	0.47
Bright Side Solar, LLC	1	4	5.07	1.93					1	4	5.07	1.93
Burrington Solar Edge	1	6	3.88	0.72					1	6	3.88	0.72
CatchinRays 2 LLC	43	343	4.01	0.70					43	343	4.01	0.70
Centurion Solar	16	110	4.06	0.95	33	205	4.02	1.20	49	315	4.03	1.12
Chabot Electric	3	28	3.96	1.28					3	28	3.96	1.28
Connecticut Solar Electric, LLC	2	14	3.68	1.18					2	14	3.68	1.18
Consulting Engineering Services, Inc.	4	35	3.69	0.85					4	35	3.69	0.85
CS Energy Systems, Inc.	2	26	3.77	0.78					2	26	3.77	0.78
CT Electrical, LLC	27	183	5.86	1.42					27	183	5.86	1.42
CT Solar Power, LLC	17	148	4.44	0.98					17	148	4.44	0.98
C-TEC Solar LLC	220	1,668	4.27	0.98	433	3,057	4.00	0.96	653	4,725	4.09	0.97
Dawn Solar Systems, Inc.	1	11	5.99	1.09					1	11	5.99	1.09
DCS	34	185	4.14	1.65	1	7	3.50	0.61	35	192	4.12	1.62
Deak Electric, Inc.	2	16	5.20	1.03					2	16	5.20	1.03
Direct Energy Solar	314	2,672	3.94	0.87	203	1,644	3.55	1.13	517	4,316	3.79	0.97
Dow Solar	3	13	8.26	0.96					3	13	8.26	0.96
Earthlight Technologies	70	624	4.26	0.76	56	466	4.01	0.86	126	1,090	4.15	0.81
Eastern CT Solar	2	21	3.43	0.65					2	21	3.43	0.65
EcoSolar Installations, LLC	13	77	4.52	1.29					13	77	4.52	1.29

[23] Based on RSIP Market Watch data as of June 30, 2015. Cost data includes all reported installed costs without including those projects where financing costs for some third party ownership installers are included as part of the total system cost. Installed capacity data is provided in kW-STC. At the end of FY 2015, RSIP was partway through incentive Step 7.

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FY 2012 - 2015	Non-Solarize				Solarize				RSIP Total			
Installer	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)
Elektron Solar, LLC	9	74	4.97	1.48					9	74	4.97	1.48
Encon, Inc.	92	680	4.47	1.16	280	1,956	3.95	1.01	372	2,636	4.08	1.05
Endless Mountains Solar Services	10	74	4.94	1.41					10	74	4.94	1.41
Evergreen Energy, LLC	18	147	4.32	1.19	1	9	3.48	0.61	19	156	4.27	1.16
Executive Electric	1	7	3.91	1.37					1	7	3.91	1.37
Giuffrida Electric Company, Inc.	5	30	5.42	1.38					5	30	5.42	1.38
GM Industries, Inc.	29	278	8.34	1.41					29	278	8.34	1.41
Green Earth Energy	10	76	4.42	0.99					10	76	4.42	0.99
Harness the Sun	17	106	4.13	1.37	22	194	3.75	1.11	39	300	3.92	1.22
Infinite Energy Systems	1	11	5.38	1.52					1	11	5.38	1.52
Intina Energy	3	22	3.95	1.18					3	22	3.95	1.18
JD Solar Solutions, LLC	111	879	3.82	1.04					111	879	3.82	1.04
Leach Services	2	12	3.69	1.54					2	12	3.69	1.54
Lenz Electric	1	4	5.71	1.96					1	4	5.71	1.96
Litchfield Hills Solar, LLC	68	498	4.76	1.18					68	498	4.76	1.18
Macri Roofing, Inc.	2	13	5.91	1.53					2	13	5.91	1.53
Made in USA Solar LLC	11	79	4.67	1.32					11	79	4.67	1.32
Mercury Solar Systems, Inc.	5	37	5.18	1.53					5	37	5.18	1.53
Mister Sparky	7	26	5.89	1.81					7	26	5.89	1.81
Modern Solar Company	4	27	5.03	1.59					4	27	5.03	1.59
Moore Energy	4	27	5.05	1.67					4	27	5.05	1.67
Mystic Solar	7	54	5.36	1.67					7	54	5.36	1.67
Next Step Living	138	855	6.40	0.88					138	855	6.40	0.88
Northeast Smart Energy LLC	14	123	3.50	1.31					14	123	3.50	1.31
Paradise Energy Solutions	1	10	4.08	0.60					1	10	4.08	0.60
PosiGen	58	369	4.55	0.81					58	369	4.55	0.81
PurePoint Energy, LLC	67	533	4.94	0.97	19	165	4.62	0.54	86	697	4.87	0.88
R. Pelton Builders	57	409	4.24	1.18					57	409	4.24	1.18
Real Goods Solar, Inc	189	1,430	4.29	1.14	147	1,068	3.78	1.27	336	2,498	4.07	1.20
Renewable Resources, Inc.	21	130	4.18	1.48	13	76	3.86	1.28	34	205	4.06	1.40
Roof Diagnostics Solar and Electric of CT	674	4,702	3.57	0.68					674	4,702	3.57	0.68
Ross Solar Group	297	2,693	4.41	1.13	263	2,236	4.09	1.02	560	4,929	4.26	1.08
Shippee Solar and Construction LLC	103	783	3.72	1.16	14	113	3.94	0.61	117	896	3.75	1.09
Sicuranza Electric	1	10	6.42	1.54					1	10	6.42	1.54
Sky View Solar	1	5	6.03	1.37					1	5	6.03	1.37
Skyline Solar	30	243	4.38	0.95					30	243	4.38	0.95

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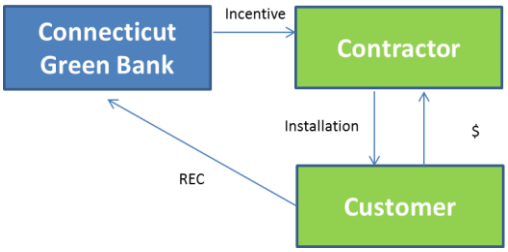
FY 2012 - 2015	Non-Solarize				Solarize				RSIP Total			
Installer	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)	# Projects	Installed Capacity (kW)	Installed Cost ($/W)	Incentive ($/W)
SolarCity	4,153	29,620	5.14	0.84	5	29	5.18	0.57	4,158	29,649	5.14	0.84
Solatek	1	10	0.00	2.10					1	10	0.00	2.10
SON Energy Systems, LLC	1	7	4.25	1.34					1	7	4.25	1.34
Sound Solar Systems, LLC	7	64	5.18	1.34					7	64	5.18	1.34
Summer Hill Solar	15	96	3.48	1.32					15	96	3.48	1.32
Sun Harvest Renewable Resources, LLC	11	82	6.08	1.63					11	82	6.08	1.63
Sundoor Solar	2	14	4.00	1.06					2	14	4.00	1.06
Sungevity, Inc.	448	3,303	4.24	0.91					448	3,303	4.24	0.91
Sunlight Solar Energy, Inc.	172	1,236	4.70	1.18	83	616	3.90	1.10	255	1,853	4.44	1.15
Sun-Wind Solutions, LLC	16	124	3.71	1.13					16	124	3.71	1.13
Super Green Solutions	8	70	3.64	0.62					8	70	3.64	0.62
Today Electronics USA	1	9	3.82	0.74					1	9	3.82	0.74
Trinity Solar	827	6,141	3.62	0.72					827	6,141	3.62	0.72
Tuscany Design Build, Inc.	8	65	5.07	1.19					8	65	5.07	1.19
US Energy Concierge	13	72	4.40	0.93					13	72	4.40	0.93
Verengo Solar	44	335	3.68	1.06					44	335	3.68	1.06
Waldo Renewable Electric, LLC	42	305	5.17	1.29	1	6	3.82	0.49	43	311	5.14	1.27
White Oak Development, LLC	16	102	6.27	1.51					16	102	6.27	1.51
Zelek Electric	1	12	0.00	0.47					1	12	0.00	0.47
FY 2012-2015 Total	**9,137**	**67,370**	**4.61**	**0.89**	**2,101**	**16,425**	**3.87**	**1.03**	**11,238**	**83,795**	**4.47**	**0.92**

Rebates and Incentives

The RSIP is a subsidy program that provides incentives to offset the cost for homeowners to install solar photovoltaic (PV) systems. Incentives are provided either upfront (i.e., through an expected performance based buy-down or EPBB) for homeowners that want to own a system or over time based on system production (i.e., through a performance based incentive or PBI) for homeowners who want to lease a system from a third-party owner. With either incentive type, the Renewable Energy Credits (RECs) are owned by the Connecticut Green Bank (see Figure 9).

Figure 9. Legal Structure and Flows of Capital for the RSIP[24]



The subsidy under the RSIP has decreased over time (see Table 38) with the intention of increasing the number of projects and increasing the amount of clean energy produced (see Table 39) while at the same time supporting the goal of reducing the market reliance on rebates and incentives and moving it towards innovative low-cost financing (see Market Transformation: Financial Warehouse and Credit Enhancement Structures for CT Solar Loan and CT Solar Lease). Step 1 began in March of 2012 and Step 7 was recently completed in August of 2015.

Table 38. RSIP Subsidy by Step and Incentive Type

RSIP Subsidy by Step	Start Date	EPBB ($/W)			PBI ($/kWh)	
		≤5 kW	5 to 10 kW	>10 kW, ≤ 20 kW	≤10 kW	>10 kW, ≤ 20 kW
Step 1	3/2/2012	$2.450	$1.250	$0.000	$0.300	$0.000
Step 2	5/8/2012	$2.275	$1.075	$0.000	$0.300	$0.000
Step 3	1/4/2013 EPBB 4/1/2013 PBI	$1.750	$0.550	$0.000	$0.225	$0.000
Step 4	1/6/2014	$1.250	$0.750	$0.000	$0.180	$0.000
Step 5	9/1/2014	$0.800		$0.400	$0.125	$0.060
Step 6	1/1/2015	$0.675		$0.400	$0.080	$0.060
Step 7	4/11/2015	$0.540		$0.400	$0.064	$0.060

[24] The Green Bank incentive is issued to the Contractor on behalf of the Customer. In the case of Third-Party Owned systems, RECs flow from the Contractor to the Connecticut Green Bank.

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Table 39. Residential Solar PV Systems Approved, In Progress or Completed through the RSIP Subsidy by Step[25]

RSIP Subsidy by Step	Approved (kW)	In Progress (kW)	Completed (kW)	Total (kW)	Average Incentive ($/W-STC)
Step 1		12	1,372	1,384	$1.84
Step 2			5,996	5,996	$1.67
Step 3	174	82	13,052	13,308	$1.27
Step 4	2,636	854	16,972	20,461	$1.06
Step 5	4,767	672	9,341	14,780	$0.76
Step 6	7,954	1,325	4,717	13,995	$0.52
Step 7	18,780	1,269	1,366	21,415	$0.40
Total	**34,311**	**4,214**	**52,816**	**91,340**	**$0.85**

Cost-Effectiveness of the RSIP

As required by statute, the Connecticut Green Bank was to conduct an evaluation of RSIP. The Green Bank hired Cadmus to evaluate the program – through the application of cost-effectiveness tests (see Tables 40, 41 and 42) as well as through the lens of the Connecticut Green Bank's objective function (CGB OF) (see Table 43).[26] Using the five standard cost-effectiveness tests adapted for energy efficiency programs, as defined in the California Standard Practices Manual[27]. Cadmus calculated the cost-effectiveness of RSIP from the following perspectives:[28]

- Total Resource Cost Test (TRC)
- Program Administrator Cost Test (PACT), also called the Utility Cost Test (UCT)
- Customer/Participant Cost Test (PCT)
- Ratepayer Impact Measure Test (RIM)
- Societal Cost Test (SCT)

[25] RSIP Step 7 ended August 7, 2015, a little over a month after the end of FY15. However, RSIP cost-effectiveness results were evaluated based on data as of August 12, 2015, after Step 7 closed. Table 39 provides RSIP numbers as of August 12, 2015 to show data upon which the cost-effectiveness results were based rather than RSIP numbers as of the end of FY15. Projects that were only in submitted status as of August 12, 2015 were not included in the cost-effectiveness analysis. As of October 16, 2015, Step 7 projects in approved and later statuses were 22.8 MW, so an additional 1.4 MW of Step 7 projects could be attributed to Step 7 as a net result of additional project approvals minus projects that were cancelled or withdrawn after August 12, 2015. For reference with respect to this CAFR, partial Step 7 numbers as of the end of FY15 were: 11,319 kW approved, 499 kW in progress, and 103 kW completed.

[26] "Cost-Effectiveness Assessment of the Residential Solar Investment Program," Shawn Shaw, P.E., Nicholas Drake-McLaughlin, M. Sami Khawaja, Ph.D., The Cadmus Group, anticipated January 2016.

[27] http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Cost-effectiveness.htm

[28] The Total Resource Cost Test (TRC) derives from the ratio of lifecycle benefits from energy savings or renewables programs over lifecycle total incremental costs (regardless of who pays them). The TRC determines whether a renewables or energy efficiency program proves more cost-effective than supplying energy through traditional generation-based methods. The benefits are composed primarily of the reduction in utility current and future costs in the form of reduced fuel expenses and deferred capital investments in generation and transmission and distribution. The Program Administrator Cost Test (PACT) assesses the value of renewable or energy efficiency offerings as resource options compared to the cost to the utility or the administrator. The benefits are similar to the TRC, but the costs are narrowly defined to be those of the administrator. The Participant Cost Test (PCT) measures cost-effectiveness from the customer's perspective with benefits primarily composed of bill reduction and the cost side composed of customer contribution to the cost of the measure. The Rate Payer Impact Test (RIM) is centered around the impact on utility rates; the benefits are similar to the TRC, but costs include program administrator and program incentive costs (as in PACT) plus utility lost revenues due to reduction in use of energy.

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Table 40 summarizes cost-effectiveness results for the five standard tests and the Green Bank's OF, for the RSIP overall and program steps 1 through 7, associated with steadily decreasing incentives. The Green Bank RSIP is cost-effective, producing significantly higher benefits than costs. RSIP passed all tests except the RIM which most programs including energy efficiency programs do not pass.[29] From a program perspective (PACT), RSIP delivers triple its investment, $3.05 in benefits for every dollar invested by the Green Bank. This was possible due to industry-wide hard and soft[30] costs falling for PV installations, increased access to financing, and a strong local solar industry that has fostered and supported increased demand despite declining state incentives.

Table 40. Cost-Effective Analysis of the RSIP by Step – Five Standard Tests

RSIP Subsidy Step	Clean Energy Deployed (MW)	TRC	PACT	PCT	RIM	SCT
Steps 1 & 2	7.4	1.44	1.50	1.72	0.40	1.64
Step 3	13.3	1.59	2.07	1.80	0.43	1.81
Step 4	20.5	1.70	2.63	1.83	0.45	1.78
Step 5	14.8	1.74	3.57	1.80	0.47	1.72
Step 6	14.0	1.76	5.16	1.80	0.49	1.76
Step 7	21.4	1.80	6.47	1.80	0.50	1.75
Overall	**91.3**	**1.70**	**3.05**	**1.80**	**0.46**	**1.75**

Table 41 highlights PACT values which increase over four-fold from 1.50 to 6.47 across steps 1 through 7, corresponding to steadily decreasing subsidies, while the PCT ratio stays relatively level. The Green Bank makes increasingly effective use of ratepayer funds to drive growth in the solar PV market while simultaneously reducing public subsidies and maintaining customer economics over the program's life. As the cost of solar falls and access to affordable private capital financing increases, the Green Bank converts these cost reductions and access to capital into reduced incentives, making public funds available to a larger number of projects –and reducing the market's reliance on incentives. Additionally, while the PACT ratio increases with decreasing subsidies and greater access to affordable financing, net benefits increase and net benefits on a per MW basis also increase.

[29] The RIM test accounts for lost utility revenue and assumes that the cost is redistributed among all ratepayers. More often than not, any measure that reduces the utility's sale of electricity will fail to pass the RIM test, regardless of societal or total resource cost-effectiveness.

[30] Through both the SunShot Initiative and Solarize Connecticut.

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Table 41. Cost-Effective Analysis of the RSIP by Step – Program Administrator Cost Test (PACT) and Participant Cost Test (PCT)

RSIP Subsidy Step	Benefits	Costs	Net Benefits	Net Benefits/ MW	Clean Energy Deployed (MW)	PACT Benefit/Cost Ratio	PCT Benefit/Cost Ratio
Steps 1 & 2	$18,646,724	$12,435,693	$6,211,031	$839,329	7.4	1.50	1.72
Step 3	$32,714,259	$15,784,621	$16,929,638	$1,272,905	13.3	2.07	1.80
Step 4	$47,901,194	$18,200,235	$29,700,959	$1,448,827	20.5	2.63	1.83
Step 5	$33,822,171	$9,467,372	$24,354,799	$1,645,594	14.8	3.57	1.80
Step 6	$31,078,515	$6,021,396	$25,057,119	$1,789,794	14.0	5.16	1.80
Step 7	$46,247,561	$7,148,375	$39,099,186	$1,827,065	21.4	6.47	1.57
Overall	**$210,410,423**	**$69,057,692**	**$141,352,731**	**$1,546,529**	**91.3**	**3.05**	**1.75**

As with the increasing PACT ratio, OF results (Table 42) demonstrate increasing cost-effectiveness of RSIP as incentives decrease, with the OF value increasing over four-fold from 18.1 at Step 1 to 83.9 for Step 7.

Table 42. Connecticut Green Bank Objective Function Values for RSIP by Step

CGB RSIP 2012-2015 Objective Function	Residential Solar PV Capacity (MW)	Lifetime kWh	Program Costs	Objective Function (kWh/$)
Steps 1 & 2	7.4	225,385,736	$12,435,693	18.1
Step 3	13.3	405,346,549	$15,784,621	25.7
Step 4	20.5	607,500,605	$18,200,235	33.4
Step 5	14.8	428,600,431	$9,467,372	45.3
Step 6	14.0	403,698,026	$6,021,396	67.0
Step 7	21.4	600,041,849	$7,148,375	83.9
Overall	**91.3**	**2,670,573,196**	**$69,057,692**	**38.7**

Cost-Effectiveness of the RSIP in Comparison to Energy Efficiency

In evaluating cost-effectiveness of RSIP, the program was compared to residential energy efficiency (EE) programs in Connecticut, with Cadmus utilizing as much as possible the same assumptions made in the assessment of the EE programs. The numbers in Table 43 below indicate that both the RSIP and the EE programs are cost-effective, with RSIP tending to have a lower Total Resource Cost (TRC) result but a higher Program Administrator Cost Test (PACT) number. With a 1.70 overall TRC ratio for the program, the RSIP proves less cost-effective than most residential energy efficiency programs, though it demonstrates better ratios from the program administrator perspective, with a PACT ratio of 3.05 for the program or 6.47 for recent performance of the program with lower incentives (i.e., RSIP step 7).[31]

[31] As provided in the 2016-2018 Electric and Natural Gas Conservation and Load Management (CL&M) plan filed with the Connecticut Department of Energy and Environmental Protection on October 1, 2015, available at http://www.energizect.com/about/eeboard/plans. The energy efficiency numbers are from Table B1, Eversource CT Electric – Costs and Benefits 2016. The PACT and the M-PACT in the above table correspond to the Electric Utility Cost Test and the Modified Utility Cost Test from the CL&M Plan. The electric utility cost test includes electric benefits and costs, while the modified utility cost test includes oil and propane savings and costs. The electric utility cost test is more relevant than is the PACT when comparing to solar PV benefits and costs but both EE tests are shown here to illustrate that the EE measures have non-electric impacts that can impact (usually increase) the ratios. The EE numbers shown here are from the 2016-2018 Electric and Natural Gas Conservation and Load Management (CL&M) plan filed with the Connecticut Department of Energy and

4. MARKET TRANSFORMATION – COST EFFECTIVENESS OF SUBSIDIES CASE OF THE RESIDENTIAL SOLAR INVESTMENT PROGRAM

Table 43. Comparison of Cost Effectiveness of the RSIP and Residential Energy Efficiency

Program, Year		Test	Benefits	Costs	Net Benefits	Ratio
RSIP	2012-2015 (Steps 1-7)	TRC	$618,994,562	$364,837,887	$254,156,675	1.70
		PACT	$210,410,423	$69,057,692	$141,352,731	3.05
	2015 Step 7	TRC	$145,277,194	$80,617,489	$64,659,705	1.80
		PACT	$46,247,561	$7,148,375	$39,099,186	6.47
EE 2016 Eversource	Residential Total	TRC	$186,853,379	$76,049,054	$110,804,325	2.46
		PACT	$89,622,927	$40,686,706	$48,936,221	2.20
		M-PACT	$133,786,974	$56,458,769	$77,328,205	2.37
	Residential Retail Products	TRC	$82,271,005	$24,792,006	$57,478,999	3.32
		PACT	$51,489,640	$13,622,165	$37,867,475	3.78
		M-PACT	$51,489,640	$13,622,165	$37,867,475	3.78
	Home Energy Solutions (HES)	TRC	$62,298,317	$19,090,656	$43,207,661	3.26
		PACT	$17,138,430	$9,467,560	$7,670,870	1.81
		M-PACT	$51,721,547	$17,965,248	$33,756,299	2.88
	HES HVAC	TRC	$5,794,248	$6,679,885	($885,637)	0.87
		PACT	$3,982,333	$2,000,000	$1,982,333	1.99
		M-PACT	$3,982,333	$2,000,000	$1,982,333	1.99
	HES Income Eligible	TRC	$22,914,543	$17,713,445	$5,201,098	1.29
		PACT	$8,853,029	$10,728,336	($1,875,307)	0.83
		M-PACT	$16,873,190	$17,459,712	($586,522)	0.97
	New Construction	TRC	$6,442,405	$4,773,062	$1,669,343	1.35
		PACT	$3,198,174	$1,868,646	$1,329,528	1.71
		M-PACT	$4,758,944	$2,411,645	$2,347,299	1.97
	Behavior	TRC	$7,132,861	$3,000,000	$4,132,861	2.38
		PACT	$4,961,321	$3,000,000	$1,961,321	1.65
		M-PACT	$4,961,321	$3,000,000	$1,961,321	1.65

Environmental Protection on October 1, 2015; the numbers could be updated slightly before the 2016-2018 CL&M Plan is finalized.

4. MARKET TRANSFORMATION – COST EFFECTIVENESS OF SUBSIDIES CASE OF THE RESIDENTIAL SOLAR INVESTMENT PROGRAM

Utility 2.0 and Cost-Effectiveness of Distributed Energy Resources

With the Cadmus evaluation providing a PACT ratio for RSIP Step 7 approaching 7 to 1, the Green Bank realizes that there is an opportunity to deploy a suite of technologies that would provide more comprehensive energy solutions for customers and benefits to the grid while still maintaining overall cost-effectiveness. Bundling technologies together would leverage the cost-effectiveness of mature technologies, PV and energy efficiency, to support investment in promising technologies such as energy storage that are of strong interest to customers but have not yet achieved commercial cost-effectiveness.[32]

The Green Bank asked Cadmus to assess the cost-effectiveness of a potential technology combination for a typical residential customer in Connecticut, bundling energy efficiency, solar PV, and energy storage into a single resource and calculating the cost-effectiveness of the resulting resource mix, as well as to consider the potential impact of smart metering technologies. Table 44 presents benefits, costs, and net benefits for the PACT, TRC and PCT ratios for RSIP Step 7, Home Energy Solutions (HES) Program[33], Energy Storage[34], and two combinations – RSIP plus storage, and RSIP plus HES plus storage. The resulting PACT, TRC, and PCT ratios are all greater than unity.

[32] During and earlier evaluation of the RSIP completed by Cadmus in January 2015, approximately 59% of customers surveyed indicated that they were also interested in energy storage. Of the customers surveyed, however, only 5% had actually installed an energy storage system. This high level of interest suggests that customers want to combine energy storage with their PV systems, though there is not enough information to gauge the value they would place on such an offering. Based on the preliminary analysis presented here, customers would be interested in energy storage and the excess cost-effectiveness of RSIP and energy efficiency technologies may be able to support the deployment of storage technologies, while maintaining programmatic cost-effectiveness.

[33] Home Energy Solutions (HES) is a residential energy efficiency program operated by the Connecticut utilities and includes a wide variety of energy efficiency measures and activities. Program participants begin with an in-home energy assessment and installation of basic measures such as weatherization and efficient lighting products. From there, participants have access to incentives and financing for appliance and HVAC upgrades and other measures. Though this assessment does not stipulate exactly which measures are installed, the analysis uses the average benefits and costs per participant, which represents a mix of basic and more advanced efficiency measures.

[34] The energy storage portion of the bundle is assumed to be a leased Tesla PowerWall 7 kWh home energy storage system. Though this unit is somewhat more expensive than current lead acid based battery systems, the popularity of the product line and offerings by major vendors, such as SolarCity, make it a reasonable choice for potential future residential scale energy storage products that may be of interest to typical Connecticut customers. To calculate the PACT and TRC, Cadmus assumed an 8% program administration cost (amounting to $400) on top of the participant cost of the energy storage system.

Table 44. Cost-Effectiveness of Bundled Resources[35]

Program/Technology	Test	# Participants	Benefits/ Participant	Costs/ Participant	Net Benefits/ Participant	Ratio
RSIP 2015 Step 7	TRC	2,639	$55,050	$30,548	$24,502	1.80
	PACT	2,639	$17,525	$2,709	$14,816	6.47
	PCT	2,639	$48,093	$26,724	$21,370	1.80
EE 2016 Eversource – Home Energy Solutions (HES)	TRC	17,320	$3,597	$1,102	$2,495	3.26
	PACT	17,320	$990	$547	$443	1.81
	PCT	17,320	$1,933	$65	$1,868	29.75
RSIP 2015 Step 7 + EE 2016 HES	TRC	1	$58,647	$31,651	$26,996	1.85
	PACT	1	$18,514	$3,255	$15,259	5.69
	PCT	1	$50,026	$26,789	$23,238	1.87
Energy Storage	TRC	1	$0	$5,400	($5,400)	0.00
	PACT	1	$0	$400	($400)	0.00
	PCT	1	$0	$5,000	($5,000)	0.00
RSIP 2015 Step 7 + Storage	TRC	1	$55,050	$35,948	$19,102	1.53
	PACT	1	$17,525	$3,109	$14,416	5.64
	PCT	1	$48,093	$31,724	$16,370	1.52
RSIP 2015 Step 7 + EE 2016 HES + Storage	TRC	1	$58,647	$37,051	$21,596	1.58
	PACT	1	$18,514	$3,655	$14,859	5.06
	PCT	1	$50,026	$31,789	$18,238	1.57

Marketing Programs

To accelerate the market for residential solar PV in Connecticut, the Connecticut Green Bank implemented Solarize Connecticut – a customer acquisition model founded in Portland, Oregon, replicated statewide in Massachusetts, and now being scaled-up across the country. Solarize programs are designed to use a combination of group purchasing, time-limited offers, and grassroots outreach, while local clean energy advocates volunteer and coordinate with their towns to help speed the process (see Table 45).

[35] Though the PCT is not calculated in the EE CL&M plans, enough data was provided to estimate the PCT for the HES Program for the purposes of this example bundling calculation. The total customer costs and number of measures/participants for HES were taken from the 2016-2018 CL&M Plan, Table B2 – Eversource CT Electric – Resource Summary 2016. Benefits were estimated by multiplying the lifetime savings in MWh attributed to HES and multiplying by 19.23 cents per kWh, the Energy Information Administration (EIA) average residential price of electricity in CT for September 2015 (from the Electric Power Monthly Table 5.6.A. Average Price of Electricity to Ultimate Customers by End-Use Sector, by State, September 2015 and 2014). This resulted in HES per participant benefits of $1933, and costs of $65, resulting in a highly favorable PCT of 29.75. The ratio could have been even higher if the benefits estimate calculation included an escalator for the price of electricity and if the peak kW impact was included benefit estimate, but the simplified calculation already yielded highly favorable results that were sufficient to illustrate the benefit of bundling technologies. The per participant HES cost of $65 is lower than the expected $99 (the per participant contribution to the HES Program as typically advertised); this is because some of the costs for homes utilizing gas are allocated to the respective gas budget in the CL&M plan.

4. MARKET TRANSFORMATION – COST EFFECTIVENESS OF SUBSIDIES CASE OF THE RESIDENTIAL SOLAR INVESTMENT PROGRAM

Table 45. Solarize Average Rate of Growth of Residential Solar PV Deployment

	Solarize Towns (2004-2011)	**During Solarize**	**Post Campaign**	**Non-Solarize Towns** (2011-2015)
Average	16.5%	110.2%	59.3%	20.9%

In a traditional Solarize Connecticut campaign (called Solarize Classic), a solar installer is competitively selected by a town based on the installer's bid price, the equipment it's using, experience in the industry and outreach strategy. Pricing is tiered based on the number of customers who participate. Part of the cost savings comes from the installer's reduced customer acquisition cost — money spent on marketing to find and acquire potential customers. Every customer pays the same price per watt, and the price is pushed down as more customers sign up with the installer. Homeowners also have the option to add to the base pricing for premium panels, equipment, or special setups involving roof pitch or electric upgrades.

The Connecticut Green Bank and its partners, SmartPower and Yale University, participated in the federal Department of Energy's Solar Energy Evolution and Diffusion Studies[36] to design and examine Solarize campaigns in Connecticut experimenting with several versions beyond Solarize Classic to determine what works best:

- **Solarize Express** – these campaigns require customers to sign contracts within 10-12 weeks rather than 18-20 as in Solarize Classic.

- **Solarize Prime** – these campaigns eliminate the tiered pricing model. The competitively selected installer offers a simple base price.

- **Solarize Choice** – this modification opens the program to three installers at a time instead of a single installer during the 20-week campaign. There is no tiered pricing and installers submit a single base price. The Solarize town's selection committee picks which three installers participate, and, as the campaign commences, they are free to reduce prices and compete against one another for customers.

- **Solarize Select** – towns were selected by lottery for the opportunity to participate. Normally towns would apply to the program, competing on criteria such as: previous clean energy leadership; number of existing solar projects; and volunteer capacity to do outreach in the communities. Randomizing the town selection process tests the significance of that process.

- **Solarize Online** – here, a customer identifies their home on an aerial map and provides information about their energy usage. The online platform then notifies each participating installer that there is an interested customer. Like a reverse auction, each installer can bid the project cost in an attempt to acquire the customer. There is no mandated pricing - just sheer competition. Installers are free to participate and a dozen have done so.

[36] http://cbey.yale.edu/programs-research/solar-energy-evolution-and-diffusion-studies-seeds

4. MARKET TRANSFORMATION – COST EFFECTIVENESS OF SUBSIDIES CASE OF THE RESIDENTIAL SOLAR INVESTMENT PROGRAM

The various types of Solarize campaigns implemented in Connecticut delivered varying results for customer acquisition (i.e., installed capacity or kW) and customer acquisition costs (i.e., marketing program costs per kW) – see Table 46.[37] It should be noted that the average customer acquisition cost for the residential solar PV industry was $490/kW in 2013 and is expected to drop to $350/kW in 2017.[38]

Table 46. Performance of Solarize Campaigns by Type in Connecticut

Metric	Solarize Classic	Solarize Express	Solarize Choice	Solarize Select	Solarize Prime	Solarize Online	Total
# of participating communities	34	5	6	5	4	4	58
# of participating contractors	11	5	8	5	4	12	18 (unique)
Installed Capacity (kW)	10,669	910	1,407	1,312	1,336	455	16,089
Acquisition Cost ($/kW)	$75	$75-$150	$150-$275	$125-$150	$75-$100	$175-$300	$100

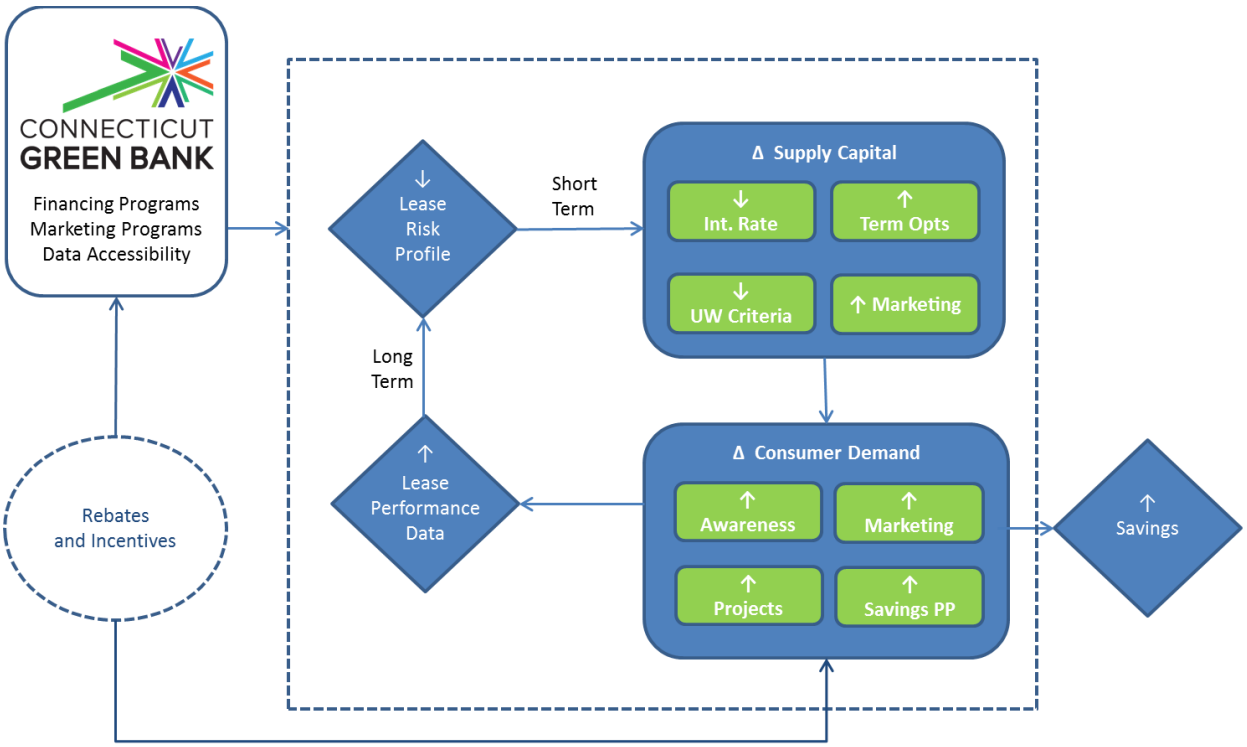
[37] Commentary: Can a 'Groupon-like' model lower the cost of solar power? Trend CT article by Matt Macunas, http://trendct.org/2015/10/20/commentary-can-a-groupon-like-model-lower-the-cost-of-solar-power.

[38] *Rooftop Solar Companies are Letting Leads Slip through the Cracks* by Julia Pyper of Greentech Media (July 24, 2015)

4. MARKET TRANSFORMATION
FINANCIAL WAREHOUSE AND CREDIT ENHANCEMENT STRUCTURES
CASE OF THE CT SOLAR LOAN

As the Connecticut Green Bank's residential solar PV loan program, we are applying the Program Logic Model that focuses on financing and credit enhancements (see Figure 10).

Figure 10. Program Logic Model for the CT Solar Loan



Model derived from work by Dunsky Energy Consulting

Financing Program

The CT Solar Loan was a financing product developed in partnership with Sungage Financial[39] that uses credit enhancements (i.e., $300,000 loan loss reserve)[40] in combination with a $5 million warehouse of funds and $1 million of subordinated debt from the Connecticut Green Bank. Through this product, the Connecticut Green Bank lowers the barriers to Connecticut homeowners seeking to install solar PV installations thus increasing demand while at the same time reducing the market's reliance on subsidies being offered through the RSIP. The CT Solar Loan was the first dedicated residential solar loan product not secured by a lien on the home or tied to a particular PV equipment OEM supplier. As a loan, capital provided to consumers for the CT Solar Loan is returned to the Connecticut Green Bank – it is not a subsidy. In fact, approximately 80% of the loan value is sold to retail investors through a "crowd funding" platform or to institutional investors without recourse to the Connecticut Green Bank. The financial structure of the CT Solar Loan product includes origination,[41] servicing,[42] and financing features in combination with the support of the Connecticut Green Bank (see Figure 1).

[39] Sungage Financial (http://www.sungagefinancial.com/) won a competitive RFP through the Connecticut Green Bank's Financial Innovation RFP to support a residential solar PV loan program
[40] From repurposed American Recovery and Reinvestment Act funds
[41] Sungage Financial in partnership with local contractors

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FINANCIAL WAREHOUSE AND CREDIT ENHANCEMENT STRUCTURES
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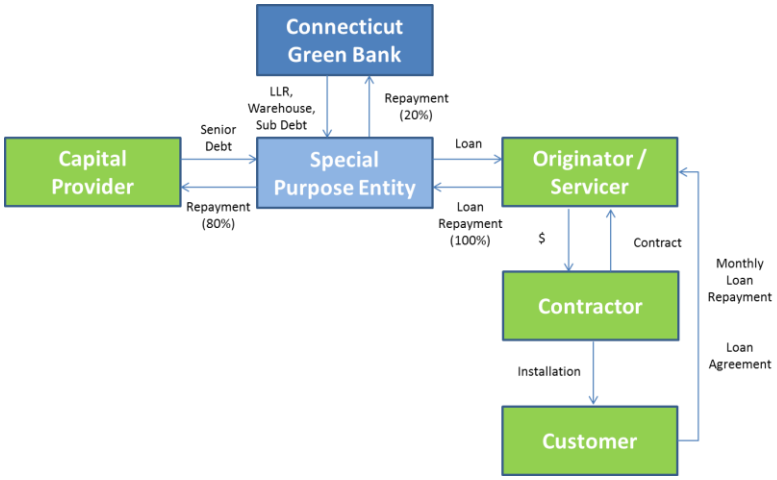
Launched in March of 2013, the CT Solar Loan provided up to $55,000 per loan, with 15-year maturity terms and affordable 6.49% interest rates (including 0.25% ACH payment benefit) to provide homeowners with the upfront capital they needed to finance residential solar PV projects.

Figure 11. Legal Structure and Flows of Capital for the CT Solar Loan



The CT Solar Loan provided financing for 279 projects totaling nearly $6.0 million of investment and 2,186 kW of residential solar PV deployment (see Table 47). To date, there have been no defaults and only a few loans (<5) in late payment from time to time.

Table 47. CT Solar Loan Metrics

Year	# of Projects	Investment	Installed Capacity (kW)
2013	3	$58,974	17.7
2014	140	$2,774,655	1,092.6
2015	136	$3,120,143	1,075.9
Total[43]	**279**	**$5,953,772**	**2,186.2**

The CT Solar Loan yields an appropriate rate of return to the capital providers commensurate with the risks they are taking, provided 19 contractors with an important sales tool, and gave nearly 300 customers the ability to own solar PV through low-interest and long-term financing along with access to the federal ITC and state incentives (i.e., the RSIP Expected Performance Based Buydown). Of the $6.0 million invested by the Connecticut Green Bank into the CT Solar Loan, $1.0 million has been sold to the crowd-funding platform Mosaic, and $4.0 million is

[42] Concord Servicing Corporation
[43] Includes approved, closed and completed projects.

currently being offered for sale to institutional investors – leaving the Connecticut Green Bank with $1.0 million of subordinated debt.

The CT Solar Loan was the Connecticut Green Bank's first residential product graduation. It started off being the first crowd-funded residential solar PV transaction with Sungage Financial through Mosaic.[44] And then it graduated to a partnership between Sungage Financial and Digital Federal Credit Union – with no resources from the Connecticut Green Bank.[45] The loan offering from Sungage Financial now includes 5, 10, and 20 year maturity terms at affordable interest rates and is being offered in Massachusetts, New Jersey, and New York – along with 14 solar PV contractors in Connecticut.

Data Accessibility

There were 462 applications into the CT Solar Loan – 279 closed, 96 withdrew, and 87 declined in underwriting. The household customers that accessed the CT Solar Loan since its launch in2013 had varying credit scores – see Table 48.

Table 48. Credit Scores of Household Customers Using the CT Solar Loan

Fiscal Year Loans Closed or Approved	Credit Score Ranges				
	Below 640	640-679	680-719	720+	Grand Total
Solar Loan			37	242	279
			13.3%	86.7%	

To date, there have been 4 delinquencies and no defaults.

Of the CT Solar Loans approved and closed with household customers, the following table is a breakdown of the contractors offering the financing product – see Table 49.

Table 49. Residential Solar PV Contractors and the CT Solar Loan

Contractor	# of Loans	$ of Loans	% of Loans
31Solar	1	$20,298	0.36%
Aegis Electrical Systems, LLC	24	$539,766	8.60%
AllGreenIT, Inc.	7	$112,604	2.51%
BeFree Green Energy, LLC	2	$46,606	0.72%
Catchin Rays	7	$175,248	2.51%
Centurion Solar	4	$107,025	1.43%
C-TEC Solar LLC	45	$926,307	16.13%
DCS	1	$16,440	0.36%

[44] http://www.businesswire.com/news/home/20140206005031/en/Sungage-Financial-CEFIA-Mosaic-Announce-5-Million#.VgRTgVIXL4Y

[45] http://www.spark.ctgreenbank.com/ct-solar-loan-partner-graduates-from-connecticut-green-bank/

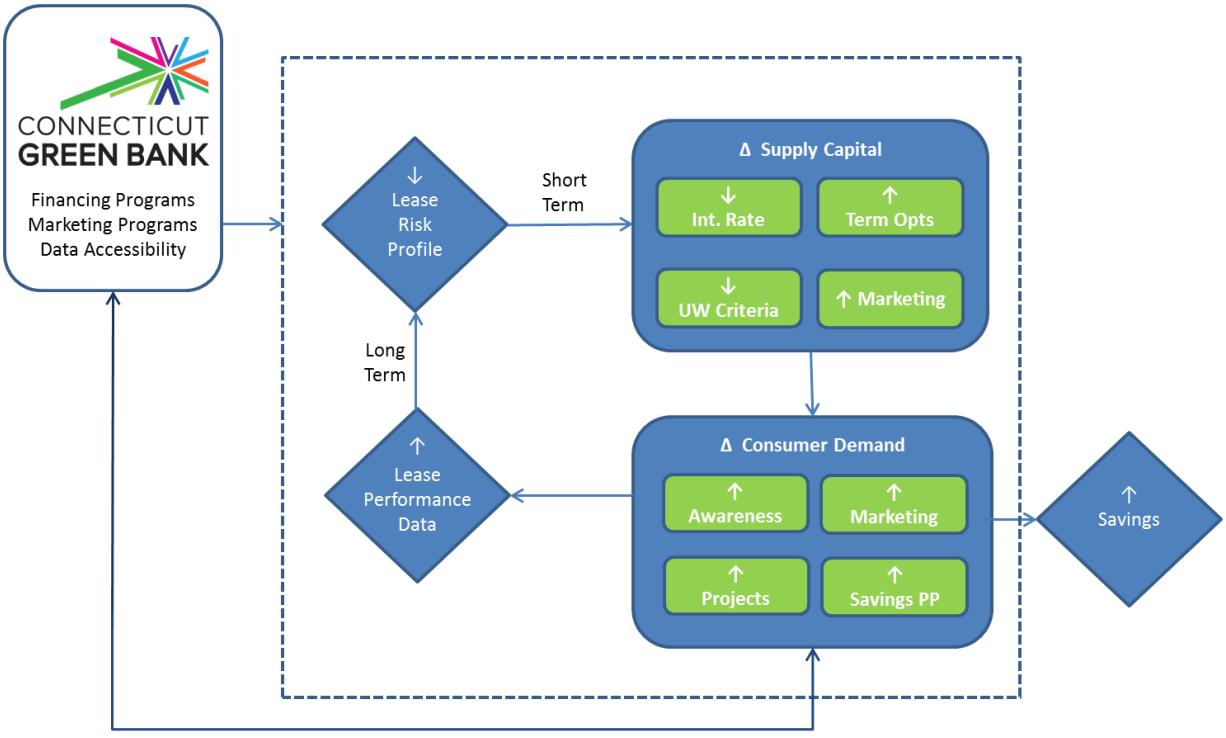
CONNECTICUT GREEN BANK

4. MARKET TRANSFORMATION
FINANCIAL WAREHOUSE AND CREDIT ENHANCEMENT STRUCTURES
CASE OF THE CT SOLAR LOAN

Contractor	# of Loans	$ of Loans	% of Loans
Direct Energy Solar	28	$572,721	10.04%
Earthlight Technologies	8	$191,189	2.87%
EcoSmart Home Services	2	$55,366	0.72%
Encon, Inc.	13	$217,599	4.66%
Northeast Smart Energy LLC	1	$19,960	0.36%
PurePoint Energy, LLC	6	$174,016	2.15%
RGS Energy	18	$360,238	6.45%
Ross Solar Group	72	$1,571,531	25.81%
Shippee Solar and Construction LLC	3	$61,543	1.08%
Sunlight Solar Energy, Inc.	36	$764,760	12.90%
US Energy Concierge	1	$20,556	0.36%
Total	**279**	**$5,953,772**	**100.00%**

As the Connecticut Green Bank's residential and commercial solar PV lease program, we are applying the Program Logic Model that focuses on financing and credit enhancements (see Figure 12).

Figure 12. Program Logic Model for the CT Solar Lease



Model derived from work by Dunsky Energy Consulting

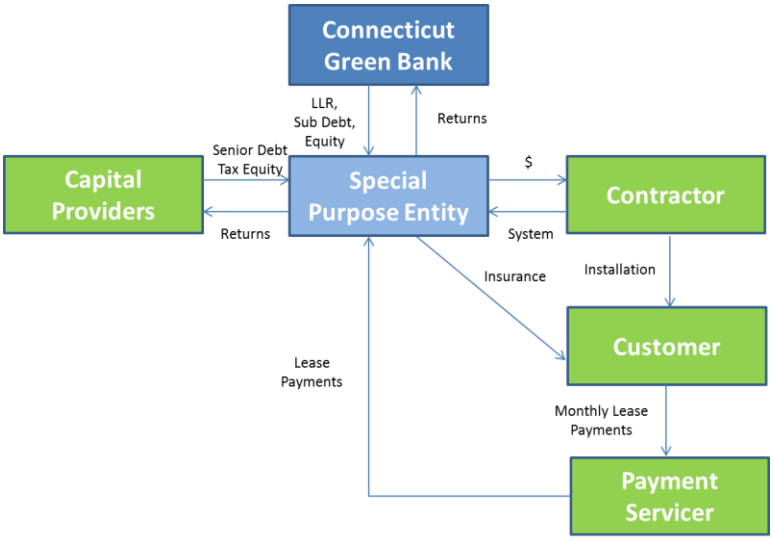
Financing Programs

The CT Solar Lease was a financing product developed in partnership with a tax equity investor (i.e., US Bank) and a syndicate of local lenders (i.e. First Niagara Bank and Webster Bank) that uses a credit enhancement (i.e., $3,500,000 loan loss reserve),[46] in combination with $2.3 million in subordinated debt and $7.2 million in equity from the Connecticut Green Bank as the "member manager" to provide up to $60 million in lease financing for residential and commercial solar PV projects. Through the product, the Connecticut Green Bank lowers the barriers to Connecticut residential and commercial customers seeking to install solar PV with no up-front investment thus increasing demand, while at the same time reducing the market's reliance on subsidies through the RSIP or being more competitive in a reverse auction through the Zero Emission Renewable Energy Credit (ZREC) program. As a lease, capital provided to consumers through the CT Solar Lease is returned to the Connecticut Green Bank, the tax equity investor and the lenders – it is not a subsidy. The financial structure of the CT Solar Lease product includes origination by contractors, servicing of lease payments,[47] insurance and "one

[46] From repurposed American Recovery and Reinvestment Act funds
[47] AFC First Financial

call" system performance and insurance resolution,[48] and financing features in combination with the support of the Connecticut Green Bank (see Figure 13).

Figure 13. Legal Structure and Flows of Capital for the CT Solar Lease[49]



Through 6/30/2015, the CT Solar Lease provided financing for 1,349 residential solar PV and 22 commercial solar PV projects totaling $58 million of investment and 13,829.3 kW of clean energy deployment (see Tables 50 and 51). To date, there have been no defaults or leases in late payment.

Table 50. CT Solar Lease Metrics – Residential

Year	# of Projects	Investment	Installed Capacity (kW)
2013	-	-	-
2014	111	$4,245,033	850.2
2015	1,238	$44,586,097	9,824.7
Total[50]	**1,349**	**$48,331,130**	**10,674.9**

[48] Assurant
[49] It should be noted that the Special Purpose Entity structure includes several entities – CT Solar Lease II, LLC and CEFIA Holdings, LLC that provide different functions.
[50] Includes approved, closed and completed projects.

Table 51. CT Solar Lease Metrics – Commercial

Year	# of Projects	Investment	Installed Capacity (kW)
2013	-	-	-
2014	-	-	-
2015	22	$9,245,538	3,154.3
Total	**22**	**$9,245,538**	**3,154.3**

The CT Solar Lease yields an appropriate rate of return to the capital providers commensurate with the risks they are taking, provided 28 contractors with an important sales tool, and gave 1,371 customers the ability to lease solar PV and lower their energy costs.

The CT Solar Lease was the Connecticut Green Bank's second residential product graduation. Of the $60 million available, nearly $50 million was used to deploy solar PV systems in the residential sector. The CT Solar Lease graduated to a partnership with Sunnova – with no financial resources from the Connecticut Green Bank.[51] The lease offering from Sunnova now expanded from a 20-year term to a 25-year term and doesn't include a tax equity investor – intended to position the product for post 2016 when the federal investment tax credit of 30% is reduced. Currently 9 of the contractors using the CT Solar Lease – representing over 80% of the volume – have signed up to use the Sunnova product.

With respect to the CT Solar Lease and the commercial market, of the $60 million available, over $10 million is being used to deploy solar PV systems in the commercial sector (see Table 52).

Table 52. CT Solar Lease Commercial Contractors

Contractor	# of Leases	$ of Leases	% of Leases
American Solar	2	$ 772,550	9.09%
C-TEC Solar LLC	1	$ 383,259	4.55%
Deutsche Eco USA Corp.	1	$ 2,111,575	4.55%
ECNY	1	$ 174,700	4.55%
Encon, Inc.	10	$ 2,665,053	45.45%
Northeast Energy Design Solutions	1	$ 802,125	4.55%
Northeast Smart Energy LLC	2	$ 371,867	9.09%
Ross Solar Group	2	$ 1,177,105	9.09%
Sky View Ventures	1	$ 522,303	4.55%
Sound Solar Systems, LLC	1	$ 265,000	4.55%
Total	22	$ 9,245,538	100.00%

[51] The Connecticut Green Bank issued an open RFP to identify a private capital provider to transition the contractors using the CT Solar Lease to a private offering. Sunnova was selected as a lease capital provider through this RFP.

Given the growth in the market from consumers and the level of interest in providing financing from local capital providers, the CT Solar Lease is under consideration for expansion as it applies to commercial customers.

Data Accessibility

1,349 household customers accessed the CT Solar Lease since its launch in2013 – see Table 53.

Table 53. Credit Scores of Household Customers Using the CT Solar Lease

Fiscal Year Loans Closed or Approved	Credit Score Ranges				
	Below 640	640-679	680-719	720+	Grand Total
Solar Lease	4	60	135	1,149	1,349
	0.3%	4.5%	10.0%	85.2%	

There were 2,454 applications received through the CT Solar Lease – 1,349 were approved, closed, or completed, 555 withdrawn, and 550 declined. Of the CT Solar Leases approved and closed with household customers, the following table is a breakdown of the contractors offering the financing product – see Table 54.

Table 54. Residential Solar PV Contractors and the CT Solar Lease

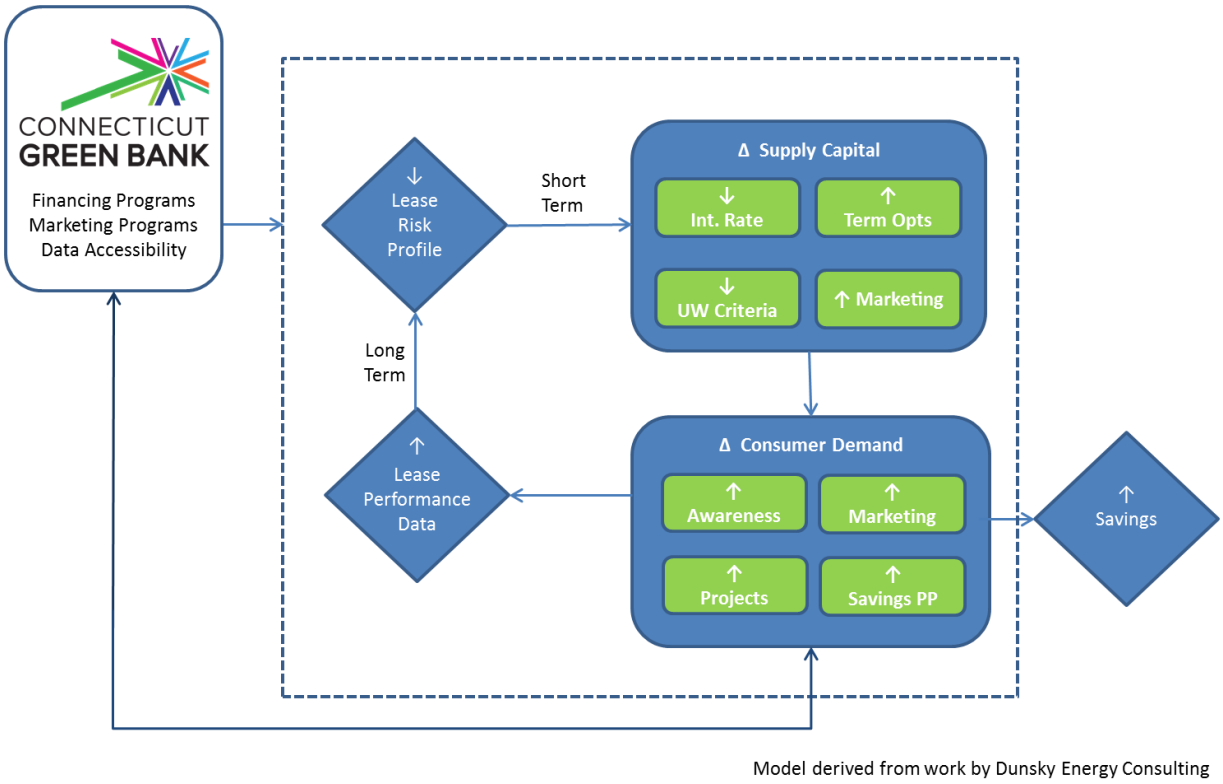
Contractor	# of Leases	$ of Leases	% of Leases
Aegis Electrical Systems, LLC	54	$1,984,302	4.00%
AllGreenIT, Inc.	9	$334,805	0.67%
Astrum Solar	66	$2,579,663	4.89%
BeFree Green Energy, LLC	97	$3,936,760	7.19%
Boston Solar	8	$286,335	0.59%
Connecticut Solar Power, LLC	3	$110,408	0.22%
C-TEC Solar LLC	87	$3,195,585	6.45%
Direct Energy Solar	107	$3,933,945	7.93%
Earthlight Technologies	19	$706,471	1.41%
EcoSmart Home Services	6	$218,903	0.44%
Encon, Inc.	163	$5,575,828	12.08%
Litchfield Hills Solar, LLC	18	$701,570	1.33%
No Contractor Selected	60	$2,084,693	4.45%
PurePoint Energy, LLC	10	$360,985	0.74%
Real Goods Solar, Inc	8	$263,660	0.59%
Renewable Resources, Inc.	4	$136,773	0.30%
RGS Energy	122	$4,313,828	9.04%
Ross Solar Group	82	$3,276,107	6.08%
Sunlight Solar Energy, Inc.	36	$1,252,545	2.67%
Trinity Solar	388	$13,511,008	28.76%
Tuscany Solar	2	$66,960	0.15%
Total	**1,349**	**$48,831,130**	**100.00%**

CONNECTICUT GREEN BANK

4. MARKET TRANSFORMATION
FINANCIAL WAREHOUSE AND CREDIT ENHANCEMENT STRUCTURES
CASE OF THE COMMERCIAL PROPERTY ASSESSED CLEAN ENERGY (C-PACE)

As the Connecticut Green Bank's commercial and industrial financing program, we are applying the Program Logic Model that focuses on financing and credit enhancements (see Figure 14).

Figure 14. Program Logic Model for the C-PACE Program



Model derived from work by Dunsky Energy Consulting

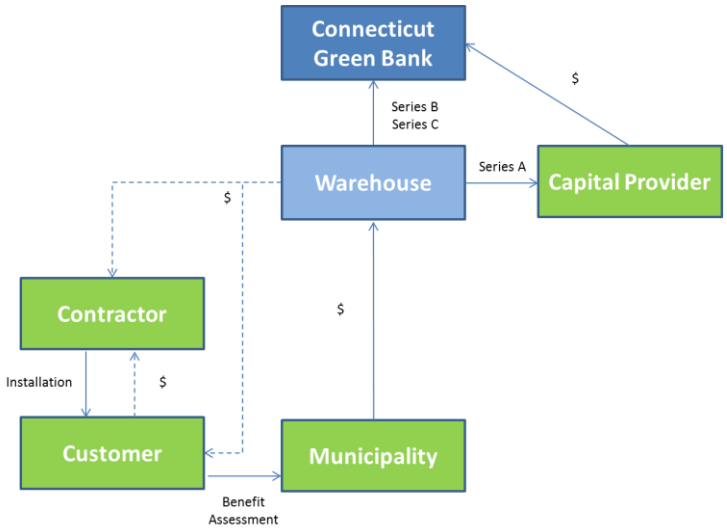
Financing Program

Commercial Property Assessed Clean Energy (C-PACE) is a structure through which commercial property owners can finance energy efficiency and renewable energy improvements through financing secured by a voluntary benefit assessment on their property and repaid via the property tax bill. A tax lien, or benefit assessment, is placed on the improved property as security for the loan, and the Connecticut Green Bank requires lender consent from existing mortgage holders prior to approving a C-PACE project. It should be noted, that to date 30 unique banks and seven specialized lending institutions have provided lender consent over 50 projects – demonstrating that existing mortgage holders see C-PACE as adding value to the property and net income to the business occupying the building as a result of lower energy prices.

The Connecticut Green Bank maintains a $40 million warehouse of capital from which it finances C-PACE transactions and sells to capital markets upon completion (see Figure 15). Through the warehouse, funds are advanced to either the customer or contractor during construction based on the project meeting certain deliverables. Once the project is completed, the construction advances convert to long term financing whereby the property owner pays a benefit assessment over time to the municipality at the same time other property taxes are paid on the property. The Connecticut Green Bank aggregates the benefit assessment liens which are

then sold to interested capital providers. As the benefit assessment payments are made by the property owners, they are then remitted from the various municipalities to the Connecticut Green Bank or its designated servicer to repay the capital providers for the energy improvements financed through C-PACE.

Figure 15. Legal Structure and Flows of Capital for C-PACE



Prior to the establishment of C-PACE in a given municipality, its legislative body must pass a resolution enabling the municipality to enter into agreement with the Connecticut Green Bank to assess, collect, remit, and assign benefit assessments against C-PACE borrowers' liabilities. As of June 30, 2015, there are 106 cities and towns signed up for C-PACE representing about 90% of commercial and industrial building space in Connecticut. Over 200 contractors have been trained to participate in the C-PACE program. Additionally as of June 30, 2015, over $57 million in C-PACE assessment advances have been approved of which $44 million has closed.

A portfolio of $14 million comprised of 30 energy efficiency and renewable energy projects across 22 municipalities was sold in two tranches to Clean Fund. Using an auction process, bids for the portfolio were competitively solicited across all of the Connecticut Green Bank's capital providers. Bidders were encouraged to offer various structures and pricing, with or without credit enhancement, and to bid for one or more projects. The selected structure has the Public Finance Authority (WI) use proceeds from Clean Fund (in return for a single class of Senior "A" bonds) to fund 80 percent of the portfolio purchase price. To credit enhance the transaction, the Connecticut Green Bank has taken back, in equal measure, Subordinated "B" and "C" bonds. The structure is, in effect, a "private securitization" of the underlying portfolio.

CONNECTICUT GREEN BANK

4. MARKET TRANSFORMATION
FINANCIAL WAREHOUSE AND CREDIT ENHANCEMENT STRUCTURES
CASE OF THE COMMERCIAL PROPERTY ASSESSED CLEAN ENERGY (C-PACE)

Data Accessibility

88 customers accessed the C-PACE since its launch in 2013 – see Table 55.

Table 55. Types of End-Use Customers Participating in C-PACE

End-Use	# of Properties (#)	Annual Savings (MMBtu)	Square Footage (ft^2)	C-PACE Investment ($)
Manufacturing/Industrial Plant	14	359,091	946,183	$11,326,346
Multifamily Housing	4	206,676	174,336	$2,328,722
Non-Refrigerated Warehouse	7	71,602	277,150	$3,075,184
Office (>5,000 SF)	26	940,512	2,965,064	$25,713,293
Other	8	91,526	226,510	$1,771,297
Retail Store	24	315,905	681,182	$12,380,836
Worship Facility	5	11,657	66,777	$326,761
Total	**88**	**1,996,969**	**5,337,202**	**$56,922,439**

To date, there have been 2 delinquencies and no defaults.

Of the 88 C-PACE projects, the following is a breakdown of projects by municipality – see Table 56.

Table 56. Cities and Towns Supporting C-PACE Projects

Municipality	# of Properties (#)	Annual Savings (MMBtu)	Square Footage (ft^2)	C-PACE Investment ($)
Ansonia	2	10,294	47,503	$233,125
Avon	2	43,969	89,764	$1,049,147
Bridgeport	12	328,123	664,343	$6,268,595
Bristol	4	57,390	90,951	$2,382,427
Brookfield	1	5,233	36,772	$1,101,405
Canton	1	3,510	15,000	$148,500
Centerbrook	1	28,598	19,674	$126,645
Cromwell	1	75,801	109,032	$1,984,880
Danbury	1	16,942	19,640	$88,757
Deep River	1	1,705	5,804	$20,225
East Haddam	2	16,756	41,450	$715,651
East Windsor	2	36,773	90,000	$1,500,000
Ellington	1	14,882	25,760	$495,768
Enfield	1	26,976	57,000	$840,640
Fairfield	1	136	11,700	$20,500
Glastonbury	2	6,958	49,000	$630,563
Hamden	1	123,089	118,722	$3,473,197
Hartford	7	55,232	253,000	$1,986,959
Killingworth	1	5,132	20,000	$259,000
Manchester	1	18,285	52,700	$596,725

CONNECTICUT GREEN BANK

4. MARKET TRANSFORMATION
FINANCIAL WAREHOUSE AND CREDIT ENHANCEMENT STRUCTURES
CASE OF THE COMMERCIAL PROPERTY ASSESSED CLEAN ENERGY (C-PACE)

Municipality	**# of Properties** (#)	**Annual Savings** (MMBtu)	**Square Footage** (ft^2)	**C-PACE Investment** ($)
Meriden	3	172,780	900,000	$3,040,842
Middletown	2	104,166	146,368	$4,013,915
Naugatuck	1	727	53,158	$541,582
New Britain	2	100,491	715,012	$5,817,472
New London	5	58,818	249,369	$2,261,817
Newington	1	13,714	53,200	$750,000
Niantic	1	2,499	16,225	$59,740
North Stonington	1	10,703	30,000	$343,897
Norwalk	1	13,164	10,000	$559,952
Norwich	1	10,896	50,000	$350,000
Plainville	3	68,005	200,000	$1,892,050
Putnam	1	184,362	125,000	$2,125,000
Shelton	1	11,427	37,600	$266,474
Simsbury	1	16,853	42,456	$674,566
Somers	1	22,204	48,360	$957,000
Southington	2	13,023	24,325	$445,691
Stamford	2	53,538	259,000	$842,266
Stratford	2	16,969	48,000	$541,010
Torrington	1	1,977	19,000	$126,194
Trumbull	1	21,316	100,000	$1,001,298
Waterbury	1	29,770	42,400	$1,530,622
Watertown	2	24,647	34,756	$786,661
West Haven	1	6,559	13,000	$227,365
Westport	2	71,533	60,154	$1,163,817
Willington	1	1,224	10,432	$53,622
Windsor	2	77,696	197,572	$2,171,102
Windsor Locks	1	12,125	34,000	$455,775
Total	**88**	**1,996,969**	**5,337,202**	**$56,922,439**

Of the C-PACE approved and closed projects, the following table is a breakdown of the contractors offering the financing product – see Table 57.

Table 57. C-PACE Contractors

Contractor	# of C-PACE Transactions	$ of C-PACE Transactions	% of C-PACE Transactions
3x Solution Inc	1	$1,101,405	1.14%
American Solar	2	$798,422	2.27%
Antonio LLC	1	$20,500	1.14%
BeFree Green Energy, LLC	1	$230,651	1.14%
C&N Mechanical	1	$30,002	1.14%
Catchin Rays	1	$27,500	1.14%
Chabot Electric	1	$231,916	1.14%
Conserv-Inc	1	$559,952	1.14%
Controlled Air	1	$128,313	1.14%
Earthlight Technologies	3	$1,003,746	3.41%
ECNY	1	$227,365	1.14%
Efficient Lighting and Maintenance, Inc.	1	$30,273	1.14%
Efficient Lighting Consultants	1	$541,582	1.14%
Emcor Services	4	$2,926,415	4.55%
Encon, Inc.	5	$1,968,466	5.68%
Energy Solutions Inc.	1	$51,116	1.14%
Entersolar	1	$1,116,624	1.14%
Environmental Systems Corp	1	$107,566	1.14%
ESI Power Corp	3	$889,996	3.41%
GM Industries, Inc.	1	$386,128	1.14%
Green Earth Energy	24	$15,145,965	27.27%
Inovateus	1	$2,753,272	1.14%
JD Solar Solutions, LLC	2	$360,263	2.27%
Kurt Kuegler	1	$120,098	1.14%
Lockheed Martin	2	$2,728,042	2.27%
MSL Group	3	$2,739,690	3.41%
No Contractor Selected	5	$2,706,989	5.68%
NORESCO	2	$2,145,598	2.27%
Nxegen	1	$312,800	1.14%
Oatley Mechanical Services, Inc.	1	$266,474	1.14%
PurePoint Energy, LLC	1	$485,000	1.14%
Reliable Combustion Services LLC	1	$384,016	1.14%
Resource Development Associates	1	$3,064,200	1.14%
Ross Solar Group	2	$835,426	2.27%
Sarracco Mechanical	1	$208,605	1.14%
Smart Energy Services	1	$418,539	1.14%
Sound Solar Systems, LLC	1	$259,000	1.14%
Southport Engineering Associates	1	$985,060	1.14%
Trane	5	$8,625,464	5.68%
Total	**88**	**$56,922,439**	**100.00%**

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CONNECTICUT GREEN BANK

Memo

To: Audit, Compliance and Governance Committee Members

From: Matt Macunas (Legislative Liaison & Marketing Manager)

CC: Brian Farnen (General Counsel and CLO) and Bryan Garcia (President and CEO)

Date: December 4, 2015

Re: Proposed 2016 Legislative Priorities

Based on the Connecticut Green Bank's senior offsite one-day strategic session, staff presents to the Audit, Compliance and Governance Committee the following consensus legislative priorities for the 2016 session (February-May) of the Connecticut General Assembly:

1. **C-PACE technical fix** - This proposal would modify the C-PACE consent language. The language needs clarification that an existing mortgage holder is signing consent only for their own lien, and that such consent is only offered on the signor's behalf and not for any other parties to the lien placement or mortgage.

2. **SHREC technical fix** – Operationalizing the groundbreaking policies of Public Act 15-194 regarding Solar Home Renewable Energy Credits will require small adjustments to the authorizing statute. This includes 1) clarifying that the purchase of SHRECs by EDCs may include multiple 15-year purchase obligations that extend beyond 2022; and 2) providing more specification on the apportionment of RECs from SHREC-producing systems after their purchase term is complete.

3. **Establish Connecticut Green Bank administrative authority** - Some of the Green Bank's statutory powers are derived from its relationship with Connecticut Innovations, Inc. (CI). As the Green Bank grows it has increasingly required stand-alone back office solutions to operate efficiently. This proposal further disentangles the Green Bank from CI by granting broader authority consistent with quasi-public agencies, such as the ability to create special purpose entities.

4. **Residential PACE** – This proposal will revise the existing R-PACE statute to make residential PACE implementable and open Connecticut's PACE-financing market to homeowners using [subordinated] lien assessments.

5. **<u>Commercial building benchmarking study</u>** – The Green Bank would like to propose a study around the rating and disclosure of energy usage in commercial properties. While not necessarily a legislative action item, this may prompt future discussion of state policy changes in this area.

The following subjects were discussed and there was consensus to not to make them legislative priorities of the Green Bank. However, please note that some of these items are pursuable outside of the legislative process:

- Allowing for crowdfunded investments
- Expanding bonding authority
- Adjusting state contracting requirements
- Changing the definition of “clean energy”
- Creating designations that might allow outside (federal) funding
- Inserting the Green Bank into renewable thermal technology policy administration

Dannel P. Malloy
GOVERNOR
STATE OF CONNECTICUT

November 5, 2015

The Honorable Julián Castro
Secretary
U.S. Department of Housing and Urban Development
451 7th Street SW
Washington, DC 20410

Thank you for your leadership in working to enable the widespread adoption of Property Assessed Clean Energy (PACE) financing as a tool to encourage cleaner, cheaper and more reliable sources of energy while creating jobs and supporting local economic development. I write to encourage your Department to craft final guidance, together with the Federal Housing Administration (FHA), that: 1) accelerates PACE financings for the residential sector; 2) does not hinder existing and successful PACE programs; and 3) provides strong consumer protections.

President Obama's announcement on August 24 that the Administration will be "unlocking residential Property Assessed Clean Energy financing" was exciting and welcome news. Connecticut and many of our local municipalities are eager to move forward with residential PACE as soon as possible. We already have 111 of our 169 cities and towns – over 90 percent of the commercial and industrial square footage in Connecticut – actively engaged in the state's Commercial Property Assessed Clean Energy (C-PACE) program, which provides property owners with 100 percent of the capital for energy improvements to reduce their operating costs. In just two years, this robust C-PACE program, administered by the Connecticut Green Bank, has resulted in approximately $100 million in energy efficiency and renewable energy improvements to scores of commercial and industrial properties throughout Connecticut.

In addition, we are very appreciative of the leadership position that the Department of Housing and Urban Development (HUD) has taken at the intersection of C-PACE and the multifamily (5+ units) residential market. The diligent efforts of your Department to craft guidance that will allow for C-PACE projects to proceed on qualifying, HUD-supported multifamily properties in Connecticut is critical to opening up that market.

As you know, PACE is an innovative financing tool that accomplishes many important public policy goals. PACE allows homeowners to affordably finance home improvements that lower their energy costs, reduce carbon emissions, and create local jobs – all while benefitting the mortgage markets by reducing monthly utility costs, and by addressing deferred maintenance needs that would without renovation create a drag on home value, livability and marketability.

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In addition, PACE is a potential solution to help our state solve the vexing issue of high energy costs faced by the single-family housing market. Across the country, the residential sector spends roughly $300 billion annually on electricity, natural gas and water, and that number is rising. Those expenditures represent a significant portion of the operating costs of a home, and are exacerbated by deferred maintenance of installed products, both of which negatively affect home values and mortgage payments.

Most importantly, the PACE assessment – like other property tax assessments – must stay with the property upon sale, refinance or foreclosure. PACE has been successful because it is simple and efficient and helps consumers make the right choices. It is essential that the guidance HUD/FHA issues is free of complicated requirements or conditions that would undermine or threaten the ability of PACE to succeed.

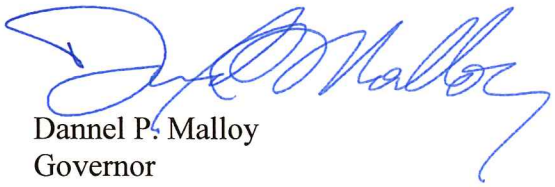
I recognize the concerns that FHA and Federal Housing Finance Agency (FHFA) have raised about the priority status of PACE liens. There is a promising resolution, whereby PACE financing providers agree to contractually subordinate, regardless of state law, to the first deed-of-trust the right to foreclose and the right to proceeds. The PACE industry has made clear it is ready to undertake this subordination to satisfy the concerns of mortgage lenders. Therefore, in FHA's final guidance we recommend that it be clear, with no ambiguity, that only PACE liens that preserve payment priority for first lien mortgages through subordination will be pursued.

I commend FHA for focusing on the need for PACE programs to comply with applicable federal and state consumer laws and the need for appropriate disclosures to homeowners participating in a PACE program. A successful PACE program must also provide for consumer protections as well as sound underwriting criteria to protect borrowers and lenders alike. In furtherance of our collective efforts, the Connecticut Green Bank intends to work with PACE lenders here in Connecticut and regionally, including New York, to develop strategies such as a loan-loss reserve, third party insurance, or other forms of credit enhancements to address regulatory concerns regarding PACE assessments on properties that may experience a decline in value and fall into foreclosure.

The President's announcement regarding PACE programs is an important step towards overcoming prior hurdles, and resolves a number of policy uncertainties that are holding back the market – potentially opening the door to millions of PACE projects around the country. I hope that the contractual subordination of PACE for FHA loans – with appropriate safeguards free of additional time-consuming requirements – will boost home sales, encourage borrowers to refinance to lower rates, increase contracting jobs, and save energy in America's aging residential building stock.

Thank you again for this announcement and the work that you and your colleagues at HUD and FHA are undertaking. I urge you to move rapidly to finalize the guidance.

Sincerely,



Dannel P. Malloy
Governor

cc: The Honorable Ed Golding, Principal Deputy Assistant Secretary, Office of Housing, U.S. Department of Housing and Urban Development

AGENDA

Offsite
Shipman & Goodwin
265 Church Street
Suite 1207
New Haven, CT

Monday, November 16, 2015
8:30 a.m. – 4:30 p.m.

Staff Invited: George Bellas, Andy Brydges, Craig Connolly, Mackey Dykes, Brian Farnen, Bryan Garcia, Ben Healey, Dale Hedman, Bert Hunter, Kerry O'Neill, and Genevieve Sherman

Facilitator: Dr. Jonathan Raab, Raab Associates, Ltd.

Primary Goal: Overall framing of Next Comp Plan

8:30 Grab Breakfast

8:45 Goals for Day—Bryan Garcia; Agenda Review—Jonathan Raab

9:00 **2013 to Present – Achievements and Failures**

- Compilation/Discussion of Key Achievements/Failures –What are the key take-aways?
- Realizing the Vision—Bryan

9:45 **Connecticut by 2020**

- What does CT look like in 2020 by sector (including major policy drivers); what do we want to accomplish; what's our role; and what will prevent us from succeeding?
- Brief presentation by sector manager, followed by group discussion
    - State of state from each manager and what does CT look like in 2020 for your sector? (10 minutes)
    - Discuss 4 questions above sequentially for each sector
    - Residential-- **Kerry O'Neill & Dale Hedman** (9:45 – 11:15)
        Solar (with Statutory and Infrastructure) (9:45 – 10:30)
        Everything Else Residential (10:30 – 11:15)

        Break 11:15 – 11:30

    - Institutional-- **Andy Brydges (**11:30 – 12:30)

12:30 Lunch

1:15 **Connecticut by 2020** (continued)

- Commercial and Industrial-- **Genevieve Sherman** (1:15 – 2:15)
- What else? **(**215-2:30)

2:30 Break

2:45 **Connecticut Leadership in the Green Bank Movement**

As we continue executing on our vision to lead the green bank movement both inside and outside of Connecticut, what would be the headline/story in Connecticut through a local press outlet regarding our assistance within CT, as well as outside of CT reporting on our assistance to other states or countries? When would these articles appear, and what would be the services/products that the article would attribute to the CT Green Bank's direct or indirect assistance?

- Identify the two scenarios – inside and outside of Connecticut
- Identify what press outlets would run the story
- Determine what the headlines would be for each story and by when
- Determine what three areas (i.e., services, products, assistance, etc.) the article would attribute to the Connecticut Green Bank
- Determine what three barriers or obstacles the Connecticut Green Bank would have had to overcome in order to achieve this result

3:45 **Public Policy/Legislative Priorities**

- What should be the Green Bank's top Legislative priorities?

4:30 Wrap Up/Next Steps/Adjourn—Bryan Garcia

Homework Assignments:

1. All Participants
   a. Come prepared to share your thoughts on 3 key achievements and 3 key failures for the CT Green Bank from 2013 to today.
   b. Review the mid-October sector-specific memos to the Board of Directors of the CT Green Bank
2. Sector Managers
   a. Come prepared to make an inspiring presentation on your sector including:
      i. State of state of what the Green Bank is currently offering and achieving in your sector (keep in mind that everyone will have read the sector briefing memo—so plan accordingly)?
      ii. What does your sector look like in 2020 (including key policy drivers)?

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CONNECTICUT
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Connecticut Green Bank - Offsite Strategic Retreat
Meeting Notes
November 16, 2015
Shipman & Goodwin Law Offices
265 Church Street, Suite 1207, New Haven

Present: Jonathan Raab (facilitator), Bryan Garcia, Bert Hunter, George Bellas, Andrew Brydges, Craig Connolly, Mackey Dykes, Brian Farnen, Ben Healey, Jane Murphy, Kerry O'Neill, Genevieve Sherman, Matt Macunas (notes)

Purpose:

1. Assess the Connecticut Green Bank's past two years
2. Look ahead to shape the next Comprehensive Plan
3. Identify and prioritize the 2016 legislative agenda

Agenda:

1. 2013 to Present – Achievements and Failures
2. Connecticut by 2020 – Green Bank's visions for future accomplishments; policy drivers; barriers
    a. Residential
    b. Institutional
    c. Commercial and Industrial
3. Connecticut Leadership in the Green Bank Movement – staff exercise
4. Legislative Priorities for 2016

2013 to Present - Achievements and Failures

Achievements (provided by senior staff during warm-up flipchart exercise)

- Deploying capital quickly
- Using bonding authority as a new mechanism of capital deployment
- Growth of residential solar and setting up the financing to sustain that growth
- The Green Bank built trust with the CT Legislature, and built its public perception as a leader
- Extending the Residential Solar Investment Program (RSIP) by developing and creating the Solar Home Renewable Energy Credit (SHREC)
    - Combining go-to-market strategies and also influencing market forces
- Building the team of Green Bank staff and internal culture
- High internal responsiveness to new product rollouts, and the operational flexibility to make rollouts successful
- Incredible growth of the market and our contributions – product and capital rollout
- Developing the Green Bank brand
- Green Bank is recognized as trusted partner for financial institutions
    - Brand, team, operations, and approach all work in tandem
- Specific examples:
    - MacArthur Foundation willingness to commit $5.0 MM program loan
    - The C-PACE warehouse, and how many financing institutions we've partnered with
    - Colebrook Wind project with Webster Bank financing
    - Anaerobic digesters with Peoples United Bank financing
    - Attracting Smart-E lenders
- CT has built a better mousetraps than any others nationally, with:
    - Performance contracting
    - Commercial Property Assessed Clean Energy (C-PACE)
    - Residential Solar Investment Program
- Finding pragmatic solutions
    - Setting up an internal C-PACE warehouse – one of the biggest decisions that made Green Bank a national brand
        - Pragmatic solutions can lead to innovation
        - Securing solar PPAs and leasing through C-PACE
- Community-based campaigns and innovative marketing

Failures (provided by senior staff during warm-up flipchart exercise)

- Spinning out products too quickly and prematurely exiting markets
- We haven't yet created an ecosystem of self-sustained private lending (high-touch required)
- We haven't been successful enough in managing the state bureaucracy to get things done
    - For example, Lead By Example
- On-bill repayment
    - Not being able to engage utilities to implement
    - No path to market
    - Not meeting goals in legislation
- WINN-LISC ESCO
    - "Never in the field of energy efficiency has so much been done for so few, and in this case for none"
- Timely, on-demand management reporting
- Utilities haven't been unlocked as a main channel for growth and partnership
- Stamford's IT infrastructure
- Green Bank should be more engaged with the ecosystem of performance-based tariffs and incentives that affect projects
- Our constraints are human resources and operations, not money. Backroom services struggle to keep up with rapid growth
- Solar lease
    - The goal was to train independents to graduate off of our product. We should've attracted the right players who'd set themselves up with 3rd party capital providers.
    - There wasn't a fallback strategy. Made us smarter in terms of finding servicers – some securities demand certain structural operational features.
    - It stressed the organization to essentially run a leasing company in-house. We had to manage every step.
    - This speaks to prioritization in how we manage resources, and what our exit strategy is, and to *how* we catalyze markets.
- Failure to understand the 3rd party ownership model and the effort to provide for independent installers
    - Replacement of financing partners, and partners' ability to pair with installers.
    - This could happen with commercial solar when the ITC drops. ZRECs have gone way down and lottery participants are price takers.
    - National providers who aren't vertically integrated who must purchase systems are impacted
    - SolarCity is positioned favorably for entry into all markets
- Getting hamstrung by state contracting requirements
- Outreach and marketing requires a sophisticated strategy, which is complicating to sector directors
- Cozy Home Loan product

Takeaways (based on discussion of full group following the flip-chart exercise)

- We've been very successful at initiating products. What we need to do is sustain market growth.
    - Do we have a "phase 2" hybrid role of supporting contractors, and using continued credit enhancement to create a glide path for the market?
    - What does sustained growth look like and what's our role?
- We must strategically manage growth.
    - Barriers arise at various points during the growth period.
    - The growth should also be in our image. Doing it quickly but with private capital making growth accessible and affordable.
    - Campaign model sustainability – without Solarize active in the market soft costs creep up again
- We must be strategic and thoughtful about our own resources and how to pick our spots.
    - How much the Green Bank takes on vs. private partners
    - This includes policy priorities like OBR, R-PACE, solar thermal, etc.
- The life cycle of market intervention isn't the same every time
    - Typical routine: catalyze the market, grow the market, and then exit.
    - Try to replicate the model of graduating the Solar Loan.
- Smarter on picking spots. We have a great team that doesn't want to say "no" because we can probably innovate (pragmatically) toward solutions and problem-solve.
    - But we don't want to come up with everyone's business model. We shouldn't try creating the model if the partner doesn't have one.
    - When we make ourselves an integral part of the model then we get embedded within it even if an exit was contemplated.
- A nuanced approach is required to create a self-sustaining model in certain areas like low-income
- Anaerobic digestion facilities need a faster path to project completion

Connecticut by 2020: Future Accomplishments, Barriers, and Policy Drivers

During this portion of the agenda, there was a sector-by-sector presentation by sector leads followed by full group discussion regarding **what the sector might look like by 2020, what the Green Bank's role should be in the sector, and what might prevent success**

The following policy drivers were brainstormed by the full group, and affect each sector discussed below in varying degrees.

Chart Notes – Policy Drivers
What can get in the way of our success?

1. **Changes in policy drivers or lack thereof**
2. **Internal alignment / resources / process mapping – specially for new products**
3. **Talent in hires / managing churn**
4. **Bureaucratic hurdles/challenges**
5. Utility resistance
6. Split incentives
7. Poor data
8. Failing small is good for learning, but failing big is very risky
9. Next governor / administration

Residential (+ Statutory and Infrastructure) Sector

Sector leaders Kerry O'Neill & Dale Hedman provided a brief presentation on the sector, followed by a discussion with all participants.

Chart Notes – Residential

- "On right path – range of options"
- End uses
  - NG conversions / renewable thermal?
  - Solar
  - Home EE improvements
  - Alternative vehicles?
- Products
  - Smart-E
  - R-PACE
  - Time of sale EE (maybe solar) makeover??
  - New homes??
  - *Green Bonds (MF maybe 1-4)
  - Predevelopment loans
  - Strategic partnerships (Home Depot)
- Strategies
  - Work with banks
  - Better coupling incentives with private capital
- Challenges
  - Split incentives
  - Utility 2.0 issues / Eversource
- 1-4 unit market
  - No stand-alone product needed
  - Support markets – education, contractors
  - Engage in CT + regional policies + legislation + program designs
- Low income + multifamily
  - Won't be at parity
  - Probably still need incentive-based product
    - Could be community solar
    - Could be pilots
- Trends
  - Changes in federal tax incentives
  - Net metering likely replaced
  - SHRECS → RECS

- We realized early that a backbone to driving Green Bank products was to deal with the statutory requirements around incentive programs
- There has been unbelievable market growth. The key is to maintain that consistency in the performance of managing this growth and the provision of incentives without being a hindrance to installers, and without a significant staff increase.
    - Allowing 3rd party owners in to participate was big.
    - We have been effective at timely project approval given a somewhat complicated installation process, and then taking the RECs to market.
- By 2020 the RSIP phase-out will have happened. There will still be a need to address market failures like multifamily, low-income, and maybe community solar, perhaps in the form of a carve-out. We might be a bigger funding participant in those areas by aiming incentives in those areas (possibly requiring policy changes). We also might get led there rather than lead the way based on others' policy aims.
- The transition away from RSIP and toward the REC market means money could be left on the table for the homeowner, further pressuring down solar purchase numbers and continuing the 3rd party trend.
    - Massachusetts Energy Consumers Alliance took care of REC sale administration for homeowners. This could be a place where Green Bank provides a service ("SHREC-to-REC")
- By 2020 we'll have a "value of solar + storage" that will allow other new value models to take hold.
    - The values of buildings will further incorporate these technologies.
    - It could be a challenge if other states choose alternate values.
- Although we'll be involved in certain residential segments, 1-4 unit residences probably won't require our financing support.
- The Green Bank should continue hanging on to contractor partnerships. We will manage a trusted contractor network and curate the market to kick out bad actors.
- We'll have played amid business opportunities with Grid 2.0 pilots.
- Resi solar will have a TAM of 15%, at $3.00 to $3.25 per watt.
    - But net metering will be different and will operate under a different model by 2020.
- There could be a coming opportunity to work regionally to achieve interstate consistency - particularly on incentives.
    - We wouldn't want 6 different fractured markets.
    - This is likeliest to happen with net metering alignment across states.
- Broader policy objectives (including climate change) will continue to underpin the clean energy rollout.

1-4 Unit Residential programs:

- Smart-E (up to 12 years)
- OBR
- R-PACE (15-20 years)

- PosiGen, RSIP LMI
- Solar Lease with no graduate

Multifamily programs:

- In the process of launching a predevelopment loan
- Smart-E
- LIME loan
- Solar PPA and lease model (with CHFA, QECBs, LIME)
- C-PACE
- ZREC

More 2020 predictions:

- Low impact on the overall market thus far. Homeowners and tenants will have accessible and affordable financing by 2020, in addition to access to community solar.
- The utilities' heating loan will be gone
    - 1% of HVAC is replaced annually so this means substantial volume for us. We will have a better relationship with the gas companies then.
- R-PACE can be an open capital, open market platform. R-PACE is a secured loan so it's rationalized as a solution for long-term financing.
- Smart-E will have good product uptake. Smart-E for multifamily will create partnerships using our predevelopment loan product.
- CPACE underwriting guidelines will adjust to multifamily with no legislation needed
- CHFA will issue green bonds for multifamily
- HVAC/natural gas will be a big piece of the volume. Solar, efficiency, controls and NG conversions are a big remarketing opportunity.
- Resi 1-4 has a presence with the home improvement space – good inroads with channel partners
- We'll have raised foundation money to address safety issues, figure out the delivery model, and work with utilities and contractors. Seeing issues with code violations though. Some municipalities give amnesty, some don't and that's a challenge.
- We'll solidify outreach and education to mortgage lenders, and see energy upgrades marketed through MLS.
- We'll be doing quarterly regional lender seminars and quarterly anonymized data publications.
- The LMI approach will incorporate neighborhood revitalization, commercial anchors, etc.
- Split incentives will still be unresolved.

Other:

- Renewable thermal
- Alternative fuel vehicles
- Recycling/waste
- Green bonds – so that it doesn't pull growth funding from ratepayers

Institutional Sector

Sector leader Andy Brydges provided a brief presentation on the sector, followed by a discussion with all participants.

Chart Notes

1. Different (+ bigger) challenges than other sectors
2. Include EE + cover PCB remediation, and also include solar + fuel cells
3. States more actively participate
    - Figure out how much using in building – public disclosure
    - Prioritize buildings
    - Finance with Green Bonds
    - Predevelopment capital
    - Could have buildings compete
    - Whittle down to 3-4 ESCOs
4. Municipal buildings participate
5. Model for other states

- Need funding source for PCBs
- Need utility participation on building energy use data
    - Benchmarking and disclosure
    - Help on 3rd party (e.g., Peregrine)
- Need Governor/DEEP to elevate priority and set goals
- Consider other models besides ESCO – (e.g., INTERNALIZE (UMA), PPAs)
- Green Bank leads with solar projects + brings in the EE package
- Should Green Bank take more assertive / lead role – especially over the next 3 years?

- There is enormous potential in the state building energy market, but it is challenging
- DEEP staff doesn't quite have the building science background to work LBE effectively
- Funding delays gave us the opportunity to build process management functions, so once it's off the ground LBE will be a nationally leading program. We've figured out how to manage contractor margins, price transparency, and reasonableness. There will be a very clear argument for cost effectiveness in these projects.
- The ESCOs are rushing into the municipal market to beat out a state program
- There's a need to encumber funds to pursue ESCO work. It's not "no money up front".
    - Submetering costs, SHPO consultants, breakup fee
- Decades of evidence provide support that it's an effective investment. Similar types of capital projects typically don't rise to the same level of attractiveness so they're falling apart.
- There is no channel for banks to sell, no profit motive for the agencies, no program in a box.

- Enormous political value exists in providing this LBE value to state. Could be helpful in future circumstances. We need to be more aggressive in taking control of these projects, making them happen.
- Public buildings will likely have to be disclosed before pushing the private building sector requirement
- The Governor's office should be more engaged here
- DEEP is a little resistant to push new projects before seeing full life cycles on the 1st three
- Catalysts in other states
    - MA dabbled and found projects too expensive. The state refined the model and brought on engineer analysts, limiting the premium paid to ESCOs.
    - Maryland exempted performance contracting from their bond cap
    - Delaware allows municipal participation under their program
- Steady budgeting (e.g., $50 MM/year) would give the state certainty in budgeting
- Clean Renewable Energy Bonds could be applied, using low cost capital
- The ITC expiration will play into project costs…we could integrate a tax equity component but it will be in a lower range. If a ZREC is applied it should ratchet up a bit to compensate.
- AD project developers want state VNM bucket re-appropriated
- We should figure how hard we want to be the player that pushes everything and rallies players, picking this as our spot.
    - Get a target of not less than $100 M/year and feed the pipeline so despite the administration they move forward.
    - We could draw low cost capital and convene projects, but that takes resources. Do we do solar and remarket? That might be worth another strategy session.
    - Many institutional projects are fuel cell ready.
    - In Phase 1, dump all available projects into the final ZREC auction in 2016 and see what gets picked.
    - We should embed someone in at DEEP/DAS to move this
    - DEEP and DAS are pointing fingers, but there is good work with Joe Cassidy at Construction Services in doing processing
- Some elements of institutional are a bit in between sectors like schools, hospitals.

By 2020:

- Municipalities will be asking themselves why they turned their back on the state program
- The State will have figured out its own energy resources
- The State will have prioritized projects, turning out $50-$100 MM/year.
    - There will be steady bond issuance for projects. Agencies could even compete.
- We will have narrowed qualified ESCO companies down to 3-4 majors
- State revolving fund could be repurposed for PCB cleanup
- More solar (and fuel cells) on SMUSH properties – could play a role in funding PPAs

Commercial & Industrial Sector

Sector leader Genevieve Sherman provided a brief presentation on the sector, followed by a discussion with all participants.

Chart Notes – Commercial and Industrial

1. C-PACE
    a. 750 projects/year, 1-2% penetration/year
    b. 5 capital providers
2. Finance utility bundles - Comprehensive EE; NG conversions; solar plus
3. Recruit/graduate new contractors
4. Solar + storage strategy
5. Partner better with utilities on data
6. All federal agencies / banks consent on C-PACE
7. Sales premium for buildings with EE + solar

Make sure get delivered savings

Or let SolarCity et al take over market? Exit direct lending by 2020? Or step down not out?

Public purpose buildings

- Can't readily use C-PACE (colleges, hospitals, schools - $300 M EE)
- PPA for EE (ESA)
- Develop pilot ESAs
    - Aggregate projects
    - Enhancements – pay as you save / MTU
- By 2020 – successful pilot
- Move program to scale (hard to scale)

Small B – utility program now

- Currently 0%, 4 years with IRB funding
- UI + CMEEC
- Green Bank help move off utility books

Drivers

- Increasing interest rates (market)
- ZREC auctions – line up with financing
- Next generation net metering/value of solar
- Incentives for storage
- Mandatory benchmarking and disclosure – at least at point of sale

- Energy Service Agreements program
    - There are "parking lots" of projects that have undergone energy audits and cash flow analysis that are not moving forward.
        - Public purpose buildings – YMCAs, parochial, hospitals, etc.
        - 47 private colleges, 97 schools
    - These facilities tend not to conceptualize the cash flow savings, might be heavily indebted already, or carry credit risk
        - There may be a need for multiple credit enhancements
    - Bridgeport International Academy is poster child for a failed C-PACE deal. They couldn't get consent, but were approached by a C-PACE capital provider afterward and they were pitched an ESA.
    - We have begun researching solutions, looking toward energy service agreements in case they can be a solution.
        - These measures tend to capture 20-40% savings

By 2020:

- There will be a successful small pilot program with ESAs leading to a 2nd capitalization.
- We'll have figured out how to do solar for this market.
- SBEA
    - Successful utility program.
    - UI gave us the opening to lower the cost of capital and get the program off utility balance sheets. We can use an IRB in more creative ways, using 0% 4-year term-out, and move toward longer terms using private capital.
    - Some businesses have trouble seeing beyond SBEA since they're longer payback measures. We envision customers over a certain size no longer accessing the 0% resource.
    - Can try this in non-Eversource territories – UI, CMEEC
    - Parlay into ESA/OBR and they'll see the value after a few years. Like reducing EEB budget. Sets precedent for EEB to kick in IRB money.
    - There would be ways to split the market with utilities. They would certainly want to keep with what's theirs.
- Warehouse facilities for hard to reach markets
- Standard offer credit enhancement that lenders can use for C&I customers, with the Green Bank as a referral agent

C&I Comments:

- Origination is perceived to be the main game, but the mix of shifting policy incentives plays as important a role.
- ZRECs – we should be positioned as smart users of subsidies. Perhaps we could be the administrator of the ZREC even if it's not extended.

- Every state that does storage has some sort of incentive for it, and Connecticut's demand charges are lower.
    - Demand charges are essentially a replacement solution in place of storage since they pay for the cost of backup capacity.
    - Storage may require a market to be in place so incentives help. However the Green Bank is best when it nudges.
- Under a PPA/lease model, payments are better matched over time with incentives.
- Contractors nervous about regulatory shifts are holding onto their margins because they're needed, given that their project volume isn't huge yet.
- Our presence in the market is needed until major players really stand up, even though it may mean smaller players die off or are absorbed. However a single company (e.g., SolarCity, Renovate America/RENEW) doesn't constitute market self-sustainability. There's the possibility we could just leave it to a major and exit the market.
    - Green Bank involvement helps make sure there's enough capital involvement for all potential projects.

Potential Policy Drivers:

- Extension of the ZREC program
    - RECs are a bigger driver than tax credits, but they are crucial for C-PACE projects
    - It's tough for solar contractors to make payroll for a full year waiting for a ZREC contract. Better to have more frequent auctions, plus line up annualized financing payments with annual incentives.
- Create next generation of tariffs for solar to give the market predictability
- Incentives for storage
    - We asked contractors to consider what a storage tariff might be if it was wrapped into a retrofit job.
- Mandatory benchmarking and disclosure
    - 15 cities currently have it. It should be first in a sequence of policies like incentivizing performance.
- Interest rate environment
    - Do our interest rates track the federal rate as it increases?
    - We've been operating in a very low rate environment. It will make SIR harder to meet as it increases. We could chase low rates but don't want to go out of bounds with Hannon.
- Projects that pencil out aren't necessarily compelling enough for lots of consumers –
    - Penalties/mandates can sometimes be more effective than incentives and CT is mostly incentives.
- "Step down" vs "stepping out"
- Energy savings
    - We need to remove the energy savings barrier to give customer more wiggle room on viability.

    - Should be very confident that projected savings were in fact delivered. If there are differences in energy and interest rate risk, confirming the projections helps allay that risk.
    - Eliminating risk of nonpayment due to energy underperformance.
    - One of PACE's biggest barriers is that we're a pay as you save program with no ability to meter that. Building owners and PACE lenders are on the same page, but the SIR test is in the way. Would prefer strong data, smart-metering requirements than strong audit requirements.
- Deferred capital expense and maintenance is a bigger issue than energy savings to building managers, so should we solve for what they're looking for. Tough to sell based on things like metering which are the purview of DEEP and EEB/utilities.

Building efficiency:

- Campus efficiency model could be a template.
- Public purpose buildings – the facilities do care about the energy savings/performance and that matters.
- This market would have a huge range of credits
    - Not as scalable as a product if this is the case
- Longer terms (which makes it harder to raise capital)
- Pay as you save makes it harder to pay back equity
- Submetering each measure is very expensive – thus performance contractors are fine with expected savings unless it's a really big measure
- Utilities might like to see something like this operationalized

Addressing product situations internally:

- Product situations aren't strictly addressed according to sectors.
    - Agency teams have begun assembling that cut across various areas outside the sector.
    - We should assemble folks in advance to determine whether departmental gaps exist and where outside staff utilization is required.
    - Process mapping is up to the sector/department primarily, afterward discovering other items that require support. We spent lots of time doing cleanup on our assets since we weren't putting in the time doing back end management.
    - Embedded costs tend not to get included when we devote resources.
    - Do we want to engage help of an asset manager? Embedded costs tend not to get included when we devote resources.
- Having a larger failure carries reputational risks with the state.
    - We shouldn't fail based on lack of attention to details that are part of big, visible projects.
    - Our portfolio is in a good place. We got smarter on operational risks based on the Solar Lease handoff, which could've been more elegant.

Connecticut Leadership in the Green Bank Movement

We then broke participants into 3 groups and asked each group to develop a press headline, press outlet, date, and what the Green Bank would've provided to garner the headline—first related to services and products provided in CT and then for assistance outside of CT. The tables below summarize the results of the exercise.

Internal CT Headline	Press Outlet	Date	Agency Assistance	Barriers
Connecticut Green Bank Turns $30 M into $1 Billion	• Hartford Courant • Hartford Business Journal • CT Mirror	November 2017	Cross-sector, total $ deployed: • 3x C-PACE • $100 M LBE • Solar support	• R-PACE • LBE underfund $100M/year • Solar tariffs: VNM, ZREC 2
CT Green Bank Saves State of CT Over $100 MM in Energy Cost Savings Over Next 10 Years	• Hartford Courant • CT Mirror	October 15, 2018	• PPA, ESPC assistance saving energy through EE, solar PV and fuel cells on X facilities at no cost to taxpayer • Collaborates with DEEP, DAS, AG, OTT • Meets policy target ahead of schedule • Muni's follow state lead	• Leaned procurement process to catalyze and accelerate (ignite) shovels in the ground • Overcame inertia and brought parties together on consensus approach and problem
CT on PACE for $100 MM in Residential Clean Energy Improvements	• Hartford Courant • CT Mirror and affiliates	December 2018	• Attributes R-PACE to C-PACE success • Combination of financing structures and technologies • Create open market platform • Cultivated relationships with municipalities	• Federal regulation • Initial legislative hurdles • Typical slow programmatic ramp (overcome by financing platform)

External CT Headline	Press Outlet	Date	Agency Assistance	Barriers
CT Green Bank Fills Climate Change Funding Gap	• Washington Post • Hartford Courant • Boston Globe • CDFI Times	November 2018	• Consulting • Purchase existing portfolios • Replace CGB's place in capital stack • Multiple product lines (LMI, public purpose buildings) • Bring/apply financial engineering begun in CT	• Legal structure • Seed capital – PRI to fund • Level of effort – grant from foundation
World Bank Creates Green Bank Subsidiary Modeled After the CT Green Bank	• Economist • TED Talk	December 31, 2018	• Developing world (e.g., Africa, India) deploying clean energy through P-P partnerships • Driving billions of investment creating local jobs and reducing GHGs • Shift from government subsidies to attracting, deploying, and leveraging public $ for private $	• Overcoming grant mentality – "teaching to fish" • Lack of demonstrating results
Suite of Green Banks Move Clean Power Plan	• Wall Street Journal	February 2017	• Successful program models • Technical aid facilitated by DOE • Ability to account for it MMB • Figuring how to monetize existing/future activities to count toward credits • Spur market activity and investment to create tradable commodity	• Time and resources • Linking the carbon markets • DEEP's focus

2016 Legislative Agenda

The final exercise identified the Green Bank's 2016 legislative strategies. After reviewing approximately a dozen candidates followed by participants' pitching the ones they felt were most important, each participant used their three dots to identify their highest priorities. Based on the discussion and dot exercise, the five below emerged as the highest priorities for the Green Bank for 2016.

Residential PACE

- This proposal will revise the existing R-PACE statute to make residential PACE implementable and open Connecticut's PACE-financing market to homeowners using [subordinated] lien assessments.

C-PACE technical fix

- This proposal would modify the C-PACE consent language. The language needs clarification that an existing mortgage holder is signing consent only for their own lien, and that such consent is only offered on the signor's behalf and not for any other parties to the lien placement or mortgage. It would also make a customer's share of natural gas pipeline infrastructure construction costs financeable.

Solar Home Renewable Energy Credits technical fix

- Operationalizing the groundbreaking policies of Public Act 15-194 regarding Solar Home Renewable Energy Credits will require small adjustments to the authorizing statute. This includes 1) clarifying that the purchase of SHRECs by EDCs may include multiple 15-year purchase obligations that extend beyond 2022; and 2) providing more specification on the apportionment of RECs from SHREC-producing systems after their purchase term is complete.

Remove the Green Bank from CI and establish Special Purpose Entity authority

- Some of the Green Bank's statutory powers are derived from its relationship with Connecticut Innovations, Inc. (CI). As the Green Bank grows it has increasingly required stand-alone back office solutions to operate efficiently. This proposal further disentangles the Green Bank from CI by granting broader authority consistent with quasi-public agencies, such as the ability to create special purpose entities.

Study: Energy benchmarking, disclosure and rating

- Intent: To complete a study to establish ratings and require their disclosure for energy usage in commercial buildings and disclosures of energy usage as a condition of residential property conveyance

The following subjects were discussed and there was consensus to not to make them legislative priorities of the Green Bank. Some of these items are pursuable outside of the legislative process.

- Allowing for crowdfunded investments
- Expanding the agency's bonding authority
- Adjusting state contracting requirements
- Changing the definition of "clean energy"
- Creating designations that might allow outside (federal) funding
- Inserting the Green Bank into renewable thermal technology policy administration

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CONNECTICUT
GREEN BANK

September 30, 2015

Department of Energy and Environmental Protection
Bureau of Energy and Technology Policy
10 Franklin Square
New Britain, CT 06051

RE: Public Comments on Proceedings for the Procurement of Resources to Provide Affordable and Reliable Electricity Pursuant to Public Act 15-107

To the Bureau:

On behalf of the Connecticut Green Bank ("Green Bank"), submitted below are public comments pertaining to the Department of Energy and Environmental Protection's resource procurement process prescribed in Public Act 15-107.

The Department ("DEEP") seeks to reduce the ratepayer-borne costs for Connecticut's electricity sector and generate savings for Connecticut residents while improving supply reliability and grid resiliency. The central issue at hand is the winter peaking problem caused by natural gas transmission constraints during the heating season and the accompanying supply shortages. With natural gas essentially setting the cost of electricity, these constraints pressure electricity rates upward for consumers.

DEEP, the Governor, and the General Assembly have recognized that this problem is addressable with an assortment of strategies. These include securing additional natural gas supply; increasing demand response measures, efficiency and distributed generation; and innovating around energy storage. Like you, we believe that the priorities set forth in Public Act 15-107 will be strong contributors to Connecticut's energy future. As an organization focused on public-private partnerships to scale-up clean energy investment, the Green Bank is pleased to provide the following input.

Specifically, this input includes the following key suggestions:

1. **Small-Scale Clean Energy, Section 1(b)** – DEEP should allow for cost-effective, behind-the-meter distributed solutions to be considered on equal footing with larger, centralized solutions.
2. **Natural Gas Resources, Section 1(d)** – Anaerobic digestion projects should be considered as eligible solutions toward providing pipeline quality methane gas into the natural gas transmission system.

3. **Section 1(e)** – The 15-107 procurement provides an opportunity to assess alternative energy efficiency measurement techniques, and to gain greater data transparency around distribution network infrastructure.

Background and Goals of the Connecticut Green Bank

The Connecticut Green Bank was introduced by Governor Daniel P. Malloy and adopted by the Connecticut General Assembly with bipartisan support as an integral part of Public Act 11-80, "An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut's Energy Future," the same policy roadmap that modernized and oriented DEEP toward the setting of state energy policy.

The goals of the Connecticut Green Bank include:

1. Attracting and deploying private capital to finance the clean energy goals of Connecticut;

2. Developing and implementing strategies that bring down the cost of clean energy in order to make it more accessible and affordable to consumers; and

3. Reducing the market's reliance on grants, rebates, and other subsidies and moving it towards innovative low-cost financing of clean energy deployment.

Procurement Opportunities under PA 15-107

SECTION 1(B) – SMALL SCALE CLEAN ENERGY REQUEST FOR PROPOSALS
In its effort to improve electric grid resiliency and reliability, and to reduce overall electricity demand, DEEP will be seeking certain distributed generation proposals. The agency must solicit passive demand response measures capable of reducing demand by 1 MW or more, either alone or through aggregation. It also must solicit Class I and Class III sources for the underdeveloped segment between 2 MW and 20 MW. Optionally, DEEP may solicit proposals for energy storage systems capable of storing up to 20 MW. It may also solicit Class I sources paired with Class II sources, or with certain existing hydropower, if such pairings will balance the energy source deliveries and improve a proposal's economic viability.

The Connecticut Green Bank and its partners have financed or provided critical financial support to many small-scale clean energy systems since the passage of PA 11-80, including:

- **Solar PV** – $77.5 million of investment in 12,854 solar PV projects totaling 95.6 MW of clean energy capacity and 90,877 MWh of clean energy production a year under the Residential Solar Investment Program (RSIP) and the Commercial Property Assessed Clean Energy (C-PACE) program.

- **Energy Efficiency** – $33.5 million of investment in 378 energy efficiency projects (including CHP) totaling 7.85 MW of capacity and 39,042 MWh of electricity savings a year.[1]
- **Fuel Cells** – Approximately $7.5 million toward the development of a $70 million ~15MW hybrid electrical generating facility in Bridgeport (including an organic Rankine cycle power plant that generates an additional 930 kW of electrical energy). This is the largest fuel cell plant in North America and was developed by Danbury-based Fuel Cell Energy.
- **Wind Energy** - A 5 MW wind project in Colebrook. The Green Bank and Webster Bank provided debt financing to develop the first utility-scale wind project in Connecticut, a $22.5 million project that will supply up to 5,000 kWh of energy per hour to the grid via an interconnection with Eversource under a 20-year PPA pursuant to Section 127 of Public Act 11-80.
- **CHP & AD** - Public Act 11-80, Section 103, statutorily mandates the Green Bank to develop and administer a 3-year Anaerobic Digestion and Combined Heat and Power pilot program to be funded at $2M/year for each program. The Green Bank has a pipeline of projects well in excess of $100 million that will soon commence construction of 8 MWs of highly efficient power generation.
- **Microgrids** – The Green Bank is working with DEEP to promote and facilitate the development of microgrids, leveraging the DEEP Micro Grid Grant and Loan Program pursuant to Public Act 12-148. Several transactions are presently in various stages of consideration and development.

The Green Bank's Comprehensive Plan specifically contemplates an imminent moment when clean energy storage reaches a market inflection point, moving from commercialization to deployment at scale. With this technology now economically viable for certain customer segments, the agency is beginning to identify opportunities to deploy storage where appropriate during the 2016 fiscal year.

The Green Bank is uniquely positioned to devise and implement a coordinated energy storage solution that functions on a distributed basis. In addition to its potential for microgrid applications, energy storage may also hold promise in the residential and commercial sectors. Both of these market segments have seen substantial uptake in solar photovoltaics. Our engagement with adopters of solar PV suggests that they are also among the best prospects for adopting energy storage solutions. These customers tend to have a particular attentiveness to energy savings, with affinities either for grid independence, first-in-line technology adoption, environmental stewardship, or all of the above. Therefore, Connecticut ratepayers who have had previous experience with the Green Bank may be among the likeliest to go deeper with clean battery storage measures. Taking advantage of these prior investments made by end-use customers may present opportunities for the integration of solar PV and storage technologies on site.

The Green Bank has 12,854 projects totaling 95.6 MW of behind the meter clean energy systems into which we could help incorporate battery storage. Over the next 2-3 years, we will help place nearly

[1] Energy efficiency figures are current to June 2015 and include several dozen combined efficiency + solar PV projects financed through the Smart-E loan program.

30,000 additional projects totaling ~ 200 MW of behind the meter clean energy that can be marketed, financed, incentivized, and installed contemporaneously with battery storage systems.

A combined set of improvements could couple a solar PV investment with energy efficiency, demand response, and battery storage, which taken together can facilitate optimal system sizing. The use of solar PV plus battery backup enables users to increase the potential size of solar installations to better meet customer load requirements without selling power back to the grid at a wholesale rate. If net metering tariffs can enable net metering with stored energy, this would help offset the capital cost of a solar PV plus battery backup installation. Further, bundling together multiple measures can ensure that they collectively meet cost-effectiveness tests, and helping homeowners make the decision to engage in deeper energy improvement measures.

Cadmus Group, Inc., has applied the standard cost-effectiveness tests to the Green Bank's Residential Solar Investment Program (RSIP). Incentives provided through RSIP have been reduced in a series of steps resulting in increasing cost-effectiveness as reflected by the Program Administrator Cost Test (PACT) which measures the efficiency of the program in leveraging benefits. The below table shows an overall PACT ratio of 3.05 for the RSIP since its inception in 2012, leveraging each dollar invested with three times the benefit. At the most recent incentive level, step 7, the leveraging ratio is 6.47 to 1, where the Green Bank has reduced subsidies significantly and increased access to financing. While RSIP cost-effectiveness has progressively increased, net benefits have stayed about level and customer economics has been maintained as indicated by the Participant Cost Test (PCT), also shown below for comparison.

CGB RSIP 2012-2015	Benefits	Costs	Net Benefits	Net Benefits/MW	Clean Energy Deployed (MW)	PACT Benefit/Cost Ratio	PCT Benefit/Cost Ratio
Steps 1 & 2	$18,646,724	$12,435,693	$6,211,031	**$839,329**	**7.4**	**1.50**	**1.72**
Step 3	$32,714,259	$15,784,621	$16,929,638	**$1,272,905**	**13.3**	**2.07**	**1.80**
Step 4	$47,901,194	$18,200,235	$29,700,959	**$1,448,827**	**20.5**	**2.63**	**1.83**
Step 5	$33,822,171	$9,467,372	$24,354,799	**$1,645,594**	**14.8**	**3.57**	**1.80**
Step 6	$31,078,515	$6,021,396	$25,057,119	**$1,789,794**	**14.0**	**5.16**	**1.80**
Step 7	$46,247,561	$7,148,375	$39,099,186	**$1,827,065**	**21.4**	**6.47**	**1.57**
Overall	$210,410,423	$69,057,692	$141,352,731	**$1,546,529**	**91.4**	**3.05**	**1.75**

A comparison of RSIP cost-effectiveness with residential energy efficiency programs, provided in the next table below, demonstrates that renewable energy is becoming as or more cost-effective than energy efficiency. RSIP is generally more cost-effective than the energy efficiency programs in terms of program administrative efficiency as measured by the PACT, though it scores lower on the Total Resource Cost (TRC) test. The PACT ratio for RSIP Step 7 represents the most recent incentive level included in the evaluation of the program, now offering an even lower incentive through Step 8. RSIP cost-effectiveness will continue to increase as incentives continue to step down.

CGB RSIP to date compared to Statewide Residential EE[2]		
Program	**TRC**	**PACT**
RSIP – 2012-2015	1.65	3.05
RSIP Step 7 - 2015	1.58	6.47
EE 2015 Statewide – Residential Retail Products	4.23	3.99
EE 2015 Statewide – Residential New Construction	1.95	2.31
EE 2015 Statewide – Home Energy Solutions	2.19	2.44
EE 2015 Statewide – HES Income Eligible	1.92	1.68
EE 2015 Statewide – Water Heating	0.65	2.45
EE 2015 Statewide – Residential Behavior	4.01	3.15
EE 2015 Statewide – Residential Combined	2.59	2.49

With a PACT ratio already approaching 7 to 1, the Green Bank sees the opportunity to bring together a suite of technologies that would provide comprehensive energy solutions for customers and benefits to the grid that would be realized as technology and implementation progresses, while still maintaining overall cost-effectiveness. To explore the impact of combining technologies on cost-effectiveness results, the below table shows combination EE + RSIP ratios, illustrating that a clean energy program with a higher ratio on a given cost effectiveness test will bring up the average when combined with a clean energy program with a lower cost effectiveness ratio on the same test. Therefore, combining technologies provides the flexibility to include individual measures with lower cost-effectiveness, while still resulting in overall cost-effectiveness for a suite of technologies.

Technology Bundle	Test	Benefit	Cost	Ratio
Combined Residential EE	TRC	$292,472,000	$112,923,552	2.59
	PACT	$217,936,000	$87,524,498	2.49
RSIP Overall	TRC	$601,331,172	$364,837,887	1.65
	PACT	$210,410,423	$69,057,692	3.05
RSIP Step 7	TRC	$127,164,744	$80,617,489	1.58
	PACT	$46,247,561	$7,148,375	6.47
Combined EE + RSIP Overall	TRC	$893,803,172	$477,761,439	1.87
	PACT	$428,346,423	$156,582,190	2.74
Combined EE + RSIP Step 7	TRC	$419,636,744	$193,541,041	2.17
	PACT	$264,183,561	$94,672,873	2.79

[2] As provided in the 2015 Annual Update to the 2013-2015 Electric and Natural Gas Conservation and Load Management (CL&M) Plan, http://www.energizect.com/about/eeboard/plans. The energy efficiency results are from Table B3 – 2015 Statewide Total Resource Costs and Benefits, which provides combined CL&P, UI, YGS, CNG, SCG totals.

For another example, including energy storage as part of a suite of technologies would be beneficial from a cost-effectiveness perspective because the policies and regulations in place to monetize the value of energy storage, in particular for residential application, are not yet in place. Energy storage may have a low to zero benefit contribution to a cost-effectiveness ratio at this time, unless one captures customer "willingness to pay." However, when the benefits and costs of energy storage are combined with those for solar PV and potentially also EE and other technologies, this bundle could still be cost-effective now.

Taken in aggregate, these distributed, bundled systems can act as a decentralized form of demand response, with the potential to be operationalized by electric distribution companies (EDCs). Distributed generation plus storage is a cheaper alternative to the use of peaking generation, can defer transmission and distribution infrastructure upgrades, and addresses the intermittency issues traditionally inherent with wind or solar. This provides value on both sides of the meter, as ratepayers have an additional reliability option without the use of polluting diesel generators (supporting Connecticut's climate change goals), and EDCs have additional demand response tools. These benefits could be better measured and leveraged, and as presented above, be favorably evaluated for cost-effectiveness.

The Green Bank therefore proposes that DEEP craft its 1(b) procurement strategy to allow for these technologies to bid into the RFP in an aggregated fashion that makes use of existing incentives, given that they would meet cost-effectiveness tests when combined as a cost-effective suite of technologies. Per Public Act 15-194, Connecticut has the stated policy mandate of deploying 300 MW of residential solar PV by 2022 in total through our Residential Solar Incentive Program, which will require approximately 30,000 *additional* installations. The Green Bank is a flexible partner and is open to a variety of arrangements - it can work with the Connecticut Energy Efficiency Fund, or with private sector entities and other potential counterparties. It can ensure that these new solar customers take advantage of passive demand response measures like lighting and insulation improvements, active demand response measures like programmable thermostats (potentially enabling automated demand response) and battery backup storage. It should be noted that the residential solar incentive program requires an energy audit (e.g., Home Energy Solutions or BPI-based audit) and will reach more than 40,000 households in total to achieve the Governor's 300 MW target for residential solar PV.

Presently, every installation of distributed generation is a one-off project. This lack of a coordinated process for DG deployment exacerbates the cost difference between utility-scale generation and DG solutions. Taken together, the deployment of myriad small clean energy projects paired with storage may demonstrate a marked effect on the winter peaking problem, since distributed storage can be aggregated and dispatched during winter peaks to reduce the need for gas fired electric generation. Under certain circumstances, storage can also be cost-effectively installed behind the meter using existing incentives and consumer financing packages that are already employed toward solar PV. Specifically, bundling solar PV and battery storage together with net metering creates an economical basis for installing storage capacity that it available year-round. The Green Bank is the agency for driving investment toward this solution, given its track record of results with solar PV. Thus our proposal is to remarket solar customers with battery storage solutions, along with passive energy efficiency measures.

There are a number of policy and regulatory questions that would require addressing, given the disruptive potential of battery technology advancements over the long term to the traditional business models of load serving utilities.

Storage as a Dispatchable Asset. EDCs will face additional challenges integrating and recognizing demand-side improvements versus grid-scale systems. One issue is technical – a storage system must be "visible" to EDCs in a more recognizable way than simply being seen as an absence of demand. Further, an EDC would need these assets to be dispatchable in order to credit them against its reserve margin and thus defer duplicative capacity reserves. This raises the question: should EDCs have the ability to directly use customer-acquired assets for the good of all ratepayers? If so, they must determine how frequently their dispatch algorithms assume control over customer batteries, which ones, and what an appropriate level of demand response compensation should be. Regulators should contemplate whether equity concerns might arise from customers, based on how fairly utilities manage these demand-side systems. Also, larger customers with larger battery storage systems may create frequency regulation issues that utilities should be cognizant of in advance of installation.

Rate Structure is at the core of project economics for energy improvements. Battery storage technology can facilitate time-of-use arbitrage for adopters, particularly those with installed solar PV or other net metered resources. Widespread storage deployment may require more nuanced electricity rates to ensure these resources are valued appropriately. Regulators should consider the use of time varied rates and resulting behavior for both net metered and non-net metered properties, and whether the result is likely to be considered a cross-subsidy or an equitable rate treatment given a customer's contributions to the grid. For example, storage systems in high locational marginal price zones may warrant rate adders for their additional usefulness to congested grid areas. Customers with distributed generation may even find that battery storage is a more attractive option in the absence of net metering than when receiving those sellback rates.

Questions and Comments for Consideration under Section 1(b)

To what extent will system aggregation be permitted?

The 2 MW nameplate capacity threshold can be achieved not only through sole source procurements, but also by aggregating many smaller systems together in a unified bid. The Green Bank strongly supports this concept and encourages a similar interpretation from DEEP. In allowing for an aggregated procurement, DEEP can allow for participation of residents and businesses in state energy policy. Nearly $500 million of investment has already been committed to clean energy and efficiency projects, predominantly at the homeowner level with residential solar installations. Bundling new energy improvements with existing installations – whose owners are the likeliest prospects for pursuing deeper measures – will leverage the substantial reach and flexibility of the Green Bank, and demonstrate policy innovation to peer agencies in other states.

Current precedent exists for the unitary consideration of myriad installations, in the sense that PURA currently allows for the aggregation of residential and commercial distributed energy projects into single dockets. Should DEEP accept similar proposals, it should make clear whether they would be analyzed in aggregate as a system-wide average, or with the component parts tested individually.

Will net metering rates be applicable to any projects under the 15-107 procurement?

Under the request for comments it appears that renewable energy project production is only paid per approved contract rates, implying that they are performance-based. For the purpose of analyzing project economics to determine applicability under the procurement, DEEP should clarify whether this is the case.

Disallowance of net metering rates may potentially disqualify aggregated small solar installations from being viable under the procurement, whereas the Green Bank suggests such proposals should be allowed to compete on an "all-in" cost/benefit basis. See also our comments under 1(e) requesting clarification on the use of ratepayer resources.

DEEP should support scaling of cost-effective energy efficiency.

Passive demand response measures like energy efficiency can, at scale, help reduce the incidence of winter peaking problems. However DEEP should develop threshold criteria to ensure that all bids submitted under a 15-107 RFP provide for measures that are cost-effective, inclusive of the use of ratepayer incentive programs that should be allowable for use on projects that bid in to this RFP. This comports with the Green Bank's position on the efficient use of ratepayer funds to develop clean energy resources. The Green Bank has presented data in these comments illustrating that RSIP and residential energy efficiency are cost-effective, and that a combination of solar PV plus energy efficiency and other measures would be complementary while still cost-effective. For energy efficiency, cost-effectiveness is addressed in the Conservation and Load Management Plans and associated Annual Updates. In summary, the Green Bank supports additional resources into energy efficiency to help scale clean energy measures, provided that these measures pass cost-effectiveness tests either on their own or in combination with solar PV and other technologies.

SECTION 1(C) – LARGE SCALE CLEAN ENERGY REQUEST FOR PROPOSALS

DEEP must seek Class I renewable energy sources of 20 MW or more, large-scale hydropower generation, and any associated transmission to tie these resources to the grid. DEEP may also allow for Class II sources to pair with these if the blend benefits the project economics. Lastly, it may also seek large capacity storage systems.

The Green Bank views the aggregation of many small resources as being equally effective as the deployment of single, large-scale projects. A resource that is scattered statewide – while more complex in its management and measurement – can be a greater contributor to grid resiliency.

The Connecticut Green Bank would like to offer its assistance to DEEP in evaluating large-scale projects under Section 1(c) of the Act. In its prior incarnation as the Connecticut Clean Energy Fund, the agency acted as an implementer for Project 150 – an initiative for developers, manufacturers and financiers to advance local Class I projects up to a 150 MW subscription cap. Project 150 successfully set forth a competitive process for renewable energy procured through long-term contracts; in the case of Project 150, the procurement entities were EDCs rather than DEEP. The Clean Energy Fund issued requests for proposals from developers, and conducted the initial screening, evaluation and selection of projects to recommend to the former Department of Public Utility Control. Project 150 has thus far resulted in the installation of two base-load Class I renewable energy projects: (1) 30 MW biomass plant in Plainville, and (2) 15 MW fuel cell park in Bridgeport. Other projects, including a 5 MW utility-scale wind project in Colebrook – arose from the predevelopment project efforts of Project 150 and are now supporting the implementation of Section 127 of PA 11-80. We would be willing to provide DEEP with a member of our team to assist with evaluating proposals for large-scale clean energy projects.

SECTION 1(D) – NATURAL GAS RESOURCES REQUEST FOR PROPOSALS

Section 1(d) approaches the winter peaking problem head-on, requiring solicitations for natural gas proposals. They must provide incremental capacity, gas, or storage, with a firm delivery capability to transport natural gas to gas-fired generating facilities within the ISO-NE load zone.

The Green Bank recognizes the importance of natural gas to the state's Comprehensive Energy Strategy. As a fuel source, natural gas bridges the present fossil-based electricity sector to a future that contemplates much heavier reliance on renewable energy. In the meantime, gas-fired generation provides fast ramping capability that harmonizes with the inherent intermittency of certain clean energy sources like solar and wind. Moreover, securing natural gas supply and addressing capacity issues will help achieve savings over the long term for Connecticut electricity ratepayers.

Connecticut's historical lack of indigenous fuel sources (i.e., coal, oil, natural gas, large hydro, etc.) has been a contributor to high energy prices, in the form of fuel delivery transportation costs. Local distributed generation using renewable fuel sources helps address this. To this point, the Green Bank is helping launch anaerobic digestion facilities, which use accelerated biological decomposition techniques to decompose organic material.[3] The byproducts of such digestion facilities are waste heat and biogas, namely methane that can be upgraded into pipeline-quality natural gas.

The Green Bank proposes in concept that this procurement allow for cleanly-produced biogas from such projects to be inserted into the natural gas transmission system as supplemental supply, under a long-

[3] The agency is working on behalf of Connecticut farms and rural businesses with this pilot program, established per Section 103 of Public Act 11-80, and as amended by Public Act 15-152. Anaerobic digestion technology is complimentary to the waste-to-energy policy aims of Public Act 13-285, whereby such facilities can accept fuel inputs from generators of organic material waste.

term power purchase agreement. On a scale suitable for transmission connection, such a project can demonstrate a novel form of supply or storage that DEEP should consider allowing into its Section 1(d) RFP. The DPUC's "Magellan Decision" speaks to the availability of landfill methane gas as a potential pipeline quality fuel input with Class I designation.[4] A project like this can exemplify the Green Bank's collaborative work to have programs and/or state policies leverage one another for mutual support and gain.

SECTION 1(E) – EVALUATION AND COMPARISON

The Green Bank agrees with the policy objectives that must be considered during proposal evaluation, which include reliability improvement; fuel diversity; positive cost-benefit to ratepayers; improved air quality; restrained environmental impact; and alignment with the Comprehensive Energy Strategy and the Integrated Resources Plan. The agency also supports the optional consideration that proposals confer spillover economic benefits to the state, which is a key focus of the Connecticut Green Bank's mission.

The Green Bank recommends not rejecting out of hand projects that make use of creative experimentation in their business models. The state articulates policy goals and sets the playing field, but should not be too prescriptive towards how projects achieve viability if they otherwise meet the criteria set forth in statute. To a similar point, DEEP should be clear in its RFPs what manner of incentives (e.g., ZRECs, net metering, etc.) it expects to be broadly applicable to project proposals. Bidders must be aware that DEEP will likely select a portfolio of projects that achieves the most with the least cost to the public. In an honest accounting of proposal costs and benefits, projects using ratepayer resources will simply count such resources as ratepayer costs. Otherwise, and without clear explanation, bidders may be submitting proposals without the crucial foreknowledge of whether DEEP holds preference for certain cash flow models over others.

Under our program delivery model, the Green Bank itself is a tool to finance distributed resources, but it does not act alone. Through the Joint Committee of the Green Bank and the Energy Efficiency Board, we have worked with DEEP and the utilities for different programs under different organizations to cross-leverage one another in the market.[5] The evaluation team should in some way recognize when such combined available resources are effectively utilized, and account for that in the course of its cost-benefit tests.

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[4] Precedent exists through 1) PURA Docket No. 03-12-10, *Request of Magellan Envirogas Partners, LLC for a Declaratory Ruling for Renewable Portfolio Standard Class I Certification; and* 2) PURA Docket No. 07-11-25, *Petition of Emcor Energy Services, Inc. for a Declaratory Ruling that the South Norwalk Landfill Methane Gas Facility will Qualify as a Class I Renewable Energy Source*.

[5] *Coordination on Goals and Priorities*, Joint Committee of the Connecticut Energy Efficiency Fund Board and the Connecticut Green Bank Board (September, 2015)

Also, the evaluation mechanism itself provides an opportunity for DEEP, the Office of the Consumer Counsel, the Attorney General, and the procurement manager to test new methodologies. For example, recently-passed energy efficiency legislation in California[6] directs that efficiency payments be linked to reductions in actual metered energy use. This "pay for performance" protocol would encourage efficiency measures that result in persistent savings as measured at the meter, and align the incentives with actual results. This model could allow for regulators and EDCs to influence outcomes, but let market players deliver the actual investment. Investors and contractors could aggregate projects into a portfolio to mitigate risk and improve confidence. An EDC could then pay for performance based on savings over a period of time after the upgrade, likely on a weather-normalized basis.[7] This model might also be tested on the sort of proposal described above in Section 1(b), whereby a Green Bank-led remarketing of storage and passive energy efficiency improvements is measured on a pay-for-performance basis.

Questions and Comments for Consideration under Section 1(e)

Is the program evaluation team amenable to the use of alternative energy efficiency analysis pilots (i.e., "pay for performance" measurement)?

DEEP should use the PA 15-107 procurement as an opportunity to increase transparency and glean better information from EDCs.

Despite our agency's substantial market experience, the real, known value of distributed resources to the power grid remains elusive both to us and to non-utility market participants. This makes it difficult to substantiate a priori the cost effectiveness of a project. As a result, commercial projects and demand side resources are disadvantaged against utility scale projects. We encourage that all interested bidders be furnished with this information when submitting proposals.

As this would be a new practice, DEEP may want to initiate a demonstration project whereby the corresponding information about distribution utility network infrastructure is made public. Perfecting the information available to bidders is likely to ensure that responses received are highly competitive, efficient, and optimally beneficial since bids will focus on addressing areas of highest need. Examples of suggested data include:

- Planned infrastructure upgrades and investment plans
- Interconnection queue
- Existing project queue at the feeder or circuit level
- Locational marginal prices and zonal congestion

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[6] SB-350 and AB-802, both from the 2015-2016 Regular Legislative Session

[7] This concept is explored on pages 12-17 of NRDC's response to California energy efficiency rulemaking 13-11-005: http://www.openeemeter.org/uploads/8/6/5/0/8650231/r1311005_nrdc_comments_on_ee_workshop_3_041315.pdf

- Existing demand behind substations
- Most recent substation upgrades

This manner of data would help firms determine how much demand is available that could potentially be satisfied by deploying distributed generation or storage solutions. It would also help DEEP determine how much cost would otherwise be socialized to ratepayers for infrastructure upgrades, assuming the absence of a solution through PA 15-107 procurement. We strongly suggest DEEP prioritize granular transparency around this data, and that the data be accurate and concise.

An arrangement like this can be done in concert with the Utility 2.0 demonstration project, since as a 15-107 procurement it would be open to market participation and could be run in parallel.

Conclusion

The procurement opportunities presented through Public Act 15-107 have the potential to be transformative to Connecticut's energy landscape, and not only in the sense that such procurements might provide long-term rate stability by addressing winter peaking, or by filling in underworked market segments such as mid-size clean energy generation. Additionally, this procurement can also be leveraged by DEEP to work in tandem with the Utility 2.0 pilot; innovate around the unitary management of disparate distributed resources; assess the efficacy of newer energy efficiency measurement techniques; and supplement interstate natural gas transmission with interconnections to local production derived from clean sources. The Connecticut Green Bank appreciates your consideration of these comments and suggestions, respectfully offered.

Sincerely,

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CONNECTICUT
GREEN BANK

October 29, 2015

Department of Energy and Environmental Protection
Bureau of Energy and Technology Policy
10 Franklin Square
New Britain, CT 06051

RE: Comments on Proceedings for Shared Clean Energy Facilities Pursuant to Public Act 15-113

To the Bureau:

On behalf of the Connecticut Green Bank ("Green Bank"), submitted below are public comments pertaining to the Department of Energy and Environmental Protection's (DEEP's) proceedings on shared clean energy facilities (SCEFs), pursuant to Public Act 15-113.

This response first provides background on the Green Bank, and then describes the Green Bank's role in policy deliberations with SCEFs. It then offers input to the questions posed in the notice of public comment.

In summary, the Green Bank strongly supports the following policy goals: 1) having accessible private investment to finance projects; 2) strategic SCEF location siting; and 3) expanded solar energy access among consumers of limited means – whose household energy burden tends to be highest, proportionally to their income. Thus the Green Bank appreciates that DEEP's questions around RFP bid evaluation methodology propose prioritizing bids that meet these policy goals. Our comments also address DEEP's other requests for feedback, after first introducing the Green Bank and its role in SCEF policy deliberation.

Background and Goals of the Connecticut Green Bank

The Connecticut Green Bank was introduced by Governor Daniel P. Malloy and adopted by the Connecticut General Assembly with bipartisan support as an integral part of Public Act 11-80, "An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut's Energy Future," the same policy roadmap that modernized and oriented DEEP toward the setting of state energy policy.

The goals of the Connecticut Green Bank include:

1. Attracting and deploying private capital to finance the clean energy goals of Connecticut;

2. Developing and implementing strategies that bring down the cost of clean energy in order to make it more accessible and affordable to consumers; and

3. Reducing the market's reliance on grants, rebates, and other subsidies and moving it towards innovative low-cost financing of clean energy deployment.

Green Bank Role in SCEF Policy Discussion

The Green Bank was a panel participant for the SCEF study conducted by the Connecticut Academy of Science and Engineering (CASE). Green Bank staff attended all public sessions for CASE's study and offered comments supporting certain policy principles: 1) that ratepayers of modest financial means should be afforded the opportunity to benefit from an SCEF program, and 2) that SCEF facilities should be sited in locations holding the potential to either improve the electric grid or obviate property-based environmental problems.

There are several ways the Green Bank can be helpful in supporting state policy with regard to SCEFs. First, Green Bank staff would be willing to participate on the RFP review team, evaluating proposals based on the forthcoming RFP's stated policy priorities around SCEFs as outlined by DEEP. Second, the Green Bank can work with project developers to assemble financing models – either for developers themselves or for their SCEF subscribers. We can provide project developers with access to low-cost private capital to help facilitate both subscriber participation and project viability – particularly in the absence of ratepayer incentives. Finally, the Green Bank can bring marketing support to bear on the behalf of either a facility or a broader SCEF program. The Green Bank has substantial experience with clean energy marketing – specifically as regards solar power. We are administering the Residential Solar Incentive Program in the midst of a historically unprecedented growth period for solar, engaging the public through our targeted Solarize campaigns and our customer education and resource platform GoSolarCT.

Response to DEEP Public Comment Questions

The Green Bank offers the following summarized input in Table 1 and in greater detail thereafter.

Table 1. Consolidated feedback on SCEF input prompts

DEEP Question	Support	Not Support	Comments
1. Subscriber role; use of ratepayer incentives	X		Allow for broad use of private investment
2. EDC role	X		Allow for EDC ownership; require

			transparency
3. Tax implications of bill crediting by SCEF	X		Examine implications of "investment" versus "subscription"
4. EDC cost recovery	X		
5. Subscriber models			
6. Special subscriber consideration	X		Prioritize low-income access
7. Special siting consideration	X		Maximize opportunities for grid or environmental benefit
8. Min/max contours: SCEF size Subscribed energy # subscribers	 X X	X	
9. Energy audit requirement	X		
10. Consumer protections			

1. Role of subscribers and applicability of ratepayer-funded incentives

A core tenet of the Green Bank model is that renewable energy can be brought to scale while reducing reliance on public subsidy.

Thus the Green Bank agrees with DEEP's proposal – that publicly subsidized project bids are not fairly comparable with project bids not making use of ratepayer-funded incentives. If DEEP maintains that ratepayer-funded incentives or loans will not be allowable, then the Green Bank could play an important role in helping bring projects to economic viability.

We stand ready to work with both developers and customers in assembling financing models to support SCEF policy. The Green Bank has several financing routes that do not make use of ratepayer dollars:

- Our planned use of "green bonds" is one such method of supporting borrowing costs with low-cost private capital.
- Commercial Property Assessed Clean Energy (C-PACE) transactions are supported by proceeds from the Regional Greenhouse Gas Initiative (i.e. not ratepayer funds). In the near future, 80-90% of C-PACE transaction funding will be drawn from private capital.
- Our Smart-E program helps finance single family residential energy improvements using federal stimulus dollars. As homeowners combine several renewable energy or energy efficiency measures over time, the Green Bank buys down their loan's interest rate as encouragement to pursue deeper improvements. We contemplate the possibility of pairing SCEF subscriptions as another qualifying measure that can be "bundled", so that SCEF participation is leveraged as a gateway to deeper energy efficiency measures.

The Green Bank plays a central role in facilitating development of renewable energy projects of all sizes. We recognize the cost economies of scale (on a total cost-per-kilowatt-hour basis) inherent to large, grid-tied projects, compared with distributed installations that serve only the electricity demand of the host. In a sense, shared clean energy facilities have characteristics of both – projects can be developed at sizes that create favorable cost economies, but to the benefit of geographically-distributed, individual off takers.

2. Role of electric distribution companies

Connecticut began its legislatively-mandated process of electricity sector restructuring in 1998, requiring utilities to divest from ownership of generation assets. The central policy aim was to encourage competition between merchant electricity generators and lower ratepayers' bills for generation costs. In the current competitive environment, customers have more choices for sourcing their electricity than ever before.

However there are legitimate arguments supporting the ability of electric distribution companies (EDCs) to own generation when it supports the aims of state policy. In particular, given the proposed locational preference for SCEF siting (see question #7), EDCs are already best positioned to assess grid improvement needs and thus capture spillover benefits by tying a SCEF to targeted areas of the transmission system. Nationwide, utilities have developed the largest volume of community solar capacity. Also, EDCs have a high degree of experience with program administration generally, which can involve customer acquisition, marketing, and participant changes. Finally, EDCs might have advantages with siting options (e.g., existing rights-of-way) and may have access to lower-cost capital than other market participants.

Should DEEP allow utilities to own SCEF pilots, then their RFP proposals should still be weighed equally with other proposals, and preclude use of ratepayer backing if all other RFP submissions are similarly precluded. Also, given that the EDCs will be partners in one form or another through the SCEF pilot program, we encourage using this opportunity to gain greater transparency around transmission and distribution system data. The real, known value of distributed resources to the power grid remains elusive to non-utility market participants. This makes it difficult to substantiate a priori the cost effectiveness of a project. As a result, commercial projects would be disadvantaged against utility-developed projects in terms of correctly predicting grid benefits. If SCEF ownership is opened to EDCs, the price for entry should be data transparency so that market-based solutions can compete and offer facility bids that carry grid improvement benefits as well.

3. Subscriber tax implications of SCEF-managed crediting

Tax implications for subscribers can generally be minimized if subscriptions are treated as utility bill offsets, and not as investments in tradable securities that offer returns to subscribers. Shared clean energy is meant to offset a customer's electricity usage, not create a revenue stream. Should a SCEF

model be characterized as an investment where "shares" of output are purchased, then federal securities regulations would apply to the proceeds received by subscribers.

Under normal circumstances a typical residential subscriber would not have the tax appetite to monetize federal tax credits that flow to a project's owners; this is another factor that limits the practicality of direct ownership stakes in SCEFs by subscribers. However a recent private letter ruling by the Internal Revenue Service allowed one particular subscriber of a Vermont community solar array to take advantage of the federal Investment Tax Credit.[1] Although this was only applicable to the petitioner in question, this interpretation of Internal Revenue Code might open the door to more direct subscriber ownership of shared clean energy facilities.

4. PURA clarification to ensure EDC cost recovery

It would minimize ambiguity for Connecticut's EDCs – and thus for SCEF program development – if PURA clarified the recoverability of administrative and power purchase costs associated with the program. As stated in the request for comments, if some form of EDC payment to SCEF developers is necessary, then the statute should be reasonably interpreted to allow for EDC cost recovery.

5. Potential subscriber models

We have no comment on this question

6. Low-to-moderate income customer inclusion

DEEP *should* adopt program design features that would target SCEF participation for low-to-moderate income customers.

If DEEP decides to accept RFP bids on the basis of a project's ability to truly excel in just one policy goal, rather than perform admirably across a weighted average of factors, then low-income service might be one such singular qualifier. For example, DEEP might give particular value to a project that demonstrates a novel approach to serving the low-to-moderate income segment – a project that can generate and return topical data to DEEP for future assessment and application to this market. In addition to reserving or prioritizing RFP bids that target this market, the Green Bank also supports the concept of a quantitative mechanism that favorably weights such RFP bids during DEEP's evaluations.

The Green Bank is taking equity concerns into consideration too, through its Residential Solar Investment Program. We are ramping up clean energy financing that specifically targets customers

[1] As chronicled by the Clean Energy States Alliance (CESA) in September 2015:
http://www.cesa.org/about-us/member-news/newsitem/IRS-Community-Shared-Solar-PLR
The Connecticut Green Bank is a founding member of CESA and is the leading member for Connecticut. Andy Brydges, the Green Bank's Director of Institutional Programs, is currently CESA's president.

below their geographic area median income. The Green Bank is offering a modified version of its Performance-Based Incentive to solar PV installers that serve low-income homeowners, with the goal of developing broader solar penetration across more income classes, particularly those households with 60-80% and 80-100% area median income (see Figure 1). In the process, we are seeing innovative new methods of customer means-testing that work to the benefit of otherwise credit-barred customers. With SCEFs mimicking on paper the transaction of having on-site solar power, these methods (e.g., looking for steady histories of utility payments) might also be used when building an SCEF customer base in this market.

Figure 1. Solar PV deployment under the Connecticut Green Bank and the Connecticut Clean Energy Fund

Income Level (AMI)	# of Census Tracts	Tract Pop.	# of Projects	Projects per Capita	Installed Capacity (kW)	Installed Capacity per Capita
Less than 60%	158	586,109	410	0.00070	2,370	0.00404
60-80%	77	348,375	731	0.00210	4,766	0.01368
80-100%	186	825,379	2,462	0.00298	16,857	0.02042
100-120%	173	753,320	3,875	0.00514	28,647	0.03803
More than 120%	230	1,053,233	5,652	0.00537	43,630	0.04142
Total	**824**	**3,566,416**	**13,310**	**0.00368**	**96,270**	**0.02699**

7. Locational preferences

DEEP should give preference to RFP bids for SCEFs in targeted locations that confer benefits to:

The Electric Grid – Shared clean energy systems can serve greater public benefits when they are built in congested areas of the electric grid (e.g., close to demand pockets that are remote from central station generators), helping bypass the need for redundant poles and wires on those circuits. Such projects can help defer capital expenditures in intermittently overloaded substations that may soon come due for replacement, absent any targeted peak shaving solutions. These congested areas may have high locational marginal prices (LMPs); if a SCEF were to help address high zonal LMPs, then it could also apply downward pressure to the averaged prices encountered by retail consumers.

The Environment – Connecticut has many brownfields that are essentially unusable until they undergo environmental remediation measures. Siting SCEFs on brownfields cycles those properties back into purposeful use faster. Such placement may also be less likely to stir up local opposition that sometimes recoils at the concept of using undeveloped "green space" for energy production – pitting one environmental concern (conservation) against another (renewable energy).

Low Income Households – Certain geographic locations have higher densities of households below the area median income. Siting clean energy – and not polluting power stations - close to these

neighborhoods could be seen positively as a reversal of the environmental equity burden that is endemic to low-income communities. Further, the shared clean energy facilities themselves may act as marketing tools by virtue of their visibility, aimed at the surrounding community that most frequently views them and drawing more local participation.

8. RFP contours

We have no comment on this question.

9. Energy audit requirements

The Green Bank supports home or business energy audits as a prerequisite for subscriber participation in SCEFs, if they have not already engaged in an energy audit in the previous three years. Would-be residential subscribers would work through the Home Energy Solutions and Smart-E Loan programs, while businesses would work through the Small Business Energy Advantage or C-PACE programs. The attraction of would-be customers toward being a SCEF subscriber could thus be used to leverage deeper penetration of basic energy efficiency measures and education. Requiring energy audits of subscribers would curtail the incidence of "throwing good money after bad" - putting clean energy from SCEFs to inefficient use.

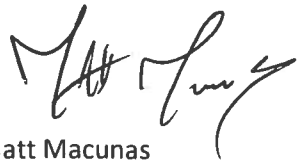
10. Consumer protections

We have no comment on this question.

Conclusion

The Green Bank appreciates the opportunity to provide input on DEEP's policy framework for shared clean energy facilities. We stand by its stated policy priorities – using SCEF policy to drive progress in grid improvement and low income market penetration – and we are prepared to mobilize private capital to finance projects.

Sincerely,



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