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

CONNECTICUT
GREEN BANK

July 10, 2015

Dear Connecticut Green Bank Board of Directors:

We have a regular meeting of the Board of Directors scheduled for Friday, July 17, 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** – We have several items, including the meeting minutes for June 19, 2015, proposed revisions to the Comprehensive Plan for FY 2015 and FY 2016, and overview of the meetings of the Board of Director and Committees. The officer-proposed revisions include the board approved FY 2016 budget and targets, new name and brand, inclusion of board committees, including an elaboration on Joint Committee of the Energy Efficiency Board and Connecticut Green Bank, and some additional definitions for SHREC, AFV and Infrastructure, and other items. You will note that we have left some space in the Comprehensive Plan to insert joint goals and objectives that will come out of the Joint Committee later on in the year. For the first time, we have also put together a summary memo of the governance of the organization for FY 2015.

- **President's Update** – I will report out with Brian Farnen on the end of the summer session for the legislature and the implementer bill.

- **Commercial and Industrial Sector Programs** – we are bringing forward three (3) C-PACE transactions for your review and approval – totaling about $1.0 million in financing in Hartford, South Windsor, and Windsor. We will also provide a quick update on the progress being made for the private capital facility for C-PACE.

- **Statutory and Infrastructure Sector Programs** – we are bringing forward our recommendations for Steps 8 through 10 for the Residential Solar Investment Program (RSIP). We are proposing 30 MW each step for a total of 90 MW – all consistent with the FY 2016 targets approved by the Board of Directors in June. Now that we have the SHREC policy in place, all program incentives and administrative costs will be covered through the RSIP. You should note that as part of our recommendations for the PBI and EPBB incentives, that we are excited to recommend a low to moderate income (LMI) PBI incentive to improve deployment of residential solar PV in census tracts less than 100% of Area Median Income (AMI).

- **End of the Year Updates** – we have wrapped up our forth fiscal year as the Connecticut Green Bank! We will be providing you with updates on the four sectors – Statutory and Infrastructure, Residential, Commercial and Industrial, and Institutional. Overall, it was another great year. We continue to build on our success and are demonstrating how the green bank model is working to increase and accelerate private investment and deployment of clean energy.

- **<u>Other Business</u>** – if we have any time left, and there are other business issues that the staff or members of the Board of Directors wants to raise, we will have time for that.

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

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

Friday, July 17, 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 June 19, 2015*
    b. Proposed Revisions to Comprehensive Plan for FY 2015 and FY 2016*
    c. Board of Directors and Committees Report for FY 2015*

4. Update from the President – 5 minutes

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

    a. C-PACE Transactions*

        i. Hartford – C-PACE Transaction*
        ii. South Windsor – C-PACE Transaction*
        iii. Windsor – C-PACE Transaction*

    b. C-PACE Private Capital Warehouse Provider Update

6. Statutory and Infrastructure Sector Program Updates and Recommendations* – 45 minutes

    a. Residential Solar Investment Program (Steps 8 through 10) – SHREC

7. Sector Updates and Progress to Targets for FY 2015* – 20 minutes

8. Other Business – 10 minutes

9. Adjourn

*Denotes item requiring Board action

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Access Code: 241-732-167

RESOLUTIONS

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

Friday, July 17, 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 June 19, 2015*

Resolution #1

Motion to approve the minutes of the Board of Directors Regular Meeting for June 19, 2015.

   b. Proposed Revisions to Comprehensive Plan for FY 2015 and FY 2016*

Resolution #2

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 approved the Comprehensive Plan for FY 2015 and FY 2016 at a meeting on June 20, 2014;

WHEREAS, Article V of the Green Bank Operating Procedures requires the Green Bank Board of Directors (the "Board") to adopt an Annual Plan for each forthcoming fiscal year;

WHEREAS, the Board of Directors has approved the annual plan of operation for Fiscal Year 2016 at a June 19, 2015 meeting;

WHEREAS, the officers of the Connecticut Green Bank propose revising the Comprehensive Plan for FY 2015 and FY 2016 to update it with respect to the approval by the Board of Directors of the annual plan of operation including budget and targets for FY 2016 at the June 19, 2015 meeting;

WHEREAS, the officers of the Connecticut Green Bank propose further revising the Comprehensive Plan for FY 2015 and FY 2016 including the revisions proposed in a memo dated July 10, 2015 and a redline version of the Comprehensive Plan updated on July 17, 2015;

NOW, therefore be it:

RESOLVED, that the Board approves the proposed revisions by the officers of the Comprehensive Plan for Fiscal Years 2015 and 2016; and

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

c. Board of Directors and Committees Report for FY 2015*

<u>Resolution #3</u>

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") and vests the power in a Board of Directors comprised of eleven voting and two non-voting members; and

WHEREAS, the structure of the Board of Directors is governed by the bylaws of the Connecticut Green Bank, including, but not limited to, its powers, meetings, committees, and other matters.

NOW, therefore be it:

RESOLVED, that Board has reviewed and approved the Overview of Compliance Reporting and the Board of Directors and Committees for FY 2015 memo dated July 10, 2015 prepared by staff, which provides a summary report of the FY 2015 governance of the Board of Directors and its Committees of the Connecticut Green Bank.

4. Update from the President – 5 minutes

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

a. C-PACE Transactions*

i. Hartford – C-PACE Transaction*

Resolution #4

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 $479,810 construction and (potentially) term loan under the C-PACE program to HARC, Inc. (f/k/a The Greater Hartford Association for Retarded Citizens, Inc.), the building owner of 900 Asylum Ave, Hartford, 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 July 17, 2015, and as he or she shall deem to be in the interests of the Board 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. South Windsor – C-PACE Transaction*

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 $116,074 construction and (potentially) term loan under the C-PACE program to Carmon & Company, LLC., the building owner of 419 Buckland Road, South Windsor, 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 July 17, 2015, and as he or she shall deem to be in the interests of the Board 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. Windsor – C-PACE Transaction*

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 $389,124 construction and (potentially) term loan under the C-PACE program to Carmon Properties, LLC, the building owner of 807 Bloomfield Ave, Windsor, 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 July 17, 2015, and as he or she shall deem to be in the interests of the Board 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.

b. C-PACE Private Capital Warehouse Provider Update

6. Statutory and Infrastructure Sector Program Updates and Recommendations* – 45 minutes

a. Residential Solar Investment Program (Steps 8 through 10) – SHREC

<u>Resolution #7</u> (Subject to change based on Deployment Committee recommendation)

WHEREAS, Public Act 15-194 "An Act Concerning the Encouragement of Local Economic Development and Access to Residential Renewable Energy" (the "Act") requires the Connecticut Green Bank ("Green Bank") to design and implement a Residential Solar Photovoltaic ("PV") Investment Program ("Program") that results in no more than three-hundred (300) megawatts of new residential PV installation in Connecticut before December 31, 2022 and creates a Solar Home Renewable Energy Credit ("SHREC") requiring the electric distribution companies to purchase through 15-year contracts the Renewable Energy Credits ("RECs");

WHEREAS, as of June 26, 2015, the Program has thus far resulted in approximately eighty-two megawatts of new residential PV installation application approvals in Connecticut – about 52 MW prior to January 1, 2015 and 26 MW after January 1, 2015 –

and when complete and commissioned will achieve about twenty-five percent of the target of three-hundred megawatts established per Public Act 15-194;

WHEREAS, on July 2, 2015, Governor Malloy officially signed Public Act 15-194 thereby passing the law;

WHEREAS, pursuant to Conn. Gen Stat. 16-245a, a renewable portfolio standard was established that requires that Connecticut Electric Suppliers and Electric Distribution Company Wholesale Suppliers obtain a minimum percentage of their retail load by using renewable energy;

WHEREAS, real-time revenue quality meters are included as part of solar PV systems being installed through the Program that determine the amount of clean energy production from such systems as well as the associated RECs which, in accordance with Public Act 15-194 will be sold to the Electric Distribution Companies through a master purchase agreement entered into between the Green Bank, Eversource Energy, and United Illuminating, and approved by the Public Utility Regulatory Authority;

WHEREAS, pursuant to the Act, the Green Bank has prepared a declining incentive block schedule ("Schedule") that offers direct financial incentives, in the form of the expected performance based buy down ("EPBB") and performance-based incentives ("PBI"), for the purchase or lease of qualifying residential solar photovoltaic systems, respectively;~~ and~~

WHEREAS, pursuant to the Act, to address willingness to pay discrepancies between communities, the Green Bank will provide additional incentive dollars to improve the deployment of residential solar PV in low to moderate income communities; and

WHEREAS, the Deployment Committee recommended on July 14, 2015 that the Board approve of the Schedule of Incentives as set forth in Tables 3 and 4 of the memo dated July 10, 2015 with one revision changing the new Low to Moderate Income incentive for Step 9 to "to be determined."

NOW, therefore be it:

RESOLVED, that Board approves of the Schedule of Incentives as set forth in Tables 3 and 4 of the memo dated July 10, 2015 to achieve 90.0 MW of solar PV deployment over FY 2016 – 30.0 MW from Step 8, 30.0 MW from Step 9, and 30.0 from Step 10;

RESOLVED, that per Public Act 15-194, the Board instructs staff to limit approval of direct financial incentives to no more than one hundred megawatts of new qualifying residential solar photovoltaic systems, in the aggregate, between the date of passage of Public Act 15-194 and April 1, 2016. ~~.~~

7. Sector Updates and Progress to Targets for FY 2015* – 20 minutes

Resolution #8

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 Connecticut Green Bank 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 Program Performance towards Targets for FY 2015 memos dated July 10, 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.

8. Other Business – 10 minutes

9. Adjourn

*Denotes item requiring Board action

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CONNECTICUT
GREEN BANK

Board of Directors Meeting

July 17, 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

- **<u>Meeting Minutes</u>** – approval of meeting minutes of June 19, 2015

- **<u>Comprehensive Plan</u>** – proposed revisions to Comprehensive Plan for FY 2015 and FY 2016, including branding, definitions, FY 2016 budget and targets, committees, Joint EEB and CGB, bond updates (REEEF, GLGF, SCRF)

- **<u>Governance Report</u>** – FY 2015 BOD and Committee report

Board of Directors
Agenda Item #4
Update from the President

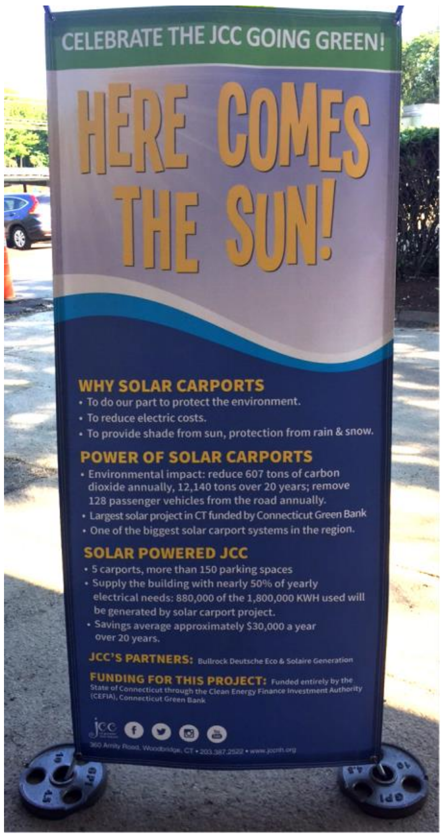
Update from the President
Legislative Session – Summer

- **<u>REEEF</u>** – supports RE and CHP projects in consultation with DEEP, DECD, and OTT. Legislature cancelled $10 million of $18 million ($8 million authorized)
- **<u>GLGF</u>** – supports loan guarantees for local lenders for individuals, small businesses, and non-profits in consultation with CHEFA and EEB. Legislature didn't cancel anything ($18 million authorized)
- **<u>SCRF</u>** – expanded the special capital reserve fund from $50 million to $100 million to support bonding. Deemed appropriated language for "Lead by Example" not included.
- **<u>Set Aside Requirements</u>** – quasi-public organizations included in 25% set-aside requirement for small and minority owned businesses if state funds are used.

Update from the President
New England's Largest Solar Carport

jcc of greater new haven

Bullrock Deutsche-Eco Solar
NEW ENERGIES. NEW HORIZONS.



Solar carport

Transmission lines

Hybrid electric bus

Board of Directors

Agenda Item #5

Commercial and Industrial Sector

C-PACE Update

- $44.6 million closed (68) deals;
- $70 million since inception (over 100 approved)
- 111 towns = over 85% eligible market covered
- 36 banks have provided mortgage lender consent
- 42 contractors have approved projects
- Over 100 contractors registered

Board of Directors

Agenda Item #5ai

Commercial and Industrial Sector

C-PACE – Hartford

900 Asylum Avenue, Hartford Ratepayer Payback

CONNECTICUT GREEN BANK

PHOTO REDACTED

- **$479,810** to install a solar PV system, lighting & HVAC upgrades
- Projected savings are **31,384 MMBtu** versus **$479,810** of ratepayer funds at risk.

- Ratepayer funds will be paid back in one of the following ways
  - ❑ (a) through a take-out by a private capital provider at the end of construction (project completion);
  - ❑ (b) subsequently, when the loan is sold down to a private capital provider; or
  - ❑ (c) through receipt of funds from the City of Hartford as it collects the C-PACE benefit assessment from the property owner.

900 Asylum Avenue, Hartford
Terms and Conditions

- **$479,810** construction loan at 5% and term loan set at a fixed 5.70% over the 17-year term
- **$479,810** loan against the property
  - Property valued at **REDACTED**
  - Loan-to-value ratio equals **REDACTED**; Lien-to-value ratio equals **REDACTED**
- DSCR > **REDACTED**

900 Asylum Avenue, Hartford
The Five W's

- **What?** Receive approval for a $479,810 construction and (potentially) term loan under the C-PACE program to HARC, Inc. to finance the construction of specified energy upgrade
- **When?** Project to commence 2015
- **Why?** Allow Green Bank to finance this C-PACE transaction, continue to build momentum in the market, and potentially provide term financing for this project until Green Bank sells it along with its other loan positions in C-PACE transactions.
- **Who?** HARC, Inc., the property owner of 900 Asylum Avenue, Hartford CT
- **Where?** 900 Asylum Avenue, Hartford CT

900 Asylum Avenue, Hartford
Project Tear Sheet

REDACTED

900 Asylum Avenue, Hartford Anticipated Cash Flow

CONNECTICUT GREEN BANK

CGB Pro Forma

Project Basics		*Cash Flows*	
		Date	CEFIA $
Amount Financed	$479,810	Jul 2015	$479,810
Construction Period (years)	0.42	Nov 2015	$9,996
Term (years)	17	Jan 2016	$44,444
Construction Financing Rate	5.00%	Jan 2017	$44,444
Term Financing Rate	5.70%	Jan 2018	$44,444
		Jan 2019	$44,444
Construction Interest Payment (bullet)	$9,996	Jan 2020	$44,444
Yearly Debt Service Payments (made semi-annually)	$44,444	Jan 2021	$44,444
		Jan 2022	$44,444
		Jan 2023	$44,444
		Jan 2024	$44,444
		Jan 2025	$44,444
		Jan 2026	$44,444
		Jan 2027	$44,444
		Jan 2028	$44,444
		Jan 2029	$44,444
		Jan 2030	$44,444
		Jan 2031	$44,444
		Jan 2032	$44,444
		Jan 2033	$0
		Jan 2034	$0
		Jan 2035	$0

900 Asylum Avenue, Hartford
Key Financial Metrics

REDACTED

Board of Directors

Agenda Item #5aii

Commercial and Industrial Sector

C-PACE – South Windsor

419 Buckland Road, South Windsor Ratepayer Payback

- **$116,074** to install 24.25 kW solar PV system
- Projected savings are **1,877 MMBtu** versus **$116,074** of ratepayer funds at risk.

PHOTO REDACTED

- Ratepayer funds will be paid back in one of the following ways
  - ❑ (a) through a take-out by a private capital provider at the end of construction (project completion);
  - ❑ (b) subsequently, when the loan is sold down to a private capital provider; or
  - ❑ (c) through receipt of funds from the Town of South Windsor as it collects the C-PACE benefit assessment from the property owner.

419 Buckland Road, South Windsor Terms and Conditions

CONNECTICUT GREEN BANK

- **$116,074** construction loan at 5% and term loan set at a fixed 6% over the 20-year term
- **$116,074** loan against the property
  - Property valued at **REDACTED**
  - Loan-to-value ratio equals **REDACTED**; Lien-to-value ratio equals **REDACTED**
- DSCR > **REDACTED**

419 Buckland Road, South Windsor
The Five W's

- **What?** Receive approval for a $116,074 construction and (potentially) term loan under the C-PACE program to Carmon & Company LLC to finance the construction of specified energy upgrade
- **When?** Project to commence 2015
- **Why?** Allow Green Bank to finance this C-PACE transaction, continue to build momentum in the market, and potentially provide term financing for this project until Green Bank sells it along with its other loan positions in C-PACE transactions.
- **Who?** Carmon & Company LLC, the property owner of 419 Buckland Road, South Windsor CT
- **Where?** 419 Buckland Road, South Windsor CT

419 Buckland Road, South Windsor Project Tear Sheet

REDACTED

419 Buckland Road, South Windsor
Key Financial Metrics

REDACTED

Board of Directors

Agenda Item #5aiii

Commercial and Industrial Sector

C-PACE – Windsor

807 Bloomfield Ave, Windsor Ratepayer Payback

PHOTO REDACTED

- **$389,124** to install 99 kW solar PV system
- Projected savings are **5,803 MMBtu** versus **$389,124** of ratepayer funds at risk.

- Ratepayer funds will be paid back in one of the following ways
  - ❑ (a) through a take-out by a private capital provider at the end of construction (project completion);
  - ❑ (b) subsequently, when the loan is sold down to a private capital provider; or
  - ❑ (c) through receipt of funds from the Town of Windsor as it collects the C-PACE benefit assessment from the property owner.

807 Bloomfield Ave, Windsor Terms and Conditions

- **$389,124** construction loan at 5% and term loan set at a fixed 5.5% over the 15-year term
- **$389,124** loan against the property
  - Property valued at **REDACTED**
  - Loan-to-value ratio equals **REDACTED**; Lien-to-value ratio equals **REDACTED**
- DSCR > **REDACTED**

807 Bloomfield Ave, Windsor
The Five W's

- **What?** Receive approval for a $389,124 construction and (potentially) term loan under the C-PACE program to Carmon Properties, LLC to finance the construction of specified energy upgrade
- **When?** Project to commence 2015
- **Why?** Allow Green Bank to finance this C-PACE transaction, continue to build momentum in the market, and potentially provide term financing for this project until Green Bank sells it along with its other loan positions in C-PACE transactions.
- **Who?** Carmon Properties, LLC, the property owner of 807 Bloomfield Ave, Windsor CT
- **Where?** 807 Bloomfield Ave, Windsor CT

807 Bloomfield Ave, Windsor Project Tear Sheet

REDACTED

807 Bloomfield Ave, Windsor Anticipated Cash Flow

CONNECTICUT GREEN BANK

Green Bank Pro Forma

Project Basics			*Cash Flows*
Amount Financed	$389,124	Date	CEFIA $
Construction Period (years)	0.50	Jul 2015	$389,124
Term (years)	15	Dec 2015	$9,728
		Jan 2016	$38,433
Construction Financing Rate	5.00%	Jan 2017	$38,433
Term Financing Rate	5.50%	Jan 2018	$38,433
		Jan 2019	$38,433
Construction Interest Payment (bullet)	$9,728	Jan 2020	$38,433
Yearly Debt Service Payments (semiannual, yrs 1-15)	$38,433	Jan 2021	$38,433
		Jan 2022	$38,433
		Jan 2023	$38,433
		Jan 2024	$38,433
		Jan 2025	$38,433
		Jan 2026	$38,433
		Jan 2027	$38,433
		Jan 2028	$38,433
		Jan 2029	$38,433
		Jan 2030	$38,433

807 Bloomfield Ave, Windsor
Key Financial Metrics

REDACTED

Board of Directors

Agenda Item #5b

Commercial and Industrial Sector

C-PACE Private Capital Warehouse Provider Update

Board of Directors

Agenda Item #6

Statutory and Infrastructure Sector

Residential Solar Investment Program

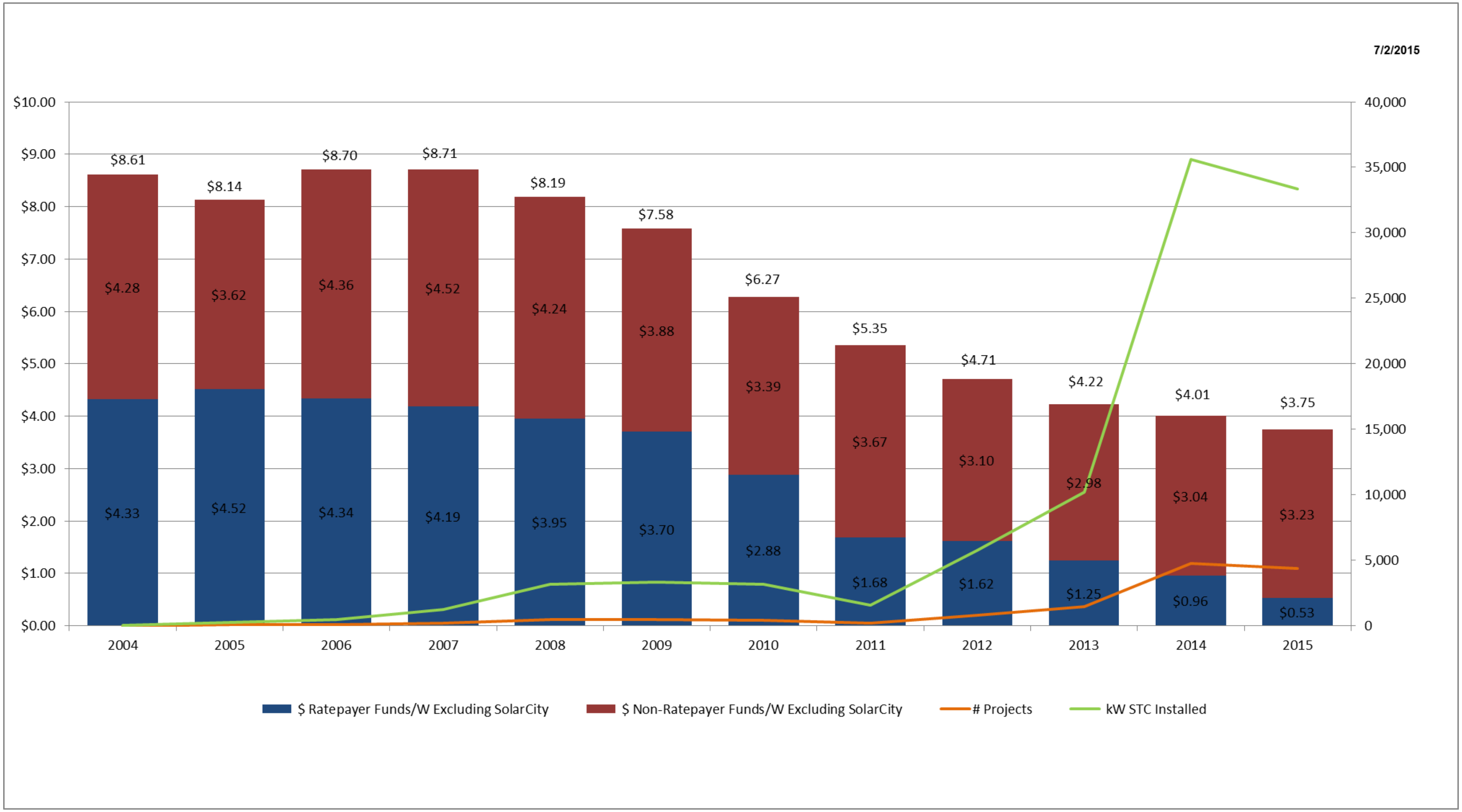
RSIP Progress to Date

- **Demand** – approved nearly 85 MW to date, of which over 55 MW from FY 2015 (more than triple FY 2014)
- **Installed Costs** – reduced by almost 30% since 2011 (from $5.35/W to $3.75/W)
- **Incentive** – reduced by almost 70% since 2011 (from $1.68/W to $0.53/W)
- **Financing** – increase in use of financing products (i.e., more than 1,434 projects and $43.1 million in approved loans and leases in FY 2015

REFERENCES
Note – installed costs exclude Solar City.
Financing includes Smart-E ($4.4 MM), CT Solar Lease ($36.2 MM), and CT Solar Loan ($2.5 MM)

RSIP Progress to Date

CONNECTICUT GREEN BANK



REFERENCES

Market Watch Report (July 10, 2015)

RSIP Progress to Date
Income Distribution by Census Tract

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**

For LMI to reach non-LMI market penetration, solar PV deployment in less than 60% AMI, 60-80% AMI, and 80-100% AMI **would have to increase by approximately 10 times, 3 times and 2 times respectively**

REFERENCES
Note – projects include both Connecticut Clean Energy Fund and Connecticut Green Bank.

SHREC Policy Overview

- **Target** – establishes a new target from "no less than 30 MW by the end of 2022" to "no more than 300 MW by the end of 2022"
- **SHREC** – establishes a "solar home renewable energy credit" (SHREC)
  - ✓ Master Purchase Agreement – EDCs must purchase Class I RECs from the CGB's RSIP over a 15-year period at a price set by the CGB through a Master Purchase Agreement approved by PURA.
  - ✓ SHREC price includes RSIP incentive and administrative costs, as well as costs of securitization.
  - ✓ SHREC price can't exceed $50 (i.e., lesser of small ZREC or $5 less than ACP) and must decline over time.
- **Permitting** – seeks to improve permitting processes in municipalities and lower "soft costs"

Proposed Steps 8 through 10 Structure and Launch

- **Race to the Rooftop**
  - BOD approved 90 MW of RSIP in FY 2016
  - Establishes “race to the rooftop” targets of 30 MW each for Steps 8 through 10 for a total of 90 MW
  - Establishes 4.5 MW for LMI market segment to start (i.e., less than 100% of AMI)

- **Launch** – Step 8 to begin on August 7, 2015 (i.e., three weeks following BOD approval – notice to installers), and Steps 9 and 10 to immediately follow conclusion of “race to the rooftop” of prior step.

Proposed Steps 8 through 10
Schedule of Incentives

RSIP Incentive Step	EPBB ($/W)			PBI ($/kWh)	
	≤5 kW	5 to 10 kW	>10 kW	≤10 kW	>10 kW
Step 6	$0.675		$0.400	$0.080	$0.060
Step 7	$0.540		$0.400	$0.064	$0.060
Step 8	**$0.540**		**$0.400**	**$0.054**	**$0.054**
Step 9	**$0.513**		**$0.400**	**$0.046**	**$0.046**
Step 10	**$0.487**		**$0.400**	**$0.039**	**$0.039**

The estimated RSIP incentives at an equivalent 15-year price ($/REC) is $22-$33 for Step 8, $19-$32 for Step 9, and $16-$30 for Step 10.

REFERENCES

Note – SHREC applies to projects approved after January 1, 2015, which begins at Step 6.

Proposed Steps 8 through 10 Schedule of Incentives LMI PBI

RSIP Incentive Step	LMI PBI ($/kWh)	
	≤10 kW	>10 kW
Step 8	**$0.110**	**$0.055**
Step 9	**TBD**	**TBD**
Step 10	**TBD**	**TBD**

LMI PBI established at these levels to support Board-approved PosiGen investment and to reduce overall energy burden for <100% AMI households.

Reduction in Energy Burden
Focus on 80% AMI

CONNECTICUT GREEN BANK

Home (New Haven – Oil Heat)		**Solar PV**		**Energy Efficiency**
	+		+	
$59,250 HHI $2,963 Energy Costs		$85/month Lease $427 Energy Savings		$15/month ESA Energy Savings
5.0% HHI on Energy Costs		**4.3% HHI on Energy Costs**		High Savings $543 → **3.4% HHI** Low Savings $70 → **4.2% HHI** **on Energy Costs**

REFERENCES

Note – analysis examines 20-year lease for a 6-kW system at an $85 monthly cost and an additional $15 for energy efficiency measures through a 20-year energy savings agreement with low (i.e., HES core services) and high (i.e., HES core services plus insulation) expected energy savings. Based on oil-heated home in New Haven.

Reduction in Energy Burden
Solar PV Lease and EE ESA

Income Level (AMI)	HH Income	Avg. HH Energy Costs	% Income Spent on Energy (Before)	Solar Lease Savings	EE Savings (Low-High)	% Savings Energy Costs	% Income Spent on Energy (After)
60%	$45,060	$2,884	6.4	$423	$70-$543	17-34%	4.3-5.3
80%	$59,250	$2,963	5.0	$427	$70-$543	17-33%	3.4-4.2
100%	$75,250	$3,453	4.6	$425	$70-$543	14-28%	3.3-3.9
120%	$90,072	$3,873	4.3	$308	$70-$543	10-22%	3.4-3.9

This analysis demonstrates that even a 60% AMI household **could achieve the same percent of income being spent on energy after going solar and installing a higher energy efficiency package** as the starting energy burden of a 120% AMI household.

REFERENCES

Note – analysis examines 20-year lease for a 6-kW system at an $85 monthly cost and an additional $15 for energy efficiency measures through a 20-year energy savings agreement with low (i.e., HES core services) and high (i.e., HES core services plus insulation) expected energy savings. Based on oil-heated home in New Haven.

Overall Strategy – Multipronged
Multifamily and Low Income

CONNECTICUT GREEN BANK

- **PosiGen Partnership** – solar lease ($85/month) and energy efficiency ESA ($15/month) product for LMI homeowners supported by $5-$10 MM investment from CGB
- **CHIF Partnership** – assisting CHIF in selling down $12-$14 MM portfolio and recapitalizing ($10-$11 MM) for focus on credit challenged homeowners (i.e., < 680 FICO) through $1.5-$2.5 MM investment; supporting MF LIME loan with $1.3 MM
- **CHFA Partnership** – Solarize for state-sponsored housing portfolio has seen 20 projects in 12 housing authorities get ZREC contracts…supporting benchmarking of 500+ affordable multifamily buildings
- **MacArthur Foundation Partnership** – supporting predevelopment, construction, and term loans for affordable MF through $5 MM PRI
- **Future Strategies** – community/shared solar policy, sub-metering, etc. to further support low income rental populations

Recommendation
RSIP Steps 8 through 10

- **Race to the Rooftop** – 30 MW blocks for Steps 8 through 10, with a 4.5 MW block for LMI to start
- **Schedule of Incentives** – non-LMI for EPBB and PBI for Steps 8 through 10 and LMI PBI for Step 8 (Steps 9 and 10 is TBD)

CONNECTICUT GREEN BANK

Board of Directors

Agenda Item #7

Sector Updates and Progress to Targets for FY 2015

Statutory and Infrastructure Programs FY 2015 Targets and Progress

CONNECTICUT GREEN BANK

Installed Capacity (MW) and Annual Clean Energy Generated and Saved (MMBtu)

Program	Approved (but not yet Closed)	Q1 – Q4 Closed	FY 2015 Targets
CHP and AD	9.6 / 699,300	0.0 / 0	14.8 / 684,364
Grid and Infrastructure	0.0 / 0	5.0 / 26,900	0.0 / 0
RSIP	N/A	55.7 / 180,732	23.1 / 91,556
Total	9.6 / 699,300	60.7 / 207,632	37.9 / 775,920

Projects and Funding

Program	Approved (but not yet Closed)	Q1 – Q4 Closed	FY 2015 Targets	CGB Capital
Projects	7	7,304	3,217	
Capital Deployed	$102,228,217	$268,263,046	$207,100,000	$40,198,900

REFERENCES

Due to historically high average of approved projects moving to completion, RSIP projects are counted as closed upon approval.
Total Approved & Closed Projects = 100% RE.

Residential Programs
FY 2015 Targets and Progress

Installed Capacity (MW) and Annual Clean Energy Generated and Saved (MMBtu)

Program	Approved (but not yet Closed)	Q1 – Q4 Closed	FY 2015 Targets
Cozy Home	0.0 / 0	0.0 / 10	0.0 / 680
Smart-E	0.5 / 2,263	1.1 / 6,828	0.7 / 5,518
Solar Lease	5.2 / 16,853	4.7 / 15,115	2.8 / 10,920
Solar Loan	0.6 / 1,903	2.7 / 8,564	3.3 / 12,744
Total	6.3 / 21,019	8.5 / 30,517	6.8 / 29,862

Projects and Funding

Program	Approved (but not yet Closed)	Q1 – Q4 Closed	FY 2015 Targets	CGB Capital
Projects	844	1,177	1,195	
Capital Deployed	$28,666,246	$31,950,462	$28,502,500	$8,231,792

REFERENCES
Smart-E lender data is as of 05/31/2015.
Closed includes closed and completed.
Total Approved & Closed Projects = 8% EE, 83% RE, 4% Both and 5% unknown.

Commercial and Industrial Programs FY 2015 Targets and Progress

CONNECTICUT GREEN BANK

Installed Capacity (MW) and Annual Clean Energy Generated and Saved (MMBtu)

Program	Approved (but not yet Closed)	Q1 – Q4 Closed	FY 2015 Targets
CT Solar Lease	0.0 / 0	1.6 / 5,089	-
C-PACE	3.1 / 21,768	5.0 / 41,897	8.8 / 114,517
Total	3.1 / 21,768	6.6 / 46,986	8.8 / 114,517

Projects and Funding

Program	Approved (but not yet Closed)	Q1 – Q4 Closed	FY 2015 Targets	CGB Capital
Projects	22	45	63	
Capital Deployed	$13,352,986	$26,450,134	$50,000,000	$19,904,966

REFERENCES
Closed includes closed and completed.
Total Approved & Closed Projects = 32% EE, 53% RE and 14% Both.

Institutional Programs
FY 2015 Targets and Progress

CONNECTICUT GREEN BANK

Installed Capacity (MW) and Annual Clean Energy Generated and Saved (MMBtu)

Program	Approved (but not yet Closed)	Q1 – Q4 Closed	FY 2015 Targets
Institutional Off-Credit ESA	0.0 / 0	0.0 / 0	0.0 / 66,668
LBE – Municipal	0.0 / 0	0.0 / 0	0.0 / 166,667
LBE- State	0.0 / 0	0.0 / 0	0.0 / 266,668
CT Solar Lease	0.0 / 0	1.5 / 5,141	2.0 / 8,370
Total	0.0 / 0	1.5 / 5,141	2.0 / 508,373

Projects and Funding

Program	Approved (but not yet Closed)	Q1 – Q4 Closed	FY 2015 Targets	CGB Capital
Projects	0	14	25	
Capital Deployed	$0	$4,916,067	$166,000,000	$1,278,178

REFERENCES
Closed includes closed and completed.
Total Approved & Closed Projects = 100% RE.

Sector Performance FY 2015

	TARGETS				PERFORMANCE			
Sector	**Private Capital** ($MM)	**CGB Investment** ($MM)	**MW**	**MMBtu**	**Private Capital** ($MM)	**CGB Investment** ($MM)	**MW**	**MMBtu**
Statutory and Infrastructure	$171.2	$35.9	37.9	775,920	$228.1	$40.2	60.7	207,633
Residential	$19.2	$9.3	6.8	29,862	$19.4	$8.2	6.9	25,442
Commercial and Industrial	$40.0	$10.0	8.8	114,517	$6.5	$19.9	6.6	46,986
Institutional	$166.1	$1.9	2.5	508,373	$3.6	$1.3	1.5	5,141
Total	**$396.5**	**$57.1**	**56.0**	**1,428,672**	**$257.6**	**$69.6**	**75.5**	**301,523**

Challenge is to realize $160 MM in **LBE projects** and to convert $142 MM in **approvals (e.g., AD)** into closed and completed projects to realize benefits

Green Bank Model Works

Comparison of Subsidy vs. Financing Model Trends

	FY 2000-FY 2011 (CCEF)	FY 2012-FY 2015 (CGB) [1]	FY 2016 Targets (CGB) [2]
Model	Subsidy	Financing	Financing
Years	11.00	4.00	1.00
Energy (MW)	43.1	123.1	110.0
Investment ($MM)	$349.2	$608.3	$670.0
Leverage Ratio	1:1	5:1	10:1

Deploying **more** clean energy at a **faster** pace while using ratepayer-taxpayer resources **responsibly**

REFERENCES

1. Closed and completed transaction, Comprehensive Annual Financial Report (2014) + approved, closed, and completed transactions for FY 2015
2. Board approved targets for FY 2016

Board of Directors

Agenda Item #8

Other Business

Clean Alternative Fuels

Definition

Fuel Types	Connecticut	Federal Government	Connecticut Clean Cities
Natural Gas	X	X	X
Propane	X	X	X
Electricity	X	X	X
Hydrogen	X	X	X
Methanol, ethanol and other alcohols		X	
Blends of 85% or more of alcohol with gasoline		X	
Coal derived liquid fuels		X	
Fuels derived from biological materials		X	X
P-Series Fuels		X	

Should we consider adding additional fuels by including federal or city definition – study to make recommendation.

REFERENCES
Connecticut defines clean alternative fuel through Public Act 14-136 as amended in in CGS 4a-59
U.S. Energy Policy Act of 1992 definition of alternative fuels

Board of Directors
Agenda Item #9
Adjourn

BOARD OF DIRECTORS OF THE
CONNECTICUT GREEN BANK
Draft Minutes – Regular Meeting
Friday, June 19, 2015

A regular meeting of the Board of Directors of the **Connecticut Green Bank (the "Green Bank")** was held on June 19, 2015, at the office of the Connecticut Green Bank, 845 Brook Street, Rocky Hill, CT.

1. **Call to order:**

   Bryan Garcia called the meeting to order at 8:47 a.m. Board members participating: Robert Klee, Norma Glover, John Harrity (by phone), Reed Hundt (by phone), Bettina Ferguson, Kevin Walsh (by phone), and Pat Wrice (by phone).

   Members Absent: Catherine Smith, Matthew Ranelli, Tom Flynn, and Mun Young Choi.

   Staff Attending: George Bellas, Mackey Dykes, Brian Farnen, Bryan Garcia, Dale Hedman, Rick Ross, Bert Hunter, Kerry O'Neill, Andy Brydges, Cheryl Samuels, Chris Magalhaes, Katy Mixter, Max Heering, Ben Healey (by phone), Mike Yu (by phone) and Genevieve Sherman (by phone).

   Others In Attendance: Terry Hannon, , Andrew Babbidge (CGB Intern), Lauren Winstel (CGB Intern), Ben North (CGB Intern), Vignesh Kumar (OTT Intern), and Joe Barren(CGB Intern).

2. **Public Comments:**

   There were no public comments.

3. **Consent Agenda**:

   a. Approval of Meeting Minutes for April 17, 2015*

      Bryan Garcia stated that there was a request to strike a line on page 16 of the Meeting Minutes from April 17, 2015. The line to be stricken was a question by Bettina Ferguson regarding how much was in the Reserve Fund.

      Bryan Garcia also stated that they were unable to get a memo out to the Board members regarding "Under $300,000 and No More in Aggregate than $1,000,000" therefore this would not be discussed today nor be approved through the consent agenda resolution.

      Upon a motion made by Bryan Garcia, seconded by Norma Glover approving the two changes to the agenda was unanimously passed.

      <u>Resolution #1</u>

Motion to approve the minutes of the Board of Directors Regular Meeting for April 17, 2015.

b. Revisions to Banking Signatories*

Resolution #2

RESOLVED, that the Connecticut Green Bank Board of Directors (the "Board") approves the addition of the position of "Vice President and Chief Operating Officer" to the Connecticut Green Bank's list of authorized bank signatories;

RESOLVED, that the Board amends the list of authorized bank signatories to reflect the position change in title from "Director Renewable Energy Deployment" to "Director of Statutory and Infrastructure Programs"; and

RESOLVED, that these changes shall be effective for the following entities: Connecticut Green Bank, CEFIA Holdings LLC, CT Solar Loan I LLC, CEFIA Services Inc., and CT Solar Lease 2 LLC. The proper Connecticut Green Bank officers are authorized and empowered to execute and deliver all other documents and instruments necessary to effectuate this resolution.

c. Revisions to Internal Accounting Control Procedures*

Resolution #3

WHEREAS, On April 22, 2015 the Connecticut Green Bank (the "Green Bank") staff presented proposed revisions to existing internal accounting control policies and procedures with the Green Bank Audit, Compliance and Governance Committee (the "ACG Committee"). After review and discussion the ACG Committee recommended to the Green Bank Board of Directors (the "Board") that the Board approve the proposed revisions attached to the Memo to the Board dated June 12, 2015;

NOW, therefore be it:

RESOLVED, that the Board approves the revisions to the following Green Bank, and its affiliates, existing internal accounting control policies: Policy 101, Policy 102, Policy 103, Policy 104, and Policy 104a, as such revisions are more fully described in the Memo to the Board dated June 12, 2015; and

RESOLVED, the proper Green Bank officers are authorized and empowered to execute and deliver all other documents and instruments necessary to effectuate this resolution.

d. Under $300,000 and No More in Aggregate than $1,000,000 (Update)

4. Update from the President:

Bryan Garcia provided updates on C-PACE, SHREC, R-PACE and Green Bonds. Bryan Garcia stated that in last year's legislative session there was a recommendation for the addition of micro grids under C-PACE. As a result, the legislative change also resulted in the requirement by the Green Bank to perform a study on the viability of R-PACE (residential PACE) in Connecticut. He explained that a study had been submitted and that the E & T committee chairs asked that legislation be drafted. Bryan Garcia explained that this has been done, but that there are some issues with respect to the legislation given the lack of support from the bank industry lobby. He explained that they are working to identify the issue and the options to work through the issues this summer and fall.

Bryan Garcia went on to provide an update on the Anaerobic Digesters. He explained that the pilot program had been extended by two years. He explained that it gives the Green Bank more time to close transactions with project sponsors, lenders and investors. He also explained that the legislature is looking to increase the provision for the Special Capital Reserve Fund for the Green Bank to support its proposed issuance of Green Bonds. Rob Klee asked if this was in the implementer special session or in the bond package. Bryan Garcia advised that it is in the implementer. He explained that this was a very successful legislative session.

Norma Glover asked if there was any progress with the permitting. Brian Farnen advised that they are working to get standardized permitting. He explained that there needs to be more consistent standards amongst the 169 municipalities. He explained that the Permitting Bill is a huge first step for legislation for solar permitting. He explained that they need to educate town inspectors. He explained that the Renewable Energy and Energy Efficiency Business Association's Board is happy with the bill. He also feels that most people in the industry are happy with it as they see it as a step in the right direction.

5. Commercial and Industrial Sector Program Updates and Recommendations

a. C-PACE Transactions

Genevieve Sherman provided an update on the C-PACE transactions.
She advised that the Green Bank has closed on numerous deals and that we have now approved over 100 projects. C-PACE staff have also added a couple of new participating municipalities as well as banks that have provided consent for C-PACE benefit assessments on properties where the banks hold a mortgage.

i. Bridgeport – C-PACE Transaction

She updated the Board on 1316 Barnum Avenue in Bridgeport. She explained that they are installing high efficiency lighting and HVAC. She advised that they are asking for approval of $629,800 provided the transaction would fall within the standard underwriting criteria (to be confirmed by an appraisal currently underway). She advised that the maximum that would be extended would be $629,800.

<u>Resolution #5</u>

WHEREAS, pursuant to Section 157 of Public Act No. 12-2 of the June 12, 2012 Special Session of the Connecticut General Assembly and as amended (the "Act"), the Connecticut Green Bank ("Green Bank") is directed to, amongst other things, establish a commercial sustainable energy program for

DRAFT

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 $629,800 construction and (potentially) term loan under the C-PACE program to Wade Properties, LLC, the building owner of 1316 Barnum Avenue, Bridgeport, 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 C-PACE authorizing statute, 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 Board of Directors of the Connecticut 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 June 12, 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;

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 instrument.

ii. Stratford – C-PACE Transaction

She also provided an update on 80 Ferry Boulevard in Stratford. This is the installation of LED lighting and a Solar PV System. She advised that they are looking for approval for $418,539 and that it falls within the standard underwriting criteria.

Resolution #6

WHEREAS, pursuant to Section 157 of Public Act No. 12-2 of the June 12, 2012 Special Session of the Connecticut General Assembly and as amended (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, 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 $418,539 construction and (potentially) term loan under the C-PACE program to Marina View LLC, the building owner of 80 Ferry Boulevard, Stratford, 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 C-PACE authorizing statute, 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 Board of Directors 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 June 12, 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;

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 instrument.

iii. Bristol – C-PACE Transaction #1

She provided an update on 1461 Farmington Avenue in Bristol. She advised that they are requesting an increase in the financing above what had been previously approved. She explained that there is a roofing update that is needed on this project, which is approximately an additional $170,000. She explained that the full transaction would be just over $1 million, but falls within the standard underwriting criteria. Bettina Ferguson questioned the interest rate buy down, asking if it was more than 25 basis points. She advised that the Connecticut Auto Retailers Association got the first 25 basis points under the promotion agreed as they submitted projects in aggregate of $5,000,000, but would have had to reach $10,000,000 to qualify for the additional 25 points.

Resolution #7

WHEREAS, pursuant to Section 157 of Public Act No. 12-2 of the June 12, 2012 Special Session of the Connecticut General Assembly and as amended (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, 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 $1,085,559 construction and (potentially) term loan under the C-PACE program to Bristol Farms Associates, LLC, the building owner of 1461 Farmington Avenue, 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 C-PACE authorizing statute, 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 other duly authorized officer of the Green Bank, is authorized to execute and deliver the Loan and, if applicable, a Feasibility Study Loan in a total 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 June 12, 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 June 19, 2015;

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.

iv. Bristol – C-PACE Transaction #2

She went on to provide an update on 223 Broad Street in Bristol. She explained that this has already been approved, but that there are additional funds needed for roof repairs. She explained that the increase in financing moved this project over the standard lien to value, but that it does meet three or more of the criteria to allow them to exceed the lien to value ratio. She explained as such, the transaction still falls within the standard underwriting criteria.

Resolution #8

WHEREAS, Pursuant to Section 157 of Public Act No. 12-2 of the June 12, 2012 Special Session of the Connecticut General Assembly and as amended (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, 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 $686,231construction and (potentially) term loan under the C-PACE program to 223 Broad Street, LLC, the building owner of 223 Broad 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 C-PACE authorizing statute, 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 other duly authorized officer of the Green Bank, is authorized to execute and deliver the Loan and, if applicable, a Feasibility Study 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 June 12, 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 June 19, 2015;

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.

v. Stamford – C-PACE Transaction

She provided an update on 1200 High Ridge Road in Stamford. She advised that this project had been approved a year ago, but the project did not close, because of roof repairs. She explained that they are looking for approval of $454,525 to finance the solar array and a portion of the roof replacement. She advised that this project does fall within the standard underwriting criteria.

Resolution #9

WHEREAS, Pursuant to Section 157 of Public Act No. 12-2 of the June 12, 2012 Special Session of the Connecticut General Assembly and as amended (the "Act"), 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 has approved a $40,000,000 CPACE construction and term loan program; WHEREAS, the Green Bank seeks to provide a $454,525 construction and (potentially) term loan under the C-PACE program to 1200 High Ridge Company, LLC, the property owner of 1200 High Ridge Road, Stamford, CT (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 C-PACE authorizing statute, 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 other duly authorized officer of the Green Bank, is authorized to execute and deliver the Loan in an amount not to be greater than one hundred ten percent of the Loan amount with terms and conditions consistent with the memorandum submitted to the Board of Directors dated June 12, 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 June 19, 2015;

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 instrument.

vi. Windsor Locks – C-PACE Transaction

She also provided an update on 27 Lawnacre Road in Windsor Locks. She explained that they are doing solar only and that they're looking to finance $455,775. She advised that this project falls within the standard underwriting criteria.

Upon a motion made by Norma Glover and seconded by Bettina Ferguson, the Board voted unanimously to approve the resolutions.

Resolution #10

WHEREAS, pursuant to Section 157 of Public Act No. 12-2 of the June 12, 2012 Special Session of the Connecticut General Assembly and as amended (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, 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 $455,775 construction and (potentially) term loan under the C-PACE program to Roberts Realty Inc., the building owner of 27 Longacre Road, Windsor Locks, 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 C-PACE authorizing statute, 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 other duly authorized officer of the Green Bank is authorized to execute and deliver the Loan and, if applicable, a Feasibility Study 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 June 12, 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;

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.

b. C-PACE Sell Down to Clean Fund "Tranche 2"

Bert Hunter advised the Board of the second sale by the Green Bank of C-PACE benefit assessment liens to the Public Finance Authority and Clean Fund. He advised that the first sale was completed in May of last year. He explained that the Green Bank is selling $10.6 million of benefit assessment liens for net proceeds to the Green Bank of $8.5 million with closing expected in July.

c. C-PACE Selection of Private Capital Warehouse Provider

This agenda item is to be discussed in Executive Session.

6. Statutory and Infrastructure Sector Program Updates and Recommendations

a. Milford – Anaerobic Digestion Transaction

Rick Ross provided an update on the AD policy and program status. He explained that the 3 year pilot program expired February 27, 2015. He explained that there has been a new House Bill to extend the program for two years. He advised that the program has already approved four projects. He explained that Green Bank's investment would be $18.5 million in loans. He went on to explain the overall project, as well as the anerobic digestion technology to be used, which is being provided by a division of General Electric. Bert Hunter advised that there are at least 50 of these systems currently in operation, almost exclusively outside the United States. Rick Ross explained that those that are currently in operation are in Europe and that this would be the second system in the US. Rob Klee asked if the ones in Europe are mostly farm based and if there is a difference between farm and food waste. Rick Ross explained that food waste yields a better biogas. Rick Ross explained that the risk is really mitigated, because the projects have proven to be successful in Europe as well as from the turn-key arrangement with

GE. He explained that the capital cost will be $23 million. The facility will process 63 tons of food scraps annually, producing 24,500 MW of electricity annually and 11,000 tons of biogas annually.

Rick Ross also explained that GE is the technology partner and that they are putting in $3 million equity. The requested loan for this project is $4,565,000 at 2% for a 15 year term. The balance would be $14.5 million from the senior lender. GE is responsible for making the system meet the requirements. He explained that the majority of the revenue comes from tipping fees. Bettina Ferguson asked if they enter into long-term contracts with the haulers for the tip fees. Rick Ross advised that that is part of the project sponsor' business plan. He recommends approval for this project.

Upon a motion made by Norma Glover seconded by Bettina Ferguson and Kevin Walsh abstaining the Board voted to approve the project.

Resolution #11

WHEREAS, in early 2013, Connecticut Green Bank ("Green Bank") released a rolling Request for Proposals ("RFP") for anaerobic digestion projects to participate in a statutorily mandated AD Pilot program pursuant to Section 103 of Public Act 11-80;

WHEREAS, the RFP is aimed at reducing landfill waste through the recycling of organics, helping to promote sustainable practices and economic prosperity of Connecticut farms and other businesses by using organic waste with on-site anaerobic digestion facilities to generate electricity and heat;

WHEREAS, AgCycle Organics, LLC submitted the New Meadow Power and Earth AD Facility proposal in response to develop, in the City of Milford, a 3.0MW anaerobic digestion and cogeneration project and, after a thorough review, was selected as a project that is consistent with the Green Bank's Comprehensive Plan and in the best interests of ratepayer;

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors approves and authorizes the Green Bank staff to execute definitive loan documentation materially based on the term sheet set forth in this due diligence package dated June 19, 2015 for financial support in the form of a $4,565,000 subordinated loan financing;

RESOLVED, that this Board action is consistent with Section 103 of Public Act 11-80; and

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

7. Residential Sector Program Updates and Recommendations

a. Low to Moderate Income Single Family Lease Product

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Kerry O'Neill provided an update on the proposed Low to Moderate Income ("LMI") Single Family Lease Program. To put the proposal in context, she explained that the Green Bank had received 2200 applications under the CT Solar Lease Program and analyzed the income of the applicants. She explained that the existing lease program had been falling short in reaching low to moderate income families – both in terms of applications received and in terms of applications approved and funded. She explained that CT Solar Lease requires a credit check (FICO score, debt to income ratios and other criteria) and explained that this target population needs an alternative underwriting approach.

She explained that PosiGen will address this hard to reach market. She explained that the company started in Louisiana, have been very successful there in the number of systems installed for LMI customers and that they are unique in the way that they combine community based marketing with an alternative underwriting approach. She explained that they look at employment history, utility payments, and bank databases. At the same time, she also advised that while financing this harder to reach demographic, they are not engaging in predatory lending techniques associated with subprime lending. She explained that they have done 6,000 installs in three years in Louisiana. She advised that they have opened an office in Bridgeport and the proposed transaction will support 1100 installations. Green Bank staff are proposing $5 million in debt together with sponsor equity from Posigen and tax equity from a tax equity provider, with an option for another $5 million if they can raise $10 million in capital with the assistance of the Green Bank.

Bert Hunter explained that one of the key reasons for the Green Bank coming in as the sole debt provider is the need to move quickly in this market. He explained that the investment tax credit will step down considerably at the end of December 2016. He advised that it takes about 6 ½ to 8 months to get panels on and energized so unless Congress extends the credit at the higher rate, the window to sign up customers at the higher tax credit rate will start to close in mid-to-late spring. He advised that this should provide enough time to make a significant impact in the community. He also explained that the emphasis is in leveraging capital. He explained that our loan is priced at 550 basis points over the ten year swap rate. Bettina Ferguson questioned (and Mr. Hunter addressed) the 10 year swap rate. Kerry O'Neill explained that the transaction assumes a tiered PBI for the low-to-moderate income population, to be proposed in July, and that the value proposition will look very affordable for the target consumer.

Rob Klee wanted to know if they were hiring local people to work in the communities. Kerry O'Neill advised that yes, they are doing that now.

Kevin Walsh asked if the capital is such that the equity coming from the developer will be beneath the Green Bank in the capital structure. Bert Hunter advised that yes, they are coming in at $4.5 million, which is close to a 1:1 ratio.

Kevin Walsh asked what the savings percentage is for the customer. Kerry O'Neill explained that it will vary. She explained that all sales propositions are

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structured to save money from day one, but that it will vary based on the household. Bert Hunter explained that the Posigen lease works out to about 15 cents per KWh, or about a 20% to 25% savings right now, plus what they would save on energy efficiency.

Kevin Walsh asked in absence of a FICO what method do they use to rate. Kerry O'Neill advised that they pull other factors beyond a traditional FICO. She explained that their repayment performance is quite good.

Reed Hundt asked in the case of the Low to Moderate income segment in Connecticut are the significant percentage of households using fuel oil. Kerry O'Neill advised that yes, but she doesn't know the percentage for that segment. Reed Hundt questioned if there had been any thoughts on ways to reduce the dependency on fuel oil. Kerry O'Neill advised that yes, it would be an option to get some of these homeowners to convert to a ductless mini split. She explained that they could work with PosiGen through one of the other programs. She advised that they will be developing a product to address heating oil for the low to moderate income segment later this year.

Bryan Garcia advised that the memo stated strategic selection process but he advised that this was not the case. It was actually from a competitive RFP and that the resolution is correct.

Bettina Ferguson question what part of the analysis focused on the condition of the home. Kerry O'Neill advised that PosiGen does that as their initial assessment.

Upon a motion made by Bettina Ferguson seconded by Norma Glover, Resolution 12 passes unanimously.

Resolution #12

WHEREAS, the Connecticut Green Bank ("Green Bank") has a mandate to deploy its resources to benefit all ratepayers, including low and moderate income ("LMI") residential households;

WHEREAS, LMI households bear a disproportionate burden of the state's high energy costs as a percentage of their income;

WHEREAS, LMI households generally do not benefit from existing federal incentives for clean energy adoption, given that such incentives require sufficient tax liabilities to be of value;

WHEREAS, traditional financing for residential solar PV and energy efficiency upgrades rely on credit tests that screen out many LMI households and, specifically, exclude them from the growing third-party ownership model for residential solar PV;

WHEREAS, the Green Bank released a Request for Proposals for Residential Solar Financing Partners (the "RFP") on December 31, 2014;

WHEREAS, PosiGen, Inc. (collectively with all affiliates and subsidiaries, "PosiGen") responded to said RFP with a comprehensive proposal to deliver a solar lease and energy efficiency finance offering to LMI households in Connecticut;

WHEREAS, Green Bank staff has reviewed PosiGen's RFP response and now recommends that the Green Bank make a commitment of $5,000,000 in debt capital (the "Loan") and a contingent commitment of another $5,000,000 in debt capital (the "Contingent Loan") to support PosiGen in delivering its offering to Connecticut's LMI households; and

WHEREAS, Green Bank staff expects to bring a proposal before the Board of Directors (the "Board") at its July 2015 meeting to request an elevated Performance Based Incentive ("PBI") under the Residential Solar Investment Program to support financing for LMI households, which elevated PBI will be critical to opening up this market segment and the success of PosiGen's efforts to accelerate deployment therein.

NOW, therefore be it:

RESOLVED, that the President of the Green Bank and any other duly authorized officer of the Green Bank, is authorized to execute and deliver the Loan with terms and conditions consistent with the memorandum submitted to the Board dated June 12, 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 the President of the Green Bank and any other duly authorized officer of the Green Bank, is authorized to execute and deliver the Contingent Loan with terms and conditions consistent with the memorandum submitted to the Board dated June 12, 2015, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 18 months 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.

b. Predevelopment Loan Program for Low Income Multifamily

Kerry O'Neill went on to provide an update on Low Income Multifamily. She advised that they will use $1 million of Green Bank capital for the Predevelopment Loan Program. She advised that owners don't know where to start. She explained that this will allow an owner to get engineering and audits done. She explained that New Ecology is a partner that came into the market with foundation funding about a year ago and that they will be a provider in this program. She explained that repayment comes after the owners secure permanent financing. She explained that there is a payment risk if they are unable to secure permanent financing. She explained that if there is a high demand for the affordable market segment, that they will look towards the MacArthur Foundation funds to expand the program.

Rob Klee wanted to know how else they were getting the word out to consumers besides the partnership with New Ecology. Kerry O'Neill stated that they have been out meeting with owners and landlords. She explained that they really have a strong pipeline, but they need to meet with local lenders. Norma Glover wanted to know if they would be able to get bankers to give out materials as they do loans. Kerry O'Neill said yes, they can be a sales force for this. Norma Glover wanted to know how much the Green Bank was getting from the MacArthur Foundation. Kerry O'Neill advised, $5 million.

Brian Farnen explained that one issue with this loan is that the MacArthur Foundation has had issues with the state contracting requirements. He explained that they are trying to work to get them comfortable with the requirements. They have issue with the non-discrimination forms and the CHRO regulatory requirements. The issue is where the CHRO requirements talk about postings and hiring, MacArthur does not want to have to follow and stay consistent with CT requirements, especially when they have no employees in Connecticut. The other issue is the state election disclosure form. They don't want to inhibit any MacArthur employee from providing a donation. He advised that if they are not able to enter into a contract they will find another non-profit to work with MacArthur to get the money into the low income market.

Norma Glover questioned whether that will affect them getting the funds. Brian Farnen advised that yes, but he feels confident that they can find an alternative solution. Bryan Garcia advised that there are some challenges, but that there is a second pathway. He advised that they'll try to find a way to bring the funds to Connecticut.

Upon a motion made by Norma Glover seconded by Bettina Ferguson the Board voted unanimously to pass Resolution 13.

<u>Resolution #13</u>

WHEREAS, the Connecticut Green Bank ("Green Bank") has a mandate to deploy private capital to support clean energy upgrades across the state's built environment;

WHEREAS, the multifamily sector is an area of active focus for the Green Bank, given the unique challenges of financing clean energy upgrades on multifamily properties, and especially on affordable multifamily properties;

WHEREAS, Green Bank staff has determined that a key reason for the lack of progress in financing clean energy upgrades for multifamily properties is a surfeit of upfront support and a lack of the capital needed to navigate the complicated energy upgrade process for these buildings, including but not limited to the steps of benchmarking, assessing, and auditing properties, as well as determining appropriate design and financing solutions; and

WHEREAS, given the acuteness of these challenges for affordable multifamily building owners, as well as the high energy burden borne by tenants living in these properties, the Green Bank Board of Directors ("Board of Directors") authorized staff to accept a Program Related Investment from the MacArthur Foundation on January 23, 2015, in the amount of $5,000,000, to support financing for these properties;

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 deploy up to $1,000,000 to create a multifamily pre-development loan fund (the "Loan Fund"), with an initial expectation of $500,000 of that total to be used for affordable multifamily properties, with terms and conditions consistent with the memorandum and associated exhibits submitted to the Board of Directors dated June 12, 2015, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers, with a fund launch date no later than 120 days from June 19, 2015;

RESOLVED, that a portion of the proceeds of the Loan Fund, not to exceed $280,000, may be used to support a pilot initiative run by New Ecology, Inc. ("NEI"), to drive volume and uptake of the Loan Fund, per NEI's response to the Green Bank's Multifamily Housing Clean Energy Financing Program Request for Proposals originally released on April 7, 2014; 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.

8. Budget and Operations Committee Updates and Recommendations

a. FY 2016 Comprehensive Plan Targets

Mackey Dykes provided an update on the FY2016 targets. He explained that there has been amazing growth in RSIP and that they will recover 100% of the costs through SHREC. Bryan Garcia explained that the use of the funds varies.

Mackey Dykes explained that the Residential sector nearly doubled the goals this year. He explained that Smart E is just over 1000 projects.

He explained that Connecticut Solar Lease is closing out this year and fully transitioning to a private product. Low income loans and leases are about 500 projects and multifamily is just over 2000 projects.

He explained that on the Commercial and Industrial side there are 63 projects around $50 million in capital deployed. He advised that they feel they will deploy $53 million in FY 2016 that will represent 90 projects. He explained that, due to the time lag between project approval and deployment of capital, the FY 2016 targets actually reflect big increase in the projects that they expect to originate in FY 2016, many of which will not close until the following fiscal year.

Mackey Dykes explained that they weren't able to reach the goal for Institutional in FY2015. He explained that they have a pathway to meeting the FY2016 goal. He explained that they have started the bonding process to fund the projects for FY2016.

He explained that Municipal target item is not the Green Bank's capital. He explained that it's really just the Green Bank assisting smaller towns and walking them through the processes.

He explained that Commercial and Institutional utilize CT Solar Lease, which is the same solar lease fund for residential, with a portion set aside. Bryan Garcia explained that this is a good opportunity to attract investments. Mackey Dykes explained that they are looking at about 20 projects, for a total investment of $122 million.

Norma Glover asked if UCONN moves to Hartford will the Green Bank play a role in ensuring the building is green. Andy Brydges explained that they have not yet spoken with them regarding that, but that they are in active discussions with them and they will discuss it.

Kevin Walsh asked to see how much of the state's capital is deployed as well. Mackey Dykes said that they will work on that. He explained that overall 13,000 projects just over $670 million in capital deployed.

b. FY 2016 Budget

George Bellas provided an update on the Profit and Loss Statement. He explained that they are budgeting $5.4 million less this fiscal year for RGGI proceeds to be utilized for Energy Efficiency since these funds will not be allocated to CGB by DEEP in the upcoming fiscal year.

George Bellas explained that REC sales will increase significantly. He explained that the FY2016 projection is about $2.1 million in sales with the majority being non-SHREC sales. He explained that this is a positive sign and will become a significant revenue component. He also discussed the projected budget of about $2.1 million in other revenues.

Under the operating xpense category, employee compensation is projected to increase by about 12%. Benefits and payroll taxes will increase by about 10%. Program development is an increase by about 39.3%. Mackey Dykes explained that this is due to the increased volume in residential projects. These projects will generate increased SHREC revenue in the future.

Craig Connolly discussed the different marketing projects including the new brand for the Green Bank. Norma Glover asked if marketing would be less in the budget next years since they won't have the rebranding. Craig Connolly said yes, it should be depending on what the marketing efforts are next year.

George Bellas went onto discuss the professional and consulting fees. He explained that office, rent and location increase by about 22.1%. He explained that some of this increase pertains to the budgeted expansion of office space in the building to accomadate new staff. . Mackey Dykes explained that there is a projected increae in IT spending during the next fiscal year as CGB moves to outsource IT operations. This outsourcing effort will result in lower IT operating costs in future fiscal years.

George Bellas went onto discuss the overall impact of budgeted revenues, operating expenses and financial incentives on CGB's net operating income. Mackey Dykes advised that they have reduced expenses by over $1 million.

Mackey Dykes discussed the various categories of project loans that are projected to be funded, totaling just over $64 million, during fiscal year 2016. George Bellas discussed the CPACE loan program. CGb will be investing approximately $50 million into the C-PACE program, and anticipates selling approximately $47 million to private investors during the upcoming fiscal year.

Mackey Dykes explained that CGB projects adding four new staff positions during the upcoming fiscal year. Two of the four positions will be to administer the SHREC program and will be recovered from the proceeds from future SHREC sales.

Bryan Garcia explained that the Budget and Operations Committee is recommending that the organization first, maintain the authorization of the Green Loan Guaranty Program and the Renewable Energy and Efficient Energy Finance Program. We will then, second, request the approval by the Board of Directors to allocate funds. He explained that if they can then get third, the approval by the Bond Commission of the authorized allocation, then the budget will see additional revenues coming in. Mackey Dykes requested that when the Board approves the budget to also approve the ability to extend the contracts with their current vendors.

Upon a motion made by Norma Glover and seconded by Bettina Ferguson, Resolution 14 passed unanimously.

Resolution #14

RESOLVED, that the Connecticut Green Bank Board of Directors (the "Board") approves the Fiscal Year 2016 Targets and Budget;

RESOLVED, that the Board approves the reallocation of American Recovery and Reinvestment Act State Energy Program funds outlined in the "Schedule of Credit Enhancements" in the Fiscal Year 2016 budget.

RESOLVED, that the Board directs staff to maintain the authorization for the Green Connecticut Loan Guaranty Program and the Renewable Energy and Efficient Energy Finance Program;

RESOLVED, that the Board directs staff to bring back a program proposal for review and approval at the July 17, 2015 meeting for the use of proceeds of the Green Connecticut Loan Guaranty Program and the Renewable Energy and Efficient Energy Finance Program;

RESOLVED, that the Board directs staff to bring back a revised budget if the funds from the Green Loan Guaranty Fund and the Renewable Energy and Efficient Energy Finance Program are allocated by the state bond commission;

RESOLVED, that the Board authorizes Green Bank staff to extend the professional services agreements (PSAs) currently in place with:

i. METIS, Financial Network, Inc.;
ii. Concord Servicing Corporation;
iii. EnergySage Inc.;
iv. Archaeological and Historical Services, Inc.;
v. True South Renewables, Inc.;
vi. Clean Power Research, L.L.C.;
vii. Locus Energy, LLC;
viii. SmartPower, Inc.; and
ix. Sustainable Real Estate Solutions, Inc.

for the remainder of fiscal year 2016 with the amounts of each PSA not to exceed the applicable approved budget line item; and

RESOLVED, that the proper Green Bank officers are authorized and empowered to do all other acts and execute and deliver all other documents as they shall deem necessary and desirable to execute these extensions.

9. Executive Session

Upon a motion made by Bettina Ferguson seconded by Norma Glover the Board voted unanimously to go into Executive Session at 10:46 a.m. to protect commercial and financial information given in confidence, not required by statute and such information relates to responses to a request for proposal before such contract was awarded.

10. Adjourn

Upon a motion made by Bettina Ferguson seconded by Norma Glover the Board voted unanimously to adjourn the meeting at 11:11 a.m.

Respectfully Submitted,

____

Rob Klee, Vice Chair

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

CONNECTICUT GREEN BANK

Memo

To: Board of Directors

From: Mackey Dykes (VP and COO), Brian Farnen (General Counsel and CLO), Bryan Garcia (President and CEO), and Bert Hunter (EVP and CIO)

Date: July 10, 2015

Re: Proposed Revisions to the Comprehensive Plan for FY 2015 and FY 2016

Background

On June 20, 2014, the Board of Directors approved the FY 2015 and FY 2016 Comprehensive Plan of the Connecticut Green Bank.[1] As required by statute, the Comprehensive Plan provides a succinct and thorough overview of the strategies of the organization, including:

- Organizational Overview – vision, mission, goals, metrics of success, governance and organizational structure;
- Review of Public Policy – from historical policies to more recent current policies;
- Description of Stakeholders – including consumers, capital providers, contractors, and policy-makers;
- Financing and Marketing Overviews;
- Sector Descriptions – including targets and budgets for FY 2015; and
- Definitions

On June 19, 2015, the Board of Directors approved the FY 2016 plan of operation, including budgets and targets.

This memo provides an overview of the proposed revisions to the Comprehensive Plan for FY 2015 and FY 2016.

Proposed Revisions

A redline version of the proposed revisions to the Comprehensive Plan for FY 2015 and FY 2016 has been included in the materials to the Board of Directors.

The proposed revisions to the Comprehensive Plan include:

- New Brand – logo and website for the Connecticut Green Bank;

[1] Comprehensive Plan for FY 2015 and FY 2016 of the Connecticut Green Bank – click here

- Committee Overview – notation of the four (4) committees of the Board of Directors – Audit, Compliance and Governance Committee, Budget & Operations Committee, Deployment Committee, and Joint Committee of the Energy Efficiency Board (EEB) and Connecticut Green Bank.
- Joint Committee – as we continue to make progress on our joint activities with the EEB, you will also see that we have noted its principles, included links to its bylaws, and are working to establish jointly-shared goals for the residential, commercial and industrial, and institutional sectors;
- Updated Budget and Targets – based on the FY 2016 board-approved budget and targets, pertinent information and links were included;
- Additions to Definitions – including the Solar Home Renewable Energy Credit (SHREC) and Alternative Fuel Vehicles and Infrastructure; and
- Other Modifications – various other minor edits.

Proposed Definition – Alternative Fuel Vehicles and Associated Infrastructure
The definition of "clean energy" for the Connecticut Green Bank includes "…projects that seek to deploy electric, electric hybrid, natural gas or alternative fuel vehicles and associated infrastructure…"

In order to provide more clarity on the definition of "alternative fuel vehicles and associated infrastructure" we propose that the Board of Directors consider the guidance offered by:

- **Clean Alternative Fuel** – C.G.S. §4a-59 as amended in Public Act 14-136, which defines "clean alternative fuel" as natural gas, propane, electricity, or hydrogen when used as a motor vehicle fuel;
- **Motor Vehicle** – C.G.S. §14-212(5), which defines "motor vehicle" as all vehicles used on the public highways; and
- **Infrastructure** – a modification of the U.S. DOE's Alternative Fuels Data Center definition of EV infrastructure. We would propose defining "associated infrastructure" as:

> "Structures, machinery, and equipment necessary and integral to refuel an alternative fuel vehicle. Infrastructure must meet or exceed any applicable state building standards, codes and regulations. "

With these clarifications, the Connecticut Green Bank staff can begin to think about its role in supporting the deployment of "alternative fuel vehicles and associated infrastructure".

Resolution
The following resolution applies to the proposed revisions to the Comprehensive Plan for FY 2015 and FY 2016 of the Connecticut Green Bank:

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 approved the Comprehensive Plan for FY 2015 and FY 2016 at a meeting on June 20, 2014;

WHEREAS, Article V of the Green Bank Operating Procedures requires the Green Bank Board of Directors (the “Board”) to adopt an Annual Plan for each forthcoming fiscal year;

WHEREAS, the Board of Directors has approved the annual plan of operation for Fiscal Year 2016 at a June 19, 2015 meeting;

WHEREAS, the officers of the Connecticut Green Bank propose revising the Comprehensive Plan for FY 2015 and FY 2016 to update it with respect to the approval by the Board of Directors of the annual plan of operation including budget and targets for FY 2016 at the June 19, 2015 meeting;

WHEREAS, the officers of the Connecticut Green Bank propose further revising the Comprehensive Plan for FY 2015 and FY 2016 including the revisions proposed in a memo dated July 10, 2015 and a redline version of the Comprehensive Plan updated on July 17, 2015;

NOW, therefore be it:

RESOLVED, that the Board approves the proposed revisions by the officers of the Comprehensive Plan for Fiscal Years 2015 and 2016; and

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

Comprehensive Plan

Fiscal Years 2015 and 2016

July 18, 2014 (Fiscal Year 2015)
Updated on July 17, 2015 (Fiscal Year 2016)

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Executive Summary

In June of 2011, in nearly a unanimous bipartisan manner, the Governor and the Connecticut General Assembly set clean energy policy in a new course in our state.[1] A major component of that policy was the creation of the nation's first "green bank" – the Clean Energy Finance and Investment Authority (CEFIA), recently renamed the Connecticut Green Bank (the Green Bank).[2] Over the past couple of years, this quasi-public organization has been transformed from its predecessor, who invested over 80 percent of its resources in grants, rebates and subsidies to build a clean energy market in our state, to a new entity that now invests over 80 percent of its resources in loans, leases and credit enhancements to grow the clean energy market in our state. The Connecticut Green Bank has become a model for other states, as well as the federal government,[3] that are seeking to use limited public resources to attract private capital investment in their clean energy economies in order to make clean energy more accessible and affordable to consumers.

The focus of the Green Bank is to attract and deploy capital to fill the investment gap needed to support the successful implementation of the state's clean energy policy goals. To that end, the organization has established a new vision:

> *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.*

Experts suggest that an investment gap of $1 trillion a year – or the so called "clean trillion" – exists until 2030 for green infrastructure growth to address important environmental challenges such as global climate change.[4] The emergence of "Cli-Fi" (or climate finance) in the recent Intergovernmental Panel on Climate Change (IPCC) report,[5] acknowledges the scale of investment and finance needed to transition to a global low-carbon economy at $360 billion a year in order to stay within the two-degree Celsius safety zone. Although we know that the levels of investment necessary to achieve our national and global priorities are high, and that the repercussions for not addressing them can indeed be felt locally, Connecticut is doing its part to attract the billions of dollars necessary to achieve its ambitious clean energy policy objectives, which will result in a reduction of greenhouse gas emissions and the creation of jobs. From the $1.5 billion necessary to convert 200,000 households from oil to natural gas and the $1.5 billion of investment required to deploy rooftop solar photovoltaic (PV) systems on the roofs of 150,000 households, to the $3 billion needed to reduce the energy consumption of our

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[1] Public Act 11-80 "An Act Concerning the Establishment of the Connecticut Department of Energy and Environmental Protection and Planning for Connecticut's Energy Future".

[2] Public Act 14-94 "An Act Concerning Connecticut's Recycling and Materials management Strategy, the Underground Damage Prevention Program, and Revisions to Energy and Environmental Statutes".

[3] In the 113th Congress, H.R. 4522 was released in the U.S. House of Representatives and S. 2271 in the U.S. Senate to establish a national green bank to assist in the financing of qualified clean energy projects and qualified energy efficiency projects.

[4] Kaminker, C. et al. (2013), "Institutional Investors and Green Infrastructure Investments: Selected Case Studies", *OECD Working Papers on Finance, Insurance and Private Pensions*, No. 35, OECD Publishing. http://dx.doi.org/10.1787/5k3xr8k6jb0n-en

[5] *Climate Change 2014: Mitigation of Climate Change* by the IPCC in Chapter 16 "Cross-Cutting Investment and Finance Issues" (April 12, 2014).

commercial and industrial property owners and over $500 million investment to support the state government's "Lead by Example" efforts to reduce energy consumption by 20 percent by 2018, the level of investment is large and will require a smarter and more efficient use of scarce public resources to attract multiples of private capital investment in our clean energy economy.

President Barack Obama said it best:

> *"We've got public banks like Connecticut's Green Bank and private banks like Goldman Sachs ready to invest billions of dollars in renewable energy."*[6]

Attracting low cost and long-term private capital will make clean energy more accessible and affordable to consumers, resulting in greater and accelerated deployment. More deployment of clean energy at a quicker pace will help reduce greenhouse gas emissions and create jobs. The contents of this Comprehensive Plan for the Green Bank demonstrate how we plan on supporting our mission and the public policy objective of delivering consumers cheaper, cleaner and more reliable sources of energy while creating jobs and supporting local economic development.

As you will read, the Green Bank is capitalized by several public sources, including a system benefit charge created during electric restructuring and carbon allowance proceeds through the Regional Greenhouse Gas Initiative (RGGI). The legislature also provided it with other tools, including bonding and access to bond funds – a Special Capital Reserve Fund, Green Loan Guaranty Fund, and Renewable Energy and Efficient Energy Finance Account – that can be accessed to support the mission of the Green Bank. As part of the process for producing this Comprehensive Plan, an extensive review of current and historical public policy on clean energy in statute was conducted – which resulted in the discovery of Connecticut's first clean energy policy passed in 1978 that can be applied to the current and future market for clean energy in our state. The results of that public policy review are included in an accompanying memo. The Green Bank will leverage a growing statewide energy brand of Energize Connecticut and manage cutting edge online and on-the-ground marketing strategies like Solarize and Energize to provide consumers with easy access to affordable capital for clean energy. By attracting and deploying private capital at 5, 10, or 20 to 1 of public funds, through public-private partnerships we can support the successful implementation of Connecticut's clean energy policy goals that are required through statute (i.e. Public Act 11-80), regulation (i.e. Conservation and Load Management Plan), and planning (i.e. Comprehensive Energy Strategy and Integrated Resources Plan). Providing easier access to low cost and long-term private capital will make clean energy more affordable and accessible to consumers.

The Comprehensive Plan is structured around four consumer sectors that outline our approach, including:

- Residential Sector – single and multifamily properties
- Commercial and Industrial Sector

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[6] President Barack Obama in a speech on American Energy on May 9, 2014.

- Institutional Sector – state, municipal, universities, schools, and hospital properties
- Infrastructure Sector – grid-tied projects, as well as statutorily required programs (i.e. Residential Solar Investment Program, Anaerobic Digester Pilot Program, etc.)

Within each sector there is a review of the regulatory and planning policies, an estimate of the total available market (TAM) and serviceable addressable market (SAM), product and program overviews, fiscal year 2015 targets (including number of projects, capital deployed, clean energy deployed, and energy generated and saved), benchmarks, and key performance indicators, and the objective function for projects within the sector.

The reader will notice several other important strategic initiatives that require coordination between the sectors as well as with outside partners, including, but not limited to the SunShot initiative to reduce "soft costs" from rooftop solar PV, a developing micro grid initiative, on bill repayment for residential customers, the development of several commercial sector financing products with the Connecticut Energy Efficiency Fund, and a multifamily and affordable housing portfolio of programs.

The Comprehensive Plan concludes with the budget reviewed and approved by the Board of Directors of the Connecticut Green Bank for Fiscal Year 2015. The budget outlines the revenues as well as the operations and program expenses necessary to implement the plan. The Comprehensive Plan will guide the decisions made by the Board of Directors and staff of the Connecticut Green Bank to meet its mission and is the formal document required by law that informs and directs future decisions of the organization.

Organization Overview

The Connecticut Green Bank (“the Green Bank”)[7] was established 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 leverages public and private funds to drive investment and scale-up clean energy deployment in Connecticut.

The Connecticut Green Bank’s purposes are:

- Developing programs to finance and otherwise support clean energy investment in residential, municipal, small business and larger commercial projects and such other programs as the Green Bank may determine;

- Supporting financing or other expenditures that promote investment in clean energy sources to foster the growth, development and commercialization of clean energy sources and related enterprises; and

- Stimulating demand for clean energy and the deployment of clean energy sources within the state that serves end-use customers in the state.

The Green Bank’s purposes are codified in Section 16-245n(d)(1) of the General Statutes of Connecticut and its board approved Resolution of Purposes.

Vision

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.

Mission

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.

Goals

To achieve its vision and mission, the Connecticut Green Bank has established the following three goals:

1. To attract and deploy capital to finance the clean energy[8] goals for Connecticut, including:

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[7] 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.

[8] 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.

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), planning (i.e., Comprehensive Energy Strategy, Integrated Resources Plan), or regulatory in nature.

Metrics of Success

The following is a breakdown of the key metrics of success for the Connecticut Green Bank:

- **Objective Function** – maximizing the amount of clean energy generated (or energy saved) per dollar of ratepayer funds at risk;[9]

- **Attract Capital** – there are several measures used, including the total amount of public and private investment in clean energy; amount of private capital or non-ratepayer fund investment in Connecticut's clean energy economy; amount of public capital or ratepayer fund investment in Connecticut's clean energy economy; leverage ratio of the amount of public versus private investment in clean energy; the ratio of the amount of public funds invested in the form of subsidies (e.g., grants), credit enhancements (e.g., loss reserves), and financing (e.g., loans and leases); and credit quality of borrowers (e.g., FICO credit scores and debt-to-income ratios).

- **Deploy Capital** – there are several measures used, including the total amount of clean energy deployed (e.g., kilowatt (kW), kW peak, including summer and winter); amount of clean energy generated and/or saved (e.g., kilowatt-hour (kWh) and million British thermal units (MMBtu)) over a year and estimated lifetime of a project; savings to investment ratio; and customer acquisition costs or the amount of marketing expenses it costs to acquire a customer to install a project as well as per energy unit generated or saved over its lifetime.

- **Green Bank** – there are several metrics of success that are important for the green bank operations, including total, distribution, diversity, and growth of current and non-current assets, strength and management of the balance sheet, and sources, amount, and growth of revenues and minimization of expenses, including grants.

[9] Objective Function Protocol – Version 1.0 – http://www.ctcleanenergy.com/documents/5a_Objective Function Protocol_Version 1.0_Memo_061314.pdf

- **Public Benefit** – there are several measures used, including estimate of the direct, indirect and induced jobs created as a result of the total capital invested in clean energy deployment;[10] an estimate of the amount of greenhouse gas emissions like carbon dioxide and methane, other air emissions like sulfur dioxide and nitrous oxides, and standard equivalencies (e.g., cars off the road and acres of trees) reduced over the life of a project.

These key metrics of success for the Green Bank are estimated for each of its programs and investments as well as tracked using established measurement and verification protocols, independently audited, and reported annually through a Comprehensive Annual Financial Review (CAFR).

Governance

Pursuant to Section 16-245n of the General Statutes of Connecticut, the powers of the Connecticut 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 (see Table 1).

Table 1. Board of Directors of the Connecticut Green Bank

Position	Status	Voting	Name	Organization
State Treasurer (or designee)	Ex Officio	Yes	Bettina Ferguson	Treasurer's Office
Commissioner of DEEP[11] (or designee)	Ex Officio	Yes	Robert Klee[12]	DEEP
Commissioner of DECD[13] (or designee)	Ex Officio	Yes	Catherine Smith[14]	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[15]	Shipman & Goodwin
Finance or Deployment	Appointed	Yes	Thomas Flynn	Environmental Data Resources
Finance of Renewable Energy	Appointed	Yes	Reed Hundt[16]	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[17]	Ex Officio	No	(unfilled)	(unfilled)

There are four (4) committees of the Board of Directors of the Connecticut Green Bank, including:

[10] The Connecticut Department of Economic Development (DECD) has approved the jobs estimates calculations as a result of the Green Bank financed clean energy projects – click here.
[11] Department of Energy and Environmental Protection
[12] Vice Chairperson of the Board of Directors and Chairperson of the Budget and Operations Committee
[13] Department of Economic and Community Development
[14] Chairperson of the Board of Directors
[15] Secretary of the Board of Directors and Chairperson of the Audit, Compliance and Governance Committee
[16] Chairperson of the Deployment Committee
[17] 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.

- Audit, Compliance and Governance
- Budget and Operations
- Deployment
- Joint Committee of the Energy Efficiency Board and the Connecticut Green Bank[18]

To support the Joint Committee of the Energy Efficiency Board and the Connecticut Green Bank, the following is a principal statement to guide its activities:

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

The Board of Directors of the Connecticut Green Bank is governed through the statute, as well as an Ethics Statement and Ethical Conduct Policy, Resolutions of Purposes, Bylaws, Joint Committee Bylaws, and Comprehensive Plan. All meetings, agendas, and materials of the Green Bank's Board of Directors and its Committees are publicly available on the organizations website.[19,20]

Organizational Structure

The organizational structure of the Connecticut Green Bank is comprised of four parts:

- **Corporate Division** – this division is responsible for providing support services to the investment and program divisions, including accounting, legal, marketing, and policy support to help them meet their goals.

- **Investment Division** – this division is responsible for *attracting capital* to finance the clean energy goals for Connecticut.

- **Program Division** – this division is responsible for *deploying capital* to meet the clean energy goals for Connecticut. There are four (4) program divisions –Residential (including multifamily), Commercial & Industrial, Institutional (e.g., state/municipal, universities, schools, hospitals ("SMUSH")) and Statutory and Infrastructure.

- **Administrative Division** – through a memorandum of understanding (MOU) between Connecticut Innovations (CI) and the Connecticut Green Bank, various administrative services are provided to the Green Bank ~~including human resources and information technology~~.

18 Pursuant to Section 16-245m(d)(2) of the Connecticut General Statutes
19 http://ctcleanenergy.com/AboutCEFIA/CEFIABoardMeetings/tabid/604/Default.aspx
20 http://ctcleanenergy.com/AboutCEFIA/CEFIACommitteeMeetings/tabid/603/Default.aspx

The Green Bank staff is attentive to the needs of its stakeholders, committed to the vision and mission of the organization, and conducts itself in a collaborative and professional manner that demonstrates its knowledge and leadership of clean energy policy, finance, and technology.

An Employee Handbook and Operating Procedures have 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.

Public Policy

The Connecticut Green Bank's role is to support the implementation of public policy on clean energy in Connecticut by attracting and deploying capital to finance the achievement of those goals. Over the course of the legislative history on clean energy in Connecticut and specifically the last decade, there have been significant public policies passed that guide the programs of the Green Bank, including, but not limited to:[21]

- **Public Act 78-262** – "An Act Establishing a State Energy Policy" is Connecticut's original energy policy from 1978. The original energy policy declared the following matters as important and are the focus of the policy - engaging in energy conservation, energy efficiency, renewable energy deployment, energy diversification, reducing reliance on interruptible sources of energy, reducing energy costs, assuring that low-income households have essential energy services, public education and consumer awareness, and including financial and technical assistance.

- **Public Act 98-28** – "An Act Concerning Electric Restructuring," deregulated the generation component of the electric utility industry and opened it up to competition, established the Class I and Class II Renewable Portfolio Standards, and created the Conservation and Load Management (C&LM) Fund to be administered by the electric distribution companies (EDCs) and the Renewable Energy Investment Fund (Clean Energy Fund or CEF) to be administered by Connecticut Innovations (CI) and later on by the Connecticut Green Bank.

- **Public Act 05-01** – "An Act Concerning Energy Independence," established the Class III Renewable Portfolio Standard for CHP and energy efficiency, Project 100 requiring the electric distribution companies to sign long-term power purchase agreements for no less than 100 megawatts of Class I renewable energy sources developed in Connecticut, and the joint committee of the Energy Conservation Management Board (ECMB) and CEF to coordinate on programs and activities.

- **Public Act 07-242** – "An Act Concerning Electricity and Energy Efficiency," expanded Project 100 to Project 150, requires the municipal utilities to submit a comprehensive report to the CEF on the actions to promote renewable energy sources, modifies the definition of clean energy for the CEF, and creates a "Municipal Renewable Energy and Efficient Energy Grant Account" for disaster relief centers and high schools to be run by CI through the CEF in consultation with the Department of Public Utility Control, Department of Education, and Department of Emergency Management and Homeland Security.[22] The act also addresses energy improvement districts, interconnection standards, property, sales, and use tax exemptions for clean energy, a definition for weatherization, and modifies the Class I and III RPS.

[21] Public Policy Review – Comprehensive Plan FY 2015 through FY 2016 Memo – http://www.ctcleanenergy.com/documents/5a_Public_Policy_Review_Comprehensive_Plan_Memo_061314.pdf

[22] The bonds were authorized in Sec. 91 of PA 07-242 and codified in CGS Sec. 16-245bb. Sec. 30 of PA 10-44 decreased the authorization from $50,000,000 to $18,000,000, effective July 1, 2010.

Definition of Clean Energy

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

- **Public Act 11-80** – "An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut's Energy Future," created DEEP and charged it with energy and policy planning and regulation, including increasing the use of clean energy and technologies that support clean energy. The act also creates the Connecticut Green Bank, sets energy reduction targets for state facilities of 20% by 2018, initiates a 3-year pilot anaerobic digester and combined heat and power program administered by the Green Bank, establishes a residential solar investment program administered by the Green Bank, creates a zero-emission renewable energy credit (ZREC) and low-emission renewable energy credit (LREC) reverse auction program for long-term contracts administered by the EDCs, and designates the Green Bank to oversee a $20 million Green Loan Guaranty Fund, capitalized state bond funds, in consultation with the Energy Conservation Management Board (ECMB) and Connecticut Health and Educational Facilities Authority (CHEFA).

- **Public Act 12-2** – "An Act Implementing Certain Provisions Concerning Government Administration," established the Commercial Property Assessed Clean Energy (C-PACE) Program to be administered by the Connecticut Green Bank, modifies the definition of clean energy for the Green Bank, permits the Green Bank to issue up to $50 million in bonds backed by a special capital reserve fund (SCRF) to support bond financing for the Green Bank,[23] and clarifies the quasi-public status of the Green Bank.

[23] Sec. 161 of PA 12-2 of the June Special Session contains the SCRF bonding provisions.

- **Public Act 12-189** – "An Act Authorizing and Adjusting Bonds of the State for Capital Improvements, Transportation, and Other Purposes," changes the "Municipal Renewable Energy and Efficient Energy Grant Account" to the "Renewable Energy and Efficient Energy Finance Account" and redirects the use of bond proceeds from CI to the Green Bank who must work in consultation with DEEP, DECD, and the State Treasurer.[24] The $18 million in bond funds can be used for financial assistance for energy efficient generation with priority given to disaster relief centers and high schools as well as projects that use major system components manufactured or assembled in Connecticut.

- **Public Act 13-298** – "An Act Concerning Implementation of Connecticut's Comprehensive Energy Strategy," reinforces key findings from DEEP with regards to the implementation of the Comprehensive Energy Strategy (CES) and includes the Green Bank in numerous instances, including coordination with ECMB, implementation of community-based marketing campaign pilots for natural gas conversions and energy efficiency, inclusion of thermal energy and electric storage technologies in the "Renewable Energy and Efficient Energy Finance Account" reinforcing the importance of financing towards the micro grid policy, and the development and implementation of an on bill repayment program for residential customers using private capital. The act also makes important adjustments to the C-PACE program to support lender consent, further defines critical facilities for micro grid purposes, and clarifies language with respect to virtual net metering, sub-metering, and energy improvement district policy.

- **Public Act 14-94** – "An Act Concerning Connecticut's Recycling and Materials Management Strategy, the Underground Damage Prevention Program, and Revisions to Energy and Environmental Statutes," renames the Clean Energy Finance and Investment Authority to the Connecticut Green Bank, allows micro grid projects as eligible for C-PACE financing, and provides cost recovery mechanism for the residential on bill repayment program. The bill also requires the Green Bank to conduct a study on residential property assessed clean energy (R-PACE), updated high performance building standards for state facilities and state funded construction, and authorized a limited liability company to be a thermal energy transportation company, regulated by PURA, for a district heating loop in Bridgeport which the Green Bank is involved in.

These statutes comprise a majority of the public policies that seek to advance clean energy in Connecticut and fall within the sphere of the Connecticut Green Bank. [25]

Beyond these statutes, there are various planning documents as well as regulatory decisions that also serve to inform the clean energy policies of the state. The public policies outlined in the 2013 Comprehensive Energy Strategy (CES) and the 2012 Integrated Resources Plan (IRP) developed by DEEP's approval of the Electric and Natural Gas Conservation and Load Management Plan (C&LM Plan), and their impact on the programs of the Green Bank, are highlighted within each of the four programmatic sectors below. The Green Bank also interplays with the administrators of the Conservation and Load Management Fund (i.e. CL&P and UI) and the Energy Efficiency Board through coordination of our staff

[24] Sec. 36 of PA 12-189 changed the administering entity in CGS Sec. 16-245bb from Connecticut Innovations, Incorporated, to Clean Energy Finance and Investment Authority and added investments, loans and other forms of financial assistance to allowable uses of proceeds, effective July 1, 2012.

[25] Special thanks to Kevin McCarthy and his team at the Office of Legislative Research for their support in reviewing this section.

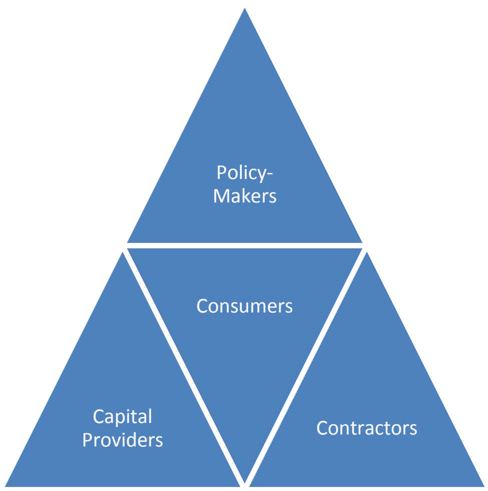
as well as a Joint Committee to continue to work to harmonize programs and initiatives to support the implementation of public policy goals.

Stakeholders

The Connecticut Green Bank identifies four (4) primary stakeholders (see Figure 1) that are the focus of its programs, products, and services, including:

- Consumers
- Capital Providers
- Contractors
- Policy-Makers

Figure 1. Stakeholders - The Three C's (Capital Providers, Consumers, and Contractors) and Policy-Makers



Consumers

A key Green Bank goal is to eliminate the financial barriers to energy efficiency upgrades and clean energy investment as well as reduce consumer reliance on grants, rebates, and other subsidies by, facilitating the transition to innovative low-cost financing of clean energy deployment using private capital. Consumers of all types (i.e., homeowners, renters, businesses, not-for-profits) seek cheaper, cleaner and more reliable sources of energy. Contractors must be able to provide consumers with comprehensive and "deeper" energy solutions while capital providers must offer consumers immediate cash flow positive returns by financing their investments. The Green Bank plays an important role in bringing consumers and contractors together by providing them with easy access to affordable capital so that they can implement energy solutions for their homes, businesses, or institutions.

Capital Providers

As a key goal is to attract capital to finance the clean energy goals for Connecticut and to develop and implement strategies that bring down the costs of clean energy (including lower interest rates, extended maturities, etc.) to make it more accessible and affordable to consumers, working in partnership with capital providers is vital to the success of the green bank model. There are local (e.g., community banks and credit unions), state, regional, and national banks, as well as equity, tax equity, and other institutional and crowd-sourced investors that seek to finance and invest in clean energy projects in

Connecticut. The Green Bank's role is to use the limited public funds it receives and leverage it to attract more private capital investment in clean energy deployment in Connecticut. The Green Bank provides several channels for capital providers to get into clean energy investing in Connecticut while earning a reasonable rate of return.

Contractors

As a key goal is to deploy capital to finance the clean energy goals for Connecticut and to develop and implement strategies that bring down the costs of clean energy (i.e., installed costs) to make it more accessible and affordable to consumers, working in partnership with qualified and certified contractors is also vital to the success of the green bank model. Qualified contractors (including the full gamut from smaller and more local businesses to the largest of energy services companies, or "ESCOs", that operate on a regional, national and even global scale) must have access to working capital to support the growth and operations of their businesses – including creating new jobs – while providing quality, timely, and cost-effective clean energy and energy efficiency solutions and financing options for consumers.

Policy-Makers

The Connecticut Green Bank was established by policy-makers to leverage public funds to attract more private capital investment to scale-up clean energy deployment in Connecticut. It is the mission of the Green Bank 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. Through its Board of Directors, the Green Bank has established a Comprehensive Plan that seeks to implement the objectives of policy-makers to deploy more clean energy at a faster pace while more efficiently managing public funds and attracting significantly more private capital. As the implementer of the C&LM Plan, the Energy Efficiency Board (EEB) and EDCs are important stakeholders for the Green Bank as well, including through the Joint EEB-Connecticut Green Bank Committee.

Financing

A major focus of the Green Bank is to attract private capital to finance the clean energy goals for Connecticut and to ensure that consumers and contractors are able to access cleaner, cheaper and more reliable sources of energy. Connecticut energy policy has ambitious goals and targets across all sectors. Goals such as:

- Enable energy efficiency improvements for at least 15% of single family homes in the state by 2020 – approximately 150,000 homes at $10,000 to achieve 20% energy reduction would cost homeowners *$1.5 billion* (PA 11-80, Sec. 124). Providing homeowners that use heating oil and can't access the natural gas expansion with access to low cost and long-term private capital to make their homes more energy efficient is important as well.

- Provide households and businesses with access to low cost and long-term private capital to help them convert from oil to natural gas for at least 200,000 households and 80,000 businesses in the state on-main in 10 years – at $7,500 for an average cost of a household conversion with equipment yields an estimated cost to homeowners of *$1.5 billion* (Natural Gas Expansion Plan). Assist households and businesses that convert to natural gas to also go deeper on energy efficiency is important as well.

- Realize the estimated potential market of over 150,000 households to install solar photovoltaic (PV) in the state – at an average cost of $27,000 per system would require an investment of *$4.0 billion* (PA 11-80, Sec. 106, Residential Solar Investment Program)

- Reduce energy use in State government buildings (which collectively spend approximately $200 million annually on energy) at least 20% from 2010 levels by January 1, 2018, would require an investment of at least *$500 million* (PA 11-80, Sec. 118)

- Realize opportunities for energy efficiency in the commercial real estate sector, estimated by HR&A to be approximately 400 million SF state-wide, could easily require *$3 billion* (PA 12-2, C-PACE enabling legislation)

Meeting these goals alone, which do not begin to consider industrial, municipal or institutional potential, could require more than *$10 billion* in investment over the next 5-10 years, which will come from a combination of private and ratepayer capital sources. Through a combination of ratepayer incentives alongside increasing low cost and long-term private capital investment, the market for clean energy will expand and consumers will pursue deeper measures. Recognizing that ratepayer resources are limited, achieving greater uptake of measures by providing consumers with easy access to affordable capital will result in a larger impact. Attracting low cost and long-term private capital will make clean energy more accessible and affordable to consumers, resulting in greater and accelerated deployment. Federal funding support, while always welcome, has been reduced dramatically and the policy dysfunction of Washington would suggest that states not have high expectations for more funding in the years immediately ahead.

The green bank model, which works by designing and implementing innovative financing, security and collection structures, has already enabled Connecticut to use its limited ratepayer and taxpayer resources to attract more than $200 million in private investment from local, regional and national sources. This model offers Connecticut and other states the most promise to source the capital required to achieve ambitious policy objectives and to transition (ultimately) to a sustainable clean energy marketplace driven solely by private sector financing (see Figure 2).

Figure 2. Purpose of Green Bank Financing - Towards a Sustainable Clean Energy Marketplace

1. Government Subsidies
2. Green Bank Financing with Reduced Subsidies
3. Green Bank Financing with No Subsidies
4. Private Sector Financing Only - Government Subsidies Only Where Private Investment Not Feasible

Acknowledging the importance of attracting more and more private capital to help Connecticut meet its clean energy goals, DEEP established a policy to ensure that subsidized financing products aren't unfairly preventing private capital from entering the market.

The ratepayer-supported C&LM financing products should be positioned in the market in such a way that they do not undermine financing products offered by the private market."

Final Decision on the 2013-2015 C&LM Plan
Department of Energy and Environmental Protection
October 31, 2013

Capitalization

The Connecticut Green Bank is capitalized through a number of public – state and federal – sources including ratepayers through a Systems Benefit Charge, greenhouse gas allowance proceeds, and bond and stimulus funds.

Systems Benefit Charge

As its main source of capitalization, the Green Bank receives a 1 mill surcharge called the Clean Energy Fund from customers of Connecticut Light & Power and United Illuminating. The fund has been in existence since Connecticut deregulated its electric industry in the late 1990's. On average, the Clean Energy Fund cost households about $10 a year and generates nearly $30 million a year to support the programs and initiatives of the Green Bank.

Regional Greenhouse Gas Emission Allowance Proceeds

The Green Bank receives a portion of Connecticut's funds from the Regional Greenhouse Gas Initiative (RGGI). As a result of regulation 22a-174-31(f)(6)(c)(ii), In fiscal year 2015, the Green Bank will receive nearly $16 million of RGGI funds designated for energy efficiency. It will receive all of the state RGGI funds for renewable energy. In fiscal year 2016, the Green Bank will continue to receive all the RGGI funds designated for renewable energy, but not for energy efficiency under the regulatory structure. The Green Bank uses the carbon allowance proceeds from the nation's first cap and trade program to provide financing for energy improvement projects through the Commercial Property Assessed Clean Energy (C-PACE) program for commercial, industrial, non-profit, and multifamily buildings. Connecticut is the first state to use carbon emission allowance revenue as financing for C-PACE in order to (1) attract private capital investment, and (2) returning the funds back for future reinvestment to lower energy costs and improve the competitiveness of our businesses.

State Bond Funds

There are various sources of state bond funds and security that have been made available to the Green Bank to support its purposes including the ability to issue bonds backed by a special capital reserve fund, loan guarantee funds, and bonding to support renewable energy and efficient energy projects. The Green Bank will begin to plan on accessing such funds and security to support the further growth and development of key programs (e.g., small business, micro grids).

Special Capital Reserve Fund

The Special Capital Reserve Fund (SCRF) allows quasi-public agencies to issue bonds for self-supporting projects or programs that are backed by the State of Connecticut, lowering the cost of capital for the program – in essence, having a no-cost insurance policy. The Green Bank received $~~50~~ 100 million in SCRF authorization that can be placed on bonds issued for energy efficiency and clean energy programs.

Green Connecticut Loan Guaranty Fund

The Green Connecticut Loan Guaranty Fund provides the Green Bank with access to $~~20~~ 18 million to attract lending institutions to participate in clean energy financing programs for individuals, non-profit organizations, and small businesses through a first loss credit enhancement. The program is to be designed in consultation with the ECMB and CHEFA.

Renewable Energy and Efficient Energy Finance Account

The Renewable Energy and Efficient Energy Finance Account of $~~1~~8 million may support grants, investments, loans or other forms of financing assistance to clean energy projects. The program is to be designed in consultation with the DEEP, DECD, and the Office of the Treasurer and priority shall be given to projects that use major system components manufactured or assembled in Connecticut.

Connecticut State Treasurer's Office

The Connecticut Green Bank will work cooperatively with the State Treasurer's Office to explore opportunities to co-invest in Connecticut projects that can deliver appropriate risk-adjusted returns for Connecticut pension assets, reduce the emissions of greenhouse gases, and contribute to job creation.

Federal Funds

Alongside public funds made available through state channels, the Green Bank has access to or expects to pursue federal funds including stimulus and revolving loan funds as well as loan guarantees, in order to bring private capital to these sources.

American Recovery and Reinvestment Act

The American Recovery and Reinvestment Act (ARRA) of 2009 awarded the Green Bank, and its predecessor the CCEF, $20 million for its programs and initiatives. About $8.25 million of those funds are currently being used as credit enhancements for the Green Bank's residential financing programs including the Smart-E Loan, Cozy Home Loan, CT Solar Loan, and CT Solar Lease. These funds have already been received and are being used to attract private capital investment in products that support the policy goals of Connecticut.

Clean Water State Revolving Fund

The Clean Water State Revolving Fund (CWSRF) serves as the nation's largest water quality financing source, helping communities across the country meet the goals of the Clean Water Act. The CWSRF programs provide low interest and long-term loans for many things including water quality protection projects for wastewater treatment. Recently, a nexus has been drawn between energy and water. The Green Bank will explore with DEEP and the Treasurer's Office how the CWSRF can be leveraged to bring in more private capital for investments in key areas (e.g., food waste and sludge from waste water treatment plants to energy through anaerobic digester projects).

Loan Guarantee

The U.S. Department of Energy (DOE) has established a $4 billion renewable energy and efficient energy loan guarantee program to support innovative, renewable energy and energy efficiency projects in the U.S. that reduce, avoid or sequester greenhouse gases. From advanced grid integration and storage projects to waste to energy and efficiency improvements, the program can potentially support a unitary plan for the implementation of important clean energy projects in multiple locations throughout the state including micro grids, food waste to energy, and district heating and cooling. The Green Bank will explore with its partners the potential to access a large federal loan guarantee to develop a unitary plan that advances the energy, environment, and economic development policy objectives of Connecticut.

Public-Private Partnerships

The foundation of the green bank model rests on Connecticut's achievement of a legislative and regulatory policy framework that makes it possible for financing, security and collection structures and mechanisms to be put in place in order to facilitate significant pools of private capital into the marketplace to finance a diverse array of energy efficiency and clean energy investment across all sectors. Since its formation, the Green Bank has attracted more than $200 million in private investment from local, regional and national sources. These investments are the quintessential public private partnerships for clean energy finance. Investments such as:

- Green Bank financing in support of the largest fuel cell in North America – a 15 MW project on an old brownfield site in a distressed community using a technology manufactured in Connecticut – attracted $65M in initial investment from Dominion Resources while creating ~150 direct jobs (i.e., manufacturing, construction, and servicing).

- A unique combination of a tax equity investor, a syndicate of debt providers and the Green Bank to create a $60 million fund for rooftop solar PV (i.e., residential lease financing for solar PV and solar hot water systems and commercial leases/PPAs for solar PV).

- A $5 million crowd-funded solar loan program supported by the Green Bank that will ultimately enable ordinary citizens to finance their neighbors' solar PV systems.

- A 2nd loss reserve provided by the Green Bank (using $2.5 million of ARRA funds) to attract $30 million of private capital for Smart-E Loans offered by nine local community banks and credit unions offering state-wide coverage. A plan for repayment of these loans on the utility bill was statutorily approved in 2013 and is presently making its way through the appropriate channels for regulatory approval.

- An offering by the Green Bank of C-PACE funded transactions that resulted in attracting $24 million in private capital using $6 million of Green Bank investment to fund a $30 million portfolio of commercial, industrial, non-profit, and multifamily projects.

These partnerships with private capital are positive signs that the funds are ready, willing and able to be supplied to the clean energy marketplace in Connecticut.

Cost of Capital

It is not sufficient for private capital to be supplied into the market for clean energy and energy efficiency investment. Capital "at any cost" will not permit the market to scale-up to levels required to enable Connecticut to achieve its policy goals. This is particularly true in Connecticut where the marketplace has become conditioned to subsidized interest rate loans, particularly for energy efficiency. To date, much success has been observed in the Green Bank's ability to attract capital at rates that are viewed by consumers as both reasonable and affordable. The Green Bank's Smart-E loan for homeowners is available at 5-year rates starting at 4.49% (4.24% from at least one lender). For homeowners without access to home equity financing, these rates compare quite favorably to unsecured lending rates, which frequently range from 9% to 12% or more. The C-PACE program is attracting funding at a level of approximately 300 basis points (100 basis points = 1%) over long term swap rates. An even lower rate was achieved for the debt funding associated with the leveraged solar lease fund. Crowd-funding could provide funding at even lower yields, but the potential for crowd funding is too uncertain at the present time to be relied upon as a meaningful supply of capital for clean energy projects.

Maturity

To date, the Green Bank has been successful in attracting capital for terms that enable consumers of all types to make the desired investments in clean energy with no cash investment up front in most cases. In fact, Green Bank programs have demonstrated that lengthening the maturity of the loan can be an effective way to raise more capital for these projects. For instance, it would require a reduction in interest rate from 5% to nearly 0% to have the same impact as a one year extension in repayment terms (i.e., from 6 years to 7 years) to finance a home oil-to-gas conversion with a new boiler/furnace for about the same $100 per month outlay. The benefits of extended terms become even more significant for financing comprehensive energy efficiency retrofits called for by the Comprehensive Energy Strategy that cost more to implement and deliver benefits to the homeowner over somewhat longer payback periods. In these cases, the 10 and 12 year maturities for the Smart-E loan and the 15 year maturity for the Solar Loan permit homeowners to become cash flow positive either throughout the life of the loan or after a modest fraction of the total loan payments have been made. With C-PACE, commercial and industrial property owners are able to finance their investments at periods extending up to 20 years, with a statutory requirement that expected energy savings exceed financing obligations levied on their property tax bill.

Private Investment and Leverage Ratio

In the end, these public-private partnerships are efforts by the Green Bank to attract private investment to finance Connecticut's clean energy goals. In doing so, the Green Bank uses a diverse array of financial structures and instruments to facilitate co-investment with a host of capital providers, participating in every level of the capital stack, from equity, to subordinated debt and senior debt (i.e., earning returns that range from "concessional rates" to market rates of return). The Green Bank will also provide other credit enhancements, such as loan loss reserves, guarantees, funding warehouses, and other forms of support where such support for the sector or achieving Connecticut's policy goals is warranted. The Green Bank has no formula for the manner or level of support or credit enhancement it ultimately provides, but seeks to provide the least amount of support necessary to result in the highest possible levels of private financing for the projects concerned or to meet programmatic goals. That said, the Green Bank has been successful in leveraging ratepayer and other forms of public capital from 4:1 to 12:1. For example, the Green Bank leverages ratepayer capital in various ways through its products, including a 5:1 leverage ratio through the CT Solar Lease whereby $10 million of ratepayer capital is used to attract $50 million in tax equity and debt investment, yielding an 11:1 leverage ratio to support the growth and sustainability of a local residential solar PV contractor market, through the Energize CT Smart-E Loan whereby a $2.5 million second loss reserve is attracting $28 million of long-term and low-interest loans from local community banks and credit unions to help finance energy improvements in homes that are consistent with the Comprehensive Energy Strategy.

Marketing

A major focus of the Green Bank is to not only attract capital to finance the clean energy goals for Connecticut, but to also *deploy* capital. Through the statewide brand of Energize Connecticut (or EnergizeCT), consumers and contractors are provided with easy access to incentives and financing. Through the Connecticut Green Bank, more and more private capital is being attracted and deployed in our state to support clean energy. Through various marketing channels including our utility partners, local lenders and contractors, on the ground community efforts, and online, more and more consumers are receiving access to cleaner, cheaper, and more reliable sources of energy. As utilities' customer engagement platforms are developed and implemented in 2015 and 2016, an abundance of data will become available and the Green Bank plans to integrate the data into its programs.

Energize Connecticut

Energize Connecticut℠ is an initiative dedicated to empowering Connecticut citizens to make smart energy choices, now and in the future. It provides Connecticut consumers, businesses and communities the resources and information they need to make it easy to save energy and build a clean energy future for everyone in the state. It is an initiative of the Connecticut Energy Efficiency Fund, the Connecticut Green Bank, the state, and the local electric and gas utilities. The Green Bank's market-facing products and programs operate under the Energize Connecticut brand. The Green Bank, in conjunction with its Energize Connecticut partners, has developed a statewide marketing plan for the brand to raise awareness as well as realizing the goal stated in the CES:

> "To create a culture that understands the value of and therefore demands energy efficiency, establishes standards that enable consumers to easily ascertain the efficiency profile of their own homes or buildings, and makes financing for energy efficiency measures both easily accessible and affordable."

For more information, go to www.energizect.com

Connecticut Green Bank

In May of 2014 through Public Act 14-94, the Clean Energy Finance and Investment Authority (CEFIA) became the Connecticut Green Bank . As the former name of the organization was thought to be long, confusing, and difficult to pronounce, the new name needs very little explanation, has more resonance, is friendlier and is closer to the mission of the organization.

The Green Bank is guided by its knowledgeable, collaborative, helpful, and solutions-oriented people – its most important asset – by providing contractors and consumers with easy access to affordable private capital. Attracting low cost and long-term private capital will make clean energy more accessible and affordable to consumers, resulting in greater and accelerated deployment.

For more information, go to ~~www.ctcleanenergy.com~~www.ctgreenbank.com~~[26]~~

~~[26] The future website of the Connecticut Green Bank is www.connecticutgreenbank.com~~

Channel Marketing

The Green Bank works on the ground in communities throughout the state with its channel marketing partners including the utilities, local lenders and contractors, and volunteer citizens and community-based organizations. It also engages consumers online through www.energizect.com and other campaign-based or programmatic platforms like www.gosolarct.com, www.solarizect.com, and www.c-pace.com.

Utility Partners

The electric (i.e., United Illuminating, Connecticut Light & Power, and Connecticut Municipal Electric Energy Cooperative) and natural gas (i.e., Connecticut Natural Gas, Southern Connecticut Gas, Yankee Gas, etc.) distribution companies are an important channel marketing partner. As administrators of the Connecticut Energy Efficiency Fund, our utility partners are helping consumers reduce their energy consumption, lower peak electric demand, and provide consumers with opportunities to access natural gas. Through the Conservation and Load Management Fund, the administrators of the CEEF are developing a customer engagement platform that can be used to target key market segments with various incentives and financing. ~~CEFIA~~Connecticut Green Bank- will work with CEEF and DEEP to share data to better inform marketing tactics to acquire customers for energy efficiency and renewable energy improvements.

Local Lending Partners

The Green Bank partners with local lenders including credit unions, community, state, regional, and national banks. Through credit enhancements – including subordinated debt, loan loss reserves, and interest rate buy downs – the Green Bank supports local lenders in providing consumers with easy access to affordable capital. With low interest loans that have long maturities, consumers can receive immediate positive cash flow returns from their energy improvements as their energy savings exceed debt service payments.

Local Contractors

The Green Bank supports local contractors installing clean energy systems in the residential, commercial, industrial, and institutional sectors. Contractors serving renewable energy, energy efficiency, and natural gas conversion projects – all components of the Comprehensive Energy Strategy – are supported with access to private capital sources to support the growth of their businesses through working capital, as well as easy access to affordable capital for their consumers.

Community-Based Campaigns

Community-based campaigns provide an opportunity to engage local residents, businesses and institutions in advancing the clean energy policy goals of the state. Over the years, the Green Bank, and its predecessor the CCEF, have been involved in the creation of several community-based campaigns that are attracting foundation contributions and winning federal grants by accelerating the deployment of clean energy in communities across the state, including the Clean Energy Communities program,[27] Neighbor to Neighbor Energy Challenge, Solarize Connecticut, and Energize Norwich.

[27] The U.S. Environmental Protection Agency and U.S. Department of Energy awarded the CCEF and SmartPower with the Green Power Pilot Award for the Connecticut Clean Energy Communities Program in 2006. Such programs were supported by contributions from the Emily Hall Tremaine Foundation, John Merck Fund, Pew Charitable Trusts, Rockefeller Brothers Fund, Surdna Foundation, and others.

Clean Energy Communities

A joint program of the Green Bank and CEEF, the Clean Energy Communities program provides cities and towns across Connecticut with rewards for advancing the clean energy goals of the state.[28] There are three (3) things a city or town must do to become a Clean Energy Community:

1. Make a Commitment – make a municipal pledge to save energy in municipal buildings, voluntarily purchase clean energy, and establish a consumer-friendly marketplace for clean energy (e.g., expedient and low-cost permitting processes).

2. Take Action **–** fulfill the pledge by helping households, businesses and institutions to save energy and install clean energy through various incentive and financing programs.

3. Receive Rewards – earn points that can be redeemed for clean energy systems and grants for energy-saving projects.

There are currently 95 communities in the state – representing 70 percent of the population – that have joined the program.

Solarize

Solarize Connecticut[SM] is a program designed to encourage the adoption of residential solar PV systems by deploying a coordinated education, marketing and outreach effort, combined with a tiered pricing structure that provides increasing savings to homeowners as more people in a community go solar.[29] The program, in partnership with SmartPower and the John Merck Fund, is designed based on a proven residential aggregation model to bring down the cost of solar PV when more and more residents sign-up for a pre-selected installer offering. The more residents that sign-up to install solar, the more price decreases for everyone who participates – see Table 2.

Table 2. Consumer Benefits from Solarize Connecticut within the Residential Solar Investment Program (as of May 30, 2014)

Performance Metric	Solarize	Non-Solarize	Total
# of Installations	1,117	2,500	3,617
Installed Capacity (kW)	7,980	17,739	25,719
# of Cities and Towns	31	138	169
Installed Cost ($/$kW_{STC}$)	$3,833	$4,662	$4,405
Costs Saved ($)	$6,615,420	-	$6,615,420

As a result of Solarize Connecticut, the "soft costs" of customer acquisition are decreased from $300-$600 per kilowatt installed to between $50 to $100 per kilowatt installed – reducing overall system costs by up to 20 percent or about $6,000 per project. As a result of the program nine of the "Top 10" cities and towns in installed capacity, watts per capita, and penetration rate for residential solar PV participated in the Solarize program. Through a federal grant from the U.S. Department of Energy through the Solar Energy Evolution Diffusion Study (SEEDS), Yale University, New York University,

[28] http://www.energizect.com/communities/programs/clean-energy-communities
[29] www.solarizect.com

SmartPower and the Green Bank are evaluating the relative performance, cost-effectiveness, scalability, and persistence of the community-based campaign model.[30]

The Solarize Connecticut model is being adapted beyond the geographic boundaries of cities and towns to include affinity groups such as large employers (e.g., colleges and universities) and membership-based organizations (e.g., faith and environmental groups) through programs like Solarize U.[31]

Energize

Based on the success and adaptation of the Solarize Connecticut model for creating significant consumer demand for clean energy, the Comprehensive Energy Strategy goal to convert hundreds of thousands of households from heating oil to natural gas, and Section 52 of Public Act 13-298 "An Act Concerning Implementation of Connecticut's Comprehensive Energy Strategy and Various Revisions to the Energy Statutes," the Energize campaign was developed by the Green Bank, DEEP, SmartPower, and Norwich Public Utilities (NPU) to support heating oil to natural gas conversions and energy efficiency upgrades in Connecticut households.

Energize Norwich, the pilot program, was launched by the Green Bank in partnership with the Town of Norwich, NPU, SmartPower, and two local lenders – Eastern Savings Bank and Core Plus Federal Credit Union. The pilot program established a stretch target of converting 400 households to natural gas in 6 months. As a result of the strong partnership between the parties and a successful outreach campaign, the target was achieved delivering over 400 natural gas conversions in less than 6 months. The pilot program created so much consumer demand for natural gas conversions that NPU had to expand their working crews in order to handle more jobs.

The success of the Energize Norwich pilot will lead to further experimentation with NPU in the Town of Norwich and an expansion into other cities and towns across Connecticut that have expressed interest to the Green Bank in supporting a similar campaign for natural gas conversions and energy efficiency upgrades for their households.

Digital and Online Media

Another important marketing channel is digital and online media. Over the past decade, much has changed with regards to providing consumers with easier, quicker, and more substantive access to information through the internet and things such as Google, Facebook, Twitter, and other online information resources. The Green Bank uses these tools to increase the level of awareness and education of consumers to help them take action to receive cleaner, cheaper, and more reliable sources of energy.

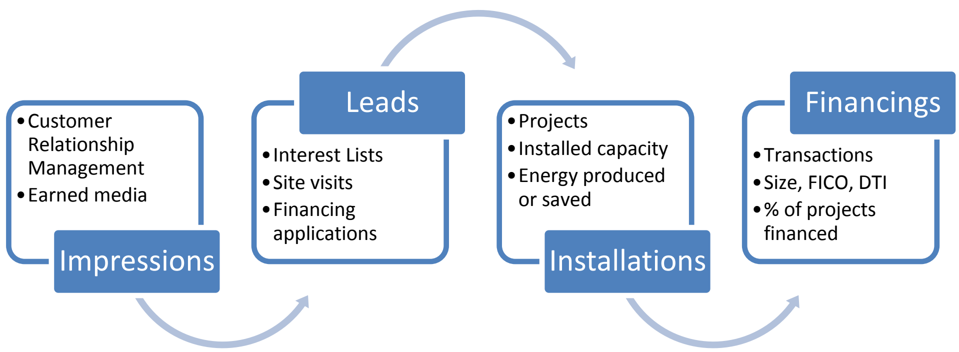
Customer Classifications

In order to achieve the ambitious energy policy objectives of Connecticut, it is important to ensure that consumers are not only increasingly becoming more educated and aware of what they can do to improve their situation, but more importantly to also use public incentives and financing from private capital sources to take action and do something. Increasing consumer education and awareness by

[30] http://solarizect.com/us-department-of-energy-grant-award-validates-success-of-solarize-connecticut-program/
[31] http://solarizect.com/solarize-u-announced/

making strong impressions and generating leads will drive more consumers to install clean energy technologies and use more private capital to finance those projects – see Figure 3.

Figure 3. Customer Classifications from Awareness to Acquisition



- **<u>Impressions</u>** – an impression is the earliest stage of consumer education and awareness. It includes things such as earned media, website hits, event attendance and customer relationship management. Impressions are a leading indicator of consumer action.

- **<u>Leads</u>** –an expressed interest by a consumer in wanting to understand the opportunity further. It includes less tangible things such as signing an interest list or having a site visit or audit, to more action oriented things such as submitting an application for approval on incentives and/or financing.

- **<u>Installations</u>** –a clean energy project that has received approval for an incentive (e.g., Residential Solar Investment Program), in construction, or commissioned. Installations are expressed in terms of the number of consumers reached, renewable energy produced (e.g., kW installed, kWh generated), and energy saved (e.g., MMBtu's), along with the associated societal benefits that come with those installations (e.g., GHG emission reductions, jobs).

- **<u>Financings</u>** –a closed loan, lease, PPA, ESA or other financing transaction where the Green Bank is repaid (versus a subsidy), including the number of transactions, size of transactions, credit scores of borrowers and the trends towards increased financing over time.

Customer Acquisition

The Connecticut Green Bank has developed a set of customer acquisition cost metrics for its financing products and marketing initiatives that includes:

- **<u>Acquisition Cost per Install</u>** – determining the costs – or marketing expenditures – per installation or customer acquired. For example, a marketing budget for Solarize of $100,000 that leads to the installation of solar PV systems on 220 homes would have an acquisition cost of about $450 per household.

- **Market Share from Financing** – tracking over time the percentage of customers that use financing products from private capital sources with and without the Green Bank support, will help transition the market from grants, rebates, and subsidies and move towards low-cost and long-term private capital. For example, in communities that are implementing Solarize campaigns, there are a greater percentage of households that are using financing than self-funding projects – which will help the market transition away from subsidies and towards private investment in the future.

- **Acquisition Cost per Energy Unit** – determining the acquisition costs per energy unit will help the Green Bank determine how effectively its marketing resources can be allocated to generate clean energy or save energy. For example, if the acquisition costs per install for solar PV on households is $450, and that system is expected to produce 175,000 kWh over its 25-year lifetime, then the acquisition cost per energy unit is $0.0025/kWh.

Over time, the goal is to reduce customer acquisition costs per install, see a gradual increase in the use of financing by consumers over time as subsidies are reduced, and lowering the acquisition cost per unit of clean energy produced or energy saved – see Table 3.

Table 3. Customer Acquisition Costs – Example for Community-Based Campaigns

Customer Acquisition Costs	Acquisition Cost per Install	Market Share from Financing Trends				Acquisition Cost per Energy Unit
		Q1	Q2	Q3	Q4	
Solarize Connecticut	$450	35%	44%	36%	8%	$0.0025/kWh or $0.75/MMBtu
Energize Norwich	$225	13%	32%	24%	26%	$1.16/MMBtu (boiler) $0.71/MMBtu (furnace)

Statutory and Infrastructure Sector

The Statutory and Infrastructure Sector is focused on implementing statutorily mandated programs[32] as well as infrastructure projects[33] that provide cheaper, cleaner and more reliable sources of energy while creating jobs and supporting local economic development.

Comprehensive Energy Strategy and Integrated Resource Plan

The Statutory and Infrastructure Sector programs support the implementation of the CES and IRP. Specifically, the deployment of clean energy supports many of the strategy recommendations in Chapter 2 (i.e., Industry Sector Strategy) and Chapter 3 (i.e., Electricity Sector Strategy) of the CES that better enable Connecticut residents and businesses to take advantage of the opportunities outlined, including, but not limited to:

- Expanding access to and realizing the full potential of combined heat and power;
- Working with municipalities to expand programs and policies that drive down the cost of in-state renewable resources;
- Developing and deploying micro grids to support critical services and ensure public safety during electricity outage crises; and
- Expanding virtual net metering opportunities to promote deployment of large-scale renewable systems.

Programs such as the U.S. Department of Energy SunShot Initiative Rooftop Solar Challenge and the Anaerobic Digester and Combined Heat and Power Pilot Programs are but a few examples where the Green Bank's Statutory and Infrastructure Sector is supporting the implementation of the CES.

Recognizing that in the future the 2012 IRP estimates a shortage in renewable energy credits for Class I Renewable Portfolio Standard compliance, more in-state generation of Class I resources will help to alleviate an expectation of higher RPS policy compliance costs. Also, should there be challenges in the near future reducing peak demand in the summer and winter, the Green Bank's support of more behind-the-meter and grid-tied clean energy systems, as well as storage, will release some cost pressures as a result of increasing peak demand.

The programs of the Statutory and infrastructure Sector are intended to support the implementation of the strategies and recommendations outlined in the CES and IRP.

[32] Examples of statutorily mandated programs would be, but are not limited to, Sections 103 (i.e., anaerobic digester and combined heat and power pilot programs) and Section 106 (residential solar investment program) of Public Act 11-80.

[33] Examples of infrastructure projects include Section 26 of Public Act 05-01 (i.e., Project 100) which resulted in the Dominion Bridgeport Fuel Cell Park or Section 127 of Public Act 11-80 (i.e., 30 MW of grid tied renewable energy projects sited in Connecticut) which resulted in Colebrook Wind.

Conservation and Load Management Plan

The Statutory and Infrastructure Sector programs support the implementation of programs in the C&LM Plan. Specifically, the deployment of solar PV systems through the Residential Solar Investment Program (RSIP) supports several of the programs in Chapter 3 (i.e., Residential Programs) of the C&LM Plan, including:

- **Home Energy Solutions (HES)** – every residential solar PV project is required to undertake a HES assessment or an equivalent energy audit.

- **Residential Behavior Program** – every residential solar PV installation includes a real-time Wi-Fi or cellular enabled monitoring system that measures the amount of energy produced from the system. On average, these systems produce nearly 70% of the energy consumption needs of the household. The data collected from these systems is made available online and serves as a way for the homeowner to adjust their behavior in order to reduce their energy consumption to equate to the level of clean energy production.

The RSIP of the Statutory and Infrastructure Sector supports the implementation of several of the programs within the C&LM Plan intended to reduce energy consumption through weatherization and behavior-based strategies. As the current installed costs of residential solar PV continue to decline below $4.00 per watt and the accompanying incentives from the Green Bank through the RSIP drop below $1.00 per watt as the market transitions towards financing, clean energy will become increasingly cost-effective , delivering quicker paybacks and greater returns that can be reinvested in deeper household energy efficiency measures.

TAM and SAM

For the Statutory and Infrastructure Sector, there are several Total Addressable Market (TAM) and Serviceable Addressable Market (SAM) scenarios with respect to residential solar PV, anaerobic digesters, and combined heat and power.

Residential Solar PV

Per Public Act 11-80, the Green Bank is to structure and implement a residential solar investment program which shall result in a minimum of 30 megawatts of new residential solar photovoltaic installations located in Connecticut on or before December 31, 2022. In order to assess the market potential for residential solar PV to determine if the goal established by the legislature is achievable, the Green Bank worked with Geostellar[34] to use big-data geomatics to determine the technical and economic viability (i.e., TAM) and market penetration (i.e., SAM) in Connecticut (see Tables 4 and 5).

Table 4. Residential Solar PV Market in Connecticut and Penetration – By Customers

Market Definition	Market Size (# of Customers)	Current Penetration (2013)
All of Connecticut	1,609,735	0.21%
Residential Sector	1,454,651	0.24%

[34] www.geostellar.com

Technically Viable Rooftops	659,312	0.52%
Economically Viable Rooftops	506,714	0.68%

Table 5. Residential Solar PV Market in Connecticut and Penetration – By Generation

Market Definition	Market Size (MWh)	Current Penetration (2013)
All of Connecticut	29,492,338	0.09%
Residential Sector	12,757,633	0.21%
Technically Viable Rooftops	6,559,940	0.41%
Economically Viable Rooftops	3,915,000	0.69%

Given the existing federal and state subsidies, according to Geostellar, more than 500,000 residential rooftops can carry solar panels that produce a net present value gain for the residences taking solar electricity off their own roofs. The potential market represents more than 40% of households in the state – and about 120 times the legislative target of 30 MW. At saturation, the total investment would be about $12 billion and create about 70,000 to 100,000 job years within the state. Geostellar has also estimated that the size of the market will grow to 650,000 rooftops, as solar costs decline. These rooftops would generate 6,599 GWh per year, equivalent to approximately 22% of total electricity consumption in the state, satisfying the state's Class I RPS.

Anaerobic Digesters

Per Public Act 11-80, the Green Bank is to set aside $2 million a year to pilot a 3-year anaerobic digester (AD) program to provide grant, loan, or power purchase agreement support to no more than five (5) projects. The three common types of AD projects that can readily be deployed in the State are Source-Separated Organic Matter (primarily Food Waste), Waste Water Treatment Facility (WWTF) sludge and Animal Waste (Farm). Because of the availability and economics of processing feedstock (i.e., food waste, sludge and animal waste), these projects take more time than other energy projects to develop.

The available food waste market assessment was based on information taken from the DEEP State-Wide Solid Waste Composition and Characterization Study and the DEEP Food Residual Generation Mapping Study (September 2001, updated for DEEP by US EPA in Spring 2012)[35] identifying all Connecticut large food waste generators. Per the source-separated organics recycling legislation (Public Act 11-217, as updated by Public Act 13-285, and codified at CGS 22a-26e) large commercial food waste generators are required to bring their source-separated organic materials to a recycling facility, unless there is not a suitable facility within a 20-mile radius of the generator. Large food waste generators subject to this requirement are identified as commercial food wholesalers or distributors, industrial food manufacturers or processors, supermarkets, resorts or conference centers that each generate an average projected volume of not less than one hundred four tons per year of source-separated organic materials (SSOM). The purpose of the law is to signal to investors and prospective facilities that a large volume of feedstock is quantified and available for composting and anaerobic digestion facilities. DEEP

[35] *Updated Mapping of Food Residual Generation in Connecticut* by the Department of Energy and Environmental Protection (Spring 2012)

estimates the total food generation within Connecticut to be in excess of 320,000 tons/year, with additional tonnages of other SSOM available as well. If all the available food waste from the large generators was made available for waste to energy plants, it could support up to 9.6 MW of generation capacity.

For WWTF, the TAM and SAM are limited to the number of facilities in the State. A WWTF study assessment done by Fuss & O'Neill (F&O) for the Green Bank[36] identified a total of 84 WWTF throughout Connecticut. The total available market capacity of all the facilities is 551-million gallons of sludge per day (MGD). However, the serviceable market, based on F&O's assessment of what criteria WWTF use as their guide for acceptable paybacks for capital investments (between 5 and 10 years), identifies facilities with greater than 5 MGD as required to achieve these paybacks. This leaves the serviceable market size at 102 MGD which accounts for less than 20 of the 84 total WWTF. The market size in the table reflects the serviceable market size based on installed generation capacity of up to 2.7 MW.

Data used to determine the potential market size for animal waste, primarily cow manure, was estimated using information provided by the agriculture department at the University of Connecticut. This TAM is directly correlated to the dairy cow population in Connecticut, which currently is estimated to be around 20,000. The market size below is a rough order of magnitude based on information gathered from several recent studies and case studies for farm AD applications. From these studies it is estimated that the manure from 1,000 cows can provide enough methane to support a generator capacity of 250 kW. Determining the serviceable available market is a bit tougher because 60% of Connecticut dairy farms are either 100 cows or less. In order for any of these farms to make an AD installation feasible it would require partnering and aggregating feedstock with other local farmers. There are only a handful of farms that are large enough, 800 plus cows, to even consider a small scale AD project without supplementing the feedstock with organic food waste.

Both food waste and waste sludge are dependent on the number of feedstock generators (see Table 6). The table below shows a preliminary estimate of the market by annual electricity generation for projects using the feedstock.

Table 6. Anaerobic Digester Market in Connecticut for Food Waste, Waste Water Treatment Sludge, and Animal Waste

Market Definition	Market Capacity (MW)	Market Size (MWh)
Food Waste (SSOM)	9.6	75,923
WWTF Sludge	2.7	21,318
Animal Waste (Farm)	TBD	35,040
Total	**12.3**	**132,281**

Micro Grid Combined Heat and Power

Per Public Act 11-80, the Green Bank is to set aside $2 million a year to pilot a 3-year CHP program to provide grant, loan, or power purchase agreement support to no more than fifty megawatts of projects.

[36] *Report to CEFIA of Results of Anaerobic Digester Project* by Fuss & O'Neill for the Connecticut Green Bank (January 21, 2014)

Given that Public Act 11-80 established two CHP programs, a pilot program administered by the Green Bank and a proscriptive program managed by DEEP, the Green Bank's CHP pilot will concentrate on the funding of micro grid projects that can utilize a CHP installation. As funding for micro grid projects under General Statutes of Connecticut, Section 16-243y, as modified by Public Act 13-298, Section 34, does not include incentive for the generation portion of a micro grid project, the Green Bank can make better use of its CHP Pilot Program funding by supporting critical facility micro grid projects. Because this change in the use of CHP Pilot Program funding was recently decided, staff has yet to determine the TAM and SAM for the micro grid CHP market.[37]

The Green Bank currently has approximately $25 million of CHP projects in the pipeline. The average installed cost of these projects fall in the range of $2,500 to $4,000 per kilowatt. If all the projects get built it would add 8 MW of additional installed clean energy capacity into Connecticut.

Product or Program Overview

The Statutory and Infrastructure Sector has established the following program targets for FY 2015 (see Table 7).

Table 7. Statutory and Infrastructure Sector Fiscal Year 2015 Targets

Program	Projects	Capital Deployed	Clean Energy Deployed (MW)	Annual Clean Energy Generated and Saved (MMBtu)
RSIP	3,200	$92,160,000	23.1	91,556
AD	5	$90,000,000	6.8	300,849
CHP	12	$25,000,000	8.0	383,515
Total	**3,217**	**$207,100,000**	**37.9**	**775,920**

Meeting these targets would generate 137,863 MWh of clean energy (or 470,528 MMBtu's) and save 775,921 MMBtus annually and 2,282,548 MWh of clean energy (or 2,425,316 MMBtu's) and save 12,371,234 MMBtus over the life of the projects.

For results to targets achieved in Fiscal Year 2015 – click here.

The Statutory and Infrastructure Sector has established the following program targets for FY 2016 (see Table 8).

Table 8. Statutory and Infrastructure Sector Fiscal Year 2016 Targets

Program	Projects	Capital Deployed	Clean Energy Deployed (MW)	Annual Clean Energy Generated and Saved

[37] As noted in the Comprehensive Energy Strategy, the TAM for industrial CHP – which is not a "critical facility" – is approximately 700 MW. To date, there is about 260 MW of CHP deployments (i.e. SAM), leaving about 440 MW of opportunity for investment, or over $750 million.

				(MMBtu)
RSIP	11,987	$402,869,745	90.0	376,603
AD	3	$62,825,000	6.2	193,681
CHP	2	$8,900,000	2.8	79,505
Total	**11,992**	**$474,594,745**	**99.0**	**649,789**

Residential Solar Investment Program

The Residential Solar Investment Program (RSIP) requires that a minimum of 30 MW of new residential solar PV be installed in Connecticut on or before December 31, 2022, at a reasonable payback to the customer all the while developing a sustainable market for contractors. The RSIP provides to residential customers, via solar PV contractors, direct financial incentives in the form of expected performance-based buy-down incentives (EPBB) and performance-based incentives (PBI) for the purchase and/or lease of qualifying residential PV systems.

Benchmarks

Below are some of the Benchmarks to be used to compare the Residential Solar Investment Program with other states in the region.

Table 89. State Benchmarks of Residential Solar PV Program Incentives[38]

Benchmarks	CT	MA	NJ	NY
Electric Retail Rate ($/kWh)	$0.1723	$0.1477	$0.1533	$0.1826
Installed Cost ($/W)	$3.86	$3.99	$3.60	$3.87
State Incentives ($/W)[39]	$0.55	$2.52	$1.60	$1.01
Federal Incentives ($/W)	$1.20	$1.16	$1.08	$1.04
Net Cost to Customer	$2.11	$0.32	$0.92	$1.82
Net Cost as % of Installed Cost	54%	8%	26%	47%
Installed Watts (2014)	36,166,000	20,075,000	45,771,000	56,078,000
Installed Watts per Capita	10	4	5	3
Energy Efficiency Requirement	Audit	Encouraged	No	Encouraged

Key Performance Indicators

Below are the Key Performance Indicators that will be used to measure the success of the RSIP for FY 2015 against previous fiscal years.

- Number of projects submitted, approved, and completed
- Total MW (name plate)
- First year and lifetime generation (MWh)
- Installed cost ($/W)
- Incentive ($/W) and percent of incentive as installed cost

[38] Calculated by Statutory and Infrastructure Sector program staff on May 30, 2015

[39] Includes present value of all state incentives (i.e., SRECs, state tax credit, etc.)

- Investment Tax Credit (ITC) ($/W) and percent of ITC as installed cost
- Ratio of ITC to incentive
- Net cost to the customer ($/W)
- Aggregate levelized cost of energy to customer ($/kWh)
- Aggregate payback to customer
- Aggregate internal rate of return to customer

Anaerobic Digester and Combine Heat and Power Pilot Program

Per Public Act 11-80 Section 103, the Green Bank is to develop a three-year pilot program for AD and CHP by setting aside $2 million a year for each pilot for three years – for a total of $12 million. Funds to support the pilot programs can be used as grants, power purchase agreements or loans. There are to be no more than five (5) AD projects, each no more than 3 MW in size, and no more than 50 MW of CHP projects each to not exceed 5 MW in size. Both pilot programs support projects at no more than $450 per kW on a grant basis. The pilots commenced at the end of FY 2012 and are to be evaluated with a report submitted to the Energy and Technology Committee prior to January 1, 2015.

To date, four AD projects have been approved or are seeking approval by the staff from the Green Bank Board of Directors for a total of 5.75 MW and $14 million in sub-debt, and three CHP projects totaling 3.7 MW and about $1 million in grants have been commissioned with an open solicitation to provide loan or PPA financing for additional projects.

Benchmarks

AD using food waste and other organics is relatively new to the New England region. The Massachusetts Clean Energy Center (MassCEC) has recently awarded $2.3 million in FY 2013 for Organic-to-Energy projects, studies, and services relating to the development of new AD facilities in an effort to divert food waste from its landfills and incinerator facilities. Of the total amount awarded, $1.75 million was awarded in grants to develop 5 new AD facilities throughout Massachusetts and remaining funds were awarded to 12 public entities and 1 non-profit for studies and other services leading up to the development of new AD facilities.

CHP deployment is common in Connecticut and throughout the New England region. Through the MassSaves program in Massachusetts, incentives for CHP include payments for feasibility studies, procurement, and installation – projects less than 150 kW receive $750 per kW up to $112,000; projects greater than 150 kW and less than 2 MW receive a payment amount that is determined by the utility administrator and can be approximately 50 percent of the installed cost of a small to medium sized project; and projects greater than 2 MW receive incentives commensurate with the availability of funds.

Key Performance Indicators

Below are the Key Performance Indicators that will be used to measure the success of the AD and CHP pilot programs for FY 2015.

- Number of projects submitted, approved and completed
- Total MW (name plate)
- First year and lifetime clean energy generation
- Amount of food waste diverted from landfills and incinerators
- Installed cost ($/kW)
- Loan to private capital ratio
- MWh's generated and/or saved per $1 of ratepayer funds at risk

Objective Function

The objective functions for the average sized project underneath each program are computed below (see Table ~~9~~10).

Table ~~9~~10. Objective Function for a Typical Project Under the Statutory and Infrastructure Sector Programs

Program	Lifetime Energy Generated and/or Saved (MWh's / MMBtu)	Dollars of Ratepayer Funds at Risk ($'s)[40]	Objective Function (kWh's Generated and/or MMBtu Saved per $1 of Ratepayer Funds at Risk)
RSIP[41]			
▪ EPBB	187.8 / 641	$3,838	48.9 / 0.1669
▪ PBI	187.8 / 641	$4,949	37.9 / 0.1295
AD			
▪ Food Waste Only	107,000 / 768,133	$720,000-$4,012,984	29.6-148.6 / 0.1914-1.0668
▪ Food Waste and WWTF Sludge	193,000 / 1,460,516	$720,000-$3,384,000	58.8-268.1 / 0.4316-2.0285
CHP	270,000 / 2,001,240	$630,000-$1,260,000	214.3–428.6 / 1.5883–3.1766

Other Areas of Strategic Importance

U.S. Department of Energy SunShot Initiative Rooftop Solar Challenge

The DOE's SunShot Initiative goal is to achieve cost reductions for solar PV systems in the United States of 75% by 2020 to enable solar electricity to be cost-competitive with other forms of energy without subsidies. As overall solar PV costs continue to decline, and as subsidies are reduced and eliminated, reduction of soft costs will continue to be critical to improvement of solar PV economics and scaling of the market.

The Green Bank has applied for and won two Rooftop Solar Challenge funding awards totaling almost $850,000. In FY 2013, the Green Bank led a collaborative Connecticut Rooftop Solar Challenge Round I team to analyze and document soft cost reduction opportunities in Connecticut, resulting in a Final Project Report and development of recommendations to improve permitting, planning and zoning, and interconnection processes for solar PV.[42] In FY 2014, the Green Bank partnered with four other New England states, under the leadership of the Clean Energy States Alliance (CESA), to continue soft cost reduction efforts under the Rooftop Solar Challenge II. In this second round of the program, the Green Bank has finished development and production of a Connecticut Rooftop Solar PV Permitting Guide[43] which completes and packages permitting recommendations and tools developed or begun in Round I. FY 2015 activities will focus on outreach to municipalities, solar PV installers and other stakeholders to implement the Permitting Guide and achieve soft cost reductions.

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[40] It should be noted that both Green Bank use of grants and loans in the "dollars of ratepayer funds at risk" result in lower and higher objective functions for grants and loans respectively as more capital is required to support the financing of projects.

[41] Objective Function for RSIP based on Step 5 incentive level. As of July 1, 2015, the RSIP is now at Step 7.

[42] Final Project Report is available for download at www.energizect.com/sunrisene.

[43] See the Permitting Guide tab at www.energizect.com/sunrisene.

The Green Bank's Solarize program has already contributed to soft cost reductions of about 20% through customer acquisition. Efforts to streamline permitting could result in an additional 5-10% or more in soft cost reductions over the next couple fiscal years, and significantly greater in the long term, in addition to removing or reducing market barriers associated with permitting and planning and zoning processes and rules. Interconnection improvements implemented by Connecticut's utilities would further add to soft cost reductions.

Micro Grid Initiative

The Green Bank plans to develop micro grid specific financing structures in FY 2015 and 2016, centered around, but not limited to, DEEP's activities. DEEP has released two rounds of Request for Proposals (RFP) to source micro grid projects, the second of which is due August 2014. Winners of the RFP will receive DEEP grants to cover the cost of micro grid interconnection. The Green Bank has partnered with DEEP to assist winners in both rounds access financing and transaction structuring for the generating assets of the micro grid. The Green Bank will leverage its current programs, including C-PACE, Lead by Example, and Anaerobic Digestion and CHP pilots to bring low-cost capital to these micro grid projects. At the end of the pilot period, the existing CHP program will transition into the Green Bank's micro grid support efforts. The Green Bank has also set aside $5 million to support micro grid projects not falling into one of these categories, which will be leveraged with private capital.

Alternative Fuel Vehicle Infrastructure

Alternative Fuel Vehicles and Infrastructure are included in the definition of "clean energy" in Public Act 11-80.[44] Specifically, vehicles powered by "natural gas, electricity, hydrogen or propane,"[45] all represent savings of between 20-60%[46] over typical gas-powered vehicles. The Green Bank is planning to release an RFP for alternative fuel vehicle infrastructure pilot programs ~~in~~ at the end of FY ~~2015~~ 2016 to source innovative structures and paths to market for the financing of commercially available systems. The Green Bank does not invest in early stage companies and technologies that aren't commercially available in the marketplace. Instead, its focus is narrow and intended to attract private investment in the scaling up of an alternative fuel vehicle infrastructure for vehicles that use clean energy. Additionally, the Green Bank plans to conduct a community-based marketing campaign pilot around residential electric vehicle purchasing in FY ~~2015~~2016. A market potential study will be conducted on alternative fuel vehicles and infrastructure in FY 2016.

Renewable Thermal Technologies

According to the Comprehensive Energy Strategy, an estimated 45 percent of the 1,540,000 premises in the state are unlikely to convert to natural gas – 666,500 residential, 33,300 commercial, and 1,100 industrial. Those customers, who are unlikely to convert to natural gas as a result of the infrastructure expansion not reaching them, will need other options in order to support the vision of the state. Advancing access to renewable thermal technologies (RTT) presents an opportunity to provide customers without access to natural gas with cleaner and more affordable options. There are a range of RTT for heating or cooling a building or heating water, including air source heat pumps, ground source heat pumps, biomass heating, district heating and cooling, and solar hot water. Providing those

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[44] Chapter 5 of the Comprehensive Energy Strategy notes "The Strategy consciously avoids trying to pick winners or to define a preferred path toward a more sustainable transportation future. Rather, this approach provides an open platform than enables new and varied technologies – electric, natural gas, propane, biofuel, hydrogen fuel cell, and other vehicles – a chance to prove themselves and to provide a choice to drivers."

[45] http://www.cga.ct.gov/2014/FC/2014HB-05117-R000335-FC.htm

[46] http://olgpropane.com/alternative_fuel_vehicle_conversion.html and http://www.greenfleetmagazine.com/natural-gas

customers who are unlikely to convert to natural gas with RTT options is an opportunity worth exploring post FY 2016. A market potential study will be conducted on RTT in FY 2016.

Clean Energy Storage

Storage is reaching an inflection point in the market, moving from commercialization of technologies to deployment at scale, as evidenced by several recent developments:

- **Tesla Gigafactory:** Tesla will announce the location of its' Gigafactory to mass produce Lithium Ion batteries at the end of the year. This factory alone will result in savings of roughly 30% on Li-Ion costs, which have declined 40% since 2010.
- **Residential PV + Storage Programs**: In 2014, SunPower launched two residential pilots in California and Australia that pairs solar with storage. SolarCity has a similar pilot program in California.
- **Advances in Commercial-Scale Storage:** In 2014, STEM, a California-based storage-as-a-service company, has launched a demand response pilot linking a collection of behind the meter batteries.

Broadly, there are three potentially-economic applications for storage across all sectors:

- **Standalone revenue / savings applications** are highly dependent on a specific customer rate structure and the utility rates available in a given area, but may include: time-of-use arbitrage and demand response payments for residential and commercial customers and frequency regulation for commercial and grid-scale users.
- **Value-add for solar installation**s: use of solar plus battery backup enables residential and customer users to either reduce the capital cost of their solar installation (if net metering tariffs can enable net metering with stored energy) and/or increase the potential size / coverage of solar installations without having to sell power back to the grid at a wholesale rate. For grid-scale operators, distributed generation plus storage at scale would provide a cheaper alternative than peak plants, without the intermittency inherent with wind and solar.
- **Increased resilience**: The use of distributed generation plus storage can provide a cleaner, cheaper and more reliable on-site alternative to diesel generators for commercial and residential customers. A recent report by Rocky Mountain Institute suggests that LCOE of solar plus battery is roughly $0.4/kwh at the commercial level, competitive with diesel generators.

While there is significant momentum behind storage, challenges to scale remain such as lifetime maintenance and performance; technology improvements; economic returns; and uncertainty around interconnection process, net metering, and rate structures. California has been the biggest initial market for storage because of a self-generation incentive that provides $1.62/W for Advanced Storage technology up to 1MW, and a step-down thereafter and a recent mandate for 1.3 GW of storage by 2020.

The Connecticut Green Bank has numerous opportunities in its residential, C-PACE and microgrid programs to incorporate storage and support bringing it to scale, creating urgency in addressing the policy and regulatory questions to deliver cleaner, cheaper and more reliable sources of energy. A market potential study will be done in FY 2016 on clean energy storage.

Residential Sector

The Residential Sector is focused on deployment of residential financial products for renewable energy, natural gas conversions, and energy efficiency projects, as well as programs and platforms that support the scaled growth of those instruments in order to provide cheaper, cleaner and more reliable sources of energy while creating jobs and supporting local economic development.

Comprehensive Energy Strategy and Integrated Resource Plan

The Residential Sector programs support the implementation of the CES and IRP. Specifically, they support the implementation of the energy efficiency, electricity, and natural gas strategy recommendations in Chapters 1, 3 and 4 of the CES.

As identified in the CES, buildings constitute 58% of the state's energy use and 87% of its electricity, with residential buildings as a whole consuming 70% more than their commercial counterparts. Due to the lack of significant residential home construction in the state, the existing opportunity for energy improvements in the residential sector is in existing housing stock, 50% of which are heated by oil, and only one-third by natural gas. Further, while 74,000 state residents have participated in the HES program through 2013 (less than 10% of eligible customers statewide), less than 10% of those who complete the HES audit go on to install deeper energy savings measures, curtailing the program's gross impact to date in the absence of a strong call to action mobilized by low-cost financing.

DEEP's 2012 Integrated Resources Plan calls for the state's electricity sector to mitigate the impact of expected increases in Class I RPS costs beginning in 2017 and the potential for increases in peak demand for both summer and winter peaks.

Conservation and Load Management Plan

The 2013-2015 Conservation and Loan Management Plan proposes to transform the HES program to a true market-based program with a strong emphasis on leveraging private investment utilizing low-cost financing options, focusing on deep energy retrofits, and enhancing the sales and marketing of the monetary value of those energy savings. As described in the C&LM Plan, "an increasingly important component of the Department's strategy to meet the state's energy efficiency goals is using limited ratepayer and public funds to leverage private capital investment in energy efficiency." The Plan echoes the CES too noting that "the development of these financing programs is critical to moderate ratepayer costs of energy efficiency programs over time," by scaling private capital investment in clean energy, lowering the cost of borrowing, and doing more with fewer ratepayer resources.

The Residential Sector team has established ongoing collaboration with the EEB and utility staff, including the following:

- Monthly residential financing meetings with DEEP, EEB Chair, EEB consultants, electric and gas utility staff – the primary forum for aligning products, marketing, and outreach across the various residential financing options

- Quarterly reports on the Green Bank Residential Sector progress to the Residential Committee of the EEB

- Joint development of an on-bill repayment program through collaboration with the Green Bank/EEB On-Bill Repayment Working Group and the Utility Working Group.

TAM and SAM

Solar PV

For Solar, the TAM is calculated to be the total number of residences with rooftops viable for siting a solar array. Using a weighted average analysis of county data by Geostellar, we calculate this value as 506,714 residences (see Table ~~10~~11).

Table ~~10~~11. Residential Solar PV TAM in Connecticut

County	# of Residential Rooftop Sites	% Viable	# Viable Residential Rooftop Sites
Fairfield	107,883	51%	54,718
Hartford	194,144	90%	175,273
Litchfield	52,034	85%	44,468
Middlesex	34,433	87%	29,970
New Haven	161,738	85%	137,316
New London	61,093	63%	28,684
Tolland	26,423	54%	14,316
Windham	21,564	56%	11,968
Total	**659,312**		**506,714**

Approximately 83% of Connecticut's residents meet the minimum credit requirements in order to qualify for Green Bank financing. Based on data from the six-month period from Nov. 1st, 2013 through April 30th, 2014 during which the Green Bank's Residential financing products were available, approximately 18.8% of RSIP projects during that period utilized Green Bank financing, yielding a net total addressable market for Green Bank PV financings of 78,981 households. Since the launch of the Green Bank's residential financing products in FY 2014 for PV systems (i.e., CT Solar Lease, CT Solar Loan, and Smart-E), a total of 398 systems have been financed, yielding a share of the total addressable market of 0.50% (see Table 1~~1~~2).

Table ~~11~~12. Residential Solar PV TAM and SAM for the Green Bank Financing Products in Connecticut

Total # Viable Residential Rooftops		506,714
Fraction that Qualify for Credit Requirements	83.0%	420,572
Fraction Utilizing Green Bank Financing – TAM	18.8%	78,981
Total # of the Green Bank Financings (as of 05/16/14)		398
Share of Addressable Market – SAM		0.50%

Natural Gas Conversions

The CES characterizes the state's market for natural gas conversions, dividing prospective residential end-users into three classifications, Segment A, B, and C. Prospective consumers in Segment A are comprised of residential – low use and residential – on main, while Segment B prospective consumers are comprised of residential – off main (see Table 13~~2~~).

Table ~~12~~13. Estimate of the Residential Natural Gas Conversion Market in Connecticut

Segment	Type	Prospective Consumers
A	Residential, Low Use	39,000
A	Residential, On Main	161,000
B	Residential, Off Main	51,500
Total		**251,500**

Given the present payback economics, the TAM is limited to Segment A, 200,000 residences in total. Providing households that seek to convert to natural gas with access to low-cost and long-term private capital will support the implementation of the CES and Natural Gas Expansion Plan. Based on Smart-E project data through May 7th, Green Bank financing has resulted in 28 natural gas conversions, or .014% of the addressable market. The Green Bank's Smart-E financing for natural gas conversions currently competes against the gas companies' Energize CT Heating Loan product. DEEP's stated policy is that ratepayer-subsidized products should be positioned such that they do not undermine products backed by private capital. This is an ongoing area of focus for DEEP, the Green Bank, the utilities and EEB.

Deeper Energy Efficiency

The CES and the C&LM Plan both call out the need for deeper energy efficiency measures to be undertaken in Connecticut homes. The Green Bank sees an opportunity to support high efficiency heating, cooling and hot water equipment upgrades. Additionally, there is a growing focus on whole home performance as an industry in the state. There are 1.4 million residential properties in Connecticut, approximately 82% of which are low-rise single family or multi-unit (1-4), 1,148,000 in total. The Green Bank estimates that approximately 83% of homeowners are credit eligible to qualify for Green Bank energy efficiency financing. This yields a total addressable market of 952,840 credit eligible households. While industry estimates vary widely, and by type of equipment, it is estimated that on average 1% of HVAC equipment is replaced each year nationally – this includes lower efficiency models. However, using this method, the Green Bank estimates a total addressable market of 9,530 projects per year.

Based on Smart-E project data through May 7th, the Green Bank has financed 90 projects incorporating high efficiency heating, cooling or hot water equipment in its first year. Therefore, the Green Bank's share of the total addressable market is 0.0001%, and 0.94% of the current market. The Green Bank's Smart-E financing for deeper residential energy efficiency projects currently competes against the Connecticut Housing Investment Fund's Residential Energy Efficiency and Energy Conservation Loan financing programs, a ratepayer-subsidized financing product. DEEP's stated policy is that ratepayer-subsidized products should be positioned such that they do not undermine products backed by private capital. This is an ongoing area of focus for DEEP, the Green Bank, the utilities and EEB.

Product or Program Overview

The Residential Sector has established the following program targets for FY 2015 (see Table 14~~3~~).

Table ~~13~~814. Residential Sector Fiscal Year 2015 Targets

Program	Projects	Capital Deployed	Clean Energy Deployed (MW)	Annual Clean Energy Generated and Saved (MMBtu)
Smart-E	300	$4,050,000	0.72	5,518
CT Solar Lease	390	$14,625,000	2.81	10,919
CT Solar Loan	455	$9,327,500	3.28	12,745
Cozy Home Loan	50	$500,000		680
Total	**1,195**	**$28,502,500**	**6.81**	**29,862**

Meeting these targets would generate 7,342 MWh of clean energy (or 25,052 MMBtu's) and save 4,809 MMBtus annually and 182,524 MWh of clean energy (or 622,798 MMBtu's) and save 68,000 MMBtus over the life of the projects.

For results to targets achieved in Fiscal Year 2015 – click here.

The Residential Sector has established the following program targets for FY 2016 (see Table 15).

Table 15. Residential Sector Fiscal Year 2016 Targets

Program	Projects	Capital Deployed	Clean Energy Deployed (MW)	Annual Clean Energy Generated and Saved (MMBtu)
Smart-E[47]	1,062	$16,287,000	1.8	21,310
CT Solar Lease	451	$16,000,000	3.4	14,227
Low Income	606	$13,750,000	3.0	14,203
Multifamily	43	$11,500,000	1.2	16,648
Total	**2,162**	**$57,537,000**	**9.4**	**66,388**

In support of the joint efforts of the Connecticut Energy Efficiency Fund and the Connecticut Green Bank per Section 16-245m(d)(2) of the Connecticut General Statutes, the following are shared goals for the single family financing products:

- X
- Y
- Z

Energize CT Smart-E Loan

[47] Includes CHIF/HES channel, existing EE/HVAC channels, and solar (with some EE)

In partnership with Connecticut's community banks and credit unions, household customers are offered low-interest (between 4.49% to 6.99%) and long-term (5 to 12 year terms) financing for a range of credit quality consumers (no less than 640 FICO) through unsecured loans backed by a second loan loss reserve from the Green Bank. Financing is available for all measures that the CES supports (e.g., energy efficiency, renewable energy, natural gas conversions, alternative fuel vehicle infrastructure) as well as up to 20% of a loan can be used for healthy home measures (e.g., asbestos remediation, lead abatement) and other related improvements. The Smart-E Loan program uses $2.8 million of repurposed ARRA-SEP funds for a second loan loss reserve and interest rate buy-downs to attract nearly $30 million of private capital.

Cozy Home Loan

The Cozy Home Loan program is a credit enhancement program that uses $410,000 of repurposed ARRA-SEP funds as a loan loss reserve and interest rate buy down to attract $2.5 million of private capital from Community Development Financial Institutions (i.e. Opportunity Finance Network). The product, administered by the Housing Development Fund, provides 10-year loans for technologies that are consistent with the goals of the Comprehensive Energy Strategy to households below 80% of area median income in the Fairfield, Litchfield, and New Haven counties.

Energize CT Solar Loan

In partnership with a crowd-sourced fund (i.e. Mosaic) and a servicer (i.e. Sungage Financial), a 15-year solar loan product is offered to a range of credit quality consumers (no less than 680 FICO) interested in solar PV. A specialty product designed for solar PV, interest rates are affordable at 6.49% and the CT Solar Loan may re-amortize after the ITC is received by the borrower to ensure the positive cash flow of energy savings from solar PV exceeding the debt service of the loan.

Energize CT Solar Lease

In partnership with state and regional banks (i.e. First Niagara Bank, Webster Bank, Liberty Bank, and Peoples United Bank), a tax equity investor (i.e. US Bank), an insurer (i.e. Assurant), and a servicer (i.e. AFC First Financial), a 20-year solar lease product is offered to a range of credit quality consumers (no less than 640 FICO) interested in solar PV and a 15-year lease product is offered for solar thermal hot water. The solar PV side of the CT Solar Lease, provides electricity at a rate that is typically 10-20% lower than the standard offer and has both fixed and variable rates.

Benchmarks

The Green Bank will benchmark residential financing program progress in the following way:

- Number of projects financed
- Level of energy savings/clean energy production achieved
- Ratio of public to private capital deployed

Key Performance Indicators

Below are the Key Performance Indicators that will be used to measure the success of the residential financing programs for FY 2015.

- Number of applications received
- Application approval rate

- Average FICO and DTI
- Average loan size, term and rate
- Delinquency and default rate
- Average energy savings/production per project
- Average system size (solar)
- Percent of projects with multiple measures (Smart-E)
- Number of eligible contractors
- Contractor engagement – percent of eligible contractors bringing in applications/repeat applications
- RSIP market penetration;
- Ratio of public to private capital deployed
- Successful innovation in marketing and outreach (ex: performance-based customer acquisition)

Objective Function

The objective functions for the average sized project underneath each program are computed below.

Table ~~14~~16. Objective Function for the Residential Sector Programs

Program	Lifetime Energy Generated and/or Saved (MWh's / MMBtu)	Dollars of Ratepayer Funds at Risk ($'s)[48]	Objective Function (kWh's Generated and/or MMBtu Saved per $1 of Ratepayer Funds at Risk)
Smart-E Loan – Solar PV	187.8 / 641	$5,938	31.6 / 0.1079
Smart-E Loan – Bundles			
• Gas Conversion[49]	- / 1,165	$844-$3,594	- / 1.9727-0.4632
• Solar PV[50]	- / 2,345	$5,783-$8,533	- / 0.4054-0.2749
• Solar Hot Water[51]	- / 1,681	$869-$2,869	- / 1.9333-0.5857
• Windows[52]	- / 1,140	$356-$2,106	- / 3.2000-0.5412
CT Solar Loan	187.8 / 641	$11,118	16.9 / 0.0576
CT Solar Lease – PV	187.8 / 641	$11,036	17.0 / 0.0581
CT Solar Lease – SHWS	- / 378	$3,568	- / 0.1060

Other Areas of Strategic Importance

On-Bill Repayment Program

[48] For Smart-E Loan Bundles, the Dollars of Ratepayer Funds at risk includes CEFIA only (i.e. higher value) as well as CEFIA and CEEF rebates (i.e. lower value), resulting in a higher and lower objective function respectively.

[49] Gas conversion bundle includes pairing a high efficiency boiler or furnace conversion from oil to natural gas with attic and wall insulation and ductless mini-split

[50] Solar PV bundle includes a high efficiency boiler or furnace conversion from oil to natural gas with attic and wall insulation, and ductless mini-split

[51] Solar hot water bundle includes attic and wall insulation, and ductless mini-split

[52] Window bundle includes attic and wall insulation

The Smart-E Loan will be the first loan product available under a new on-bill repayment program being developed jointly with the EEB and electric utilities (in June 2013, the State of Connecticut General Assembly authorized On-Bill Repayment ("OBR") in Section 58 of Public Act 13-298, codified in Section 16a-40m of the Connecticut General Statutes). The OBR program is being developed as an open market platform that will ultimately allow multiple financing products access to repayment through the utility bill. The legislation authorizes transferability of the repayment obligation and disconnection of service (with applicable consumer protections) for non-payment of obligation. The OBR program is being developed in phases.

Solar and Energy Efficiency Market Integration

The Green Bank will be piloting a variety of strategies to encourage consumers to combine solar energy installations with energy efficiency. This will include special offers such as interest rate buy-downs for qualifying projects that combine solar and efficiency; contractor matchmaking events to encourage partnerships between solar installers and efficiency contractors; and a variety of pilot marketing strategies.

Institutional Sector

The Institutional Sector is focused on the development and deployment of programs that support investments in energy efficiency and renewable energy projects at state buildings as well as in municipal, university, school and hospital (MUSH) settings in order to provide cheaper, cleaner and more reliable sources of energy while creating jobs and supporting local economic development.

This sector is particularly limited in its ability to generate revenue to pay for energy projects, and often credit constrained which makes borrowing difficult. The Green Bank is focused on the development of low- or no-upfront cost financing mechanisms that use energy savings to fully finance investments in comprehensive retrofits that can address the aging infrastructure issues common to the MUSH market.

Comprehensive Energy Strategy and Integrated Resource Plan

The CES seeks to deepen efficiency investments beyond simple measures such as changing out light bulbs to those that address heating and ventilation systems, insulation, and other deeper efficiency improvements. For state and municipal buildings, the CES describes Connecticut's Lead by Example program, which was created in 2011 to fund energy efficiency improvements in state and local government buildings through a standardized Energy Savings Performance Contracting (ESPC) process that enables state agencies and municipalities to implement comprehensive energy retrofits that are paid for by guaranteed future energy savings and can be structured to require no upfront capital investment. The first municipal and state participants in the performance contracting program launched projects in 2013.

The CES and IRP identify programs, policies, and strategies not only for lowering utility bills and improving the environmental performance of Institutional Sector facilities, but also for increasing their resilience and reliability for Connecticut's citizens. The Green Bank will play an important role in developing innovative finance structures that enable credit-constrained Institutional customers to borrow to meet this this commitment to energy efficiency and reliability.

Conservation and Load Management Plan

The increased funding for the conservation and load management programs approved by DEEP in October 2013 was designed to complement numerous other initiatives the State has undertaken to reduce energy costs in Connecticut. In the Institutional Sector, these include the development of the standardized Energy Savings Performance Contracting (ESPC) process within the Lead by Example program, third party financing programs for hospitals and acute care facilities, and education, outreach, and assistance with energy benchmarking for Connecticut schools and municipalities. In the C&LM plan, several initiatives were outlined to assist that Sector in contributing their share of the State's 20% by 2018 energy reduction goal. Increased funding in the C&LM plan included budget for a Program Manager for the Lead by Example program to accelerate the development of ESPC projects in state agencies and municipalities, enhanced training and consultation for the Lead by Example and Energy Savings Performance Contract programs, as well as increased program budgets for a number of applicable commercial and industrial (C&I) programs (Institutional Sector customers are generally eligible to participate in C&I Program offerings as applicable).

Key areas for collaboration between CEEF and the Green Bank include:

- The Lead by Example program, in which CEEF incentives for comprehensive retrofits encourage deeper efficiency measures, and the Green Bank is assisting in developing financing mechanisms or providing guidance to customers on financing options.

- Performance contracting, which is to be further supported in the C&LM plan both by increased benchmarking as an assessment tool to evaluate baseline energy use for ESPC projects, and by the provision of energy consumption data to support strategic energy management practices among municipalities and schools.

- The design of programs (e.g., positioning rebates or financing products to encourage bundling of deeper measures), and the delivery of programs (e.g. partnerships with state and local government) including the development of collateral and targeted messages, which can be supported by the increased C&LM marketing budget.

TAM and SAM

Estimates of the Total Addressable Market (TAM) are based on known and estimated data on the number of facilities, square footage, and estimated energy expenditures. Estimates of the Serviceable Available Market (SAM) are primarily based on market penetration studies for the energy savings performance contracting industry, as a proxy for comprehensive retrofits that would be undertaken under any financing mechanism that uses energy savings to finance investments in upgraded equipment. Market potential in terms of energy and dollars are based on percentage energy savings from comprehensive retrofits applied to estimates of energy use intensity per square foot.

To calculate the Institutional sector TAM, we use data that exists on various unit measures of the MUSH market segments, including number of state buildings, population, and lists of facilities from trade associations for private colleges and schools and hospitals. However, robust square footage data varies and is not widely available. Square footage of state buildings was quantified by OPM in the most recent State Building Inventory (March 2014). Square footage estimates for municipalities are based on average per capita square footage for some known Connecticut towns and cities, extrapolated to the entire Connecticut population. While preliminary, these estimates appear to be in line with available estimates of Level of Service Standards for municipalities in other parts of the country. Estimates for square footage of hospital facilities are based on national estimates of square footage per available hospital beds. Estimates for private colleges and schools are based on average building square footage per student for some known schools in Connecticut, extrapolated to the total number of schools. This data will be refined over time (see Table 17).

The Green Bank's estimates of the total number of facilities and square footage of buildings in Connecticut's Institutional sector are presented in the table below. Overall, the sector is estimated to include about 300 million square feet, and at an estimated energy cost of about $3/square foot where exact energy expenditures are unavailable, the MUSH sector in Connecticut is estimated to currently spend over $900 million per year on energy.

Table ~~15~~9~~17~~. Institutional Sector TAM in Connecticut

Market Segment	#	Units	Million ft^2	Estimated Annual Energy Use (million MMBtu)	Estimated Annual Energy Expenditures (million $)
State Facilities	3,200	Buildings	60.5	9	$200
UCONN and State Colleges	23	Campuses	29.5	4.4	$88.5
Municipal Facilities	169	Towns	104.5	15.5	$314
Private K-12 Schools	97	Schools	30	4.5	$90
Private Colleges and Universities	47	Schools	82	12.3	$246.5
Hospitals	37	Hospitals	22	5	$66.5
Total	3,550		300	46.6	$917

Lawrence Berkeley National Laboratory (September 2013) issued a report on the current size and remaining market potential of the U.S. energy service company (ESCO) industry. Data on market penetration was obtained from surveys of ESCO companies. Median values of market penetration (as a percentage of total floor area) that were reported for the Northeast are presented below. This data supports the Green Bank's assessment that traditional performance contracting, with associated debt commitments for bond or lease financing commonly used, has been most successful to the segments of the MUSH sector with good credit (i.e. state and local facilities including K-12 schools). The development of an off-credit financing structure, described in the program section below, will be necessary to unlock the market potential of those portions of the MUSH sector that are more credit constrained (i.e. hospitals, private colleges/universities and private schools).

Market Segment	Median Estimate of ESCO Market Penetration Since 2003 (% of total market floor area)
K-12 Schools	45%
State and Local	39%
Universities and Colleges	25%
Health and Hospitals	10%

For purposes of estimating SAM, we assume that K-12 schools represent mostly public schools which were included in the TAM under the municipal facilities market segment. Further, we know that the standardized ESPC program in Connecticut was only recently developed, and that state facilities in Connecticut, including public colleges and universities, have not used performance contracting since 2003. Therefore, we have adapted LBNL's estimates of the market opportunity to estimate the SAM, based on square footage. To estimate the market potential in terms of lifetime MMBtu saved, we have assumed a 25% reduction in energy consumption over 15 years (see Table 18~~6~~).

Table ~~16~~10~~18~~. Institutional Sector SAM in Connecticut

Market Segment	Estimated TAM (million ft^2)	Estimated Market Penetration	Estimated SAM (million ft^2)	Estimated Lifetime Savings (million MMBtu)
State Facilities	60.5	0%	60.5	34
Municipal Facilities	104.5	43%	59.5	59
Private K-12 Schools	30	25%	22.5	17
Private Higher Education	82	25%	61.5	46
Hospitals	22	10%	19.8	19
Total	**300**		**224**	**175**

Product or Program Overview

The Institutional Sector has established the following program targets for FY 2015 (see Table 19~~7~~).

Table ~~17~~19. Institutional Sector Fiscal Year 2015 Targets

Program	Projects	Capital Deployed	Clean Energy Deployed (MW)	Annual Clean Energy Produced and Saved (MMBtu)
Lead By Example – State	7	$125,000,000	-	266,668
Lead By Example – Municipal	6	$25,000,000	-	166,667
Institutional Off Credit ESA	2	$10,000,000	-	66,668
CT Solar Lease	10	$6,000,000	2.0	8,370
Winn-LISC MF Open Market ESCO	5	$2,000,000	0.5	2,093
Total	30	$168,000,000	2.5	510,466

For the primarily energy efficiency driven programs, including the Lead By Example and Off Credit Energy Savings Agreement (ESA) programs, meeting these targets would save 500,000 MMBtus annually and 7,500,000 MMBtus over the life of the projects. For the primarily clean energy focused programs, including the CT Solar Lease and Open Market ESCO programs, meeting these targets would generate 3,000 MWh of clean energy annually, and 76,500 MWh of clean energy over the life of the projects.

For results to targets achieved in Fiscal Year 2015 – click here.

The Infrastructure Sector has established the following program targets for FY 2016 (see Table 20).

Table 20. Institutional Sector Fiscal Year 2016 Targets

Program	Projects	Capital Deployed	Clean Energy Deployed (MW)	Annual Clean Energy Produced and Saved (MMBtu)
Lead By Example – State	4	$95,000,000	0.0	228,000
Lead By Example – Municipal	3	$20,000,000	0.0	56,250
Institutional Off Credit ESA	2	$1,000,000	0.0	28,750

CT Solar Lease	10	$6,000,000	2.0	8,369
Total	**19**	**$122,000,000**	**2.0**	**321,369**

In support of the joint efforts of the Connecticut Energy Efficiency Fund and the Connecticut Green Bank per Section 16-245m(d)(2) of the Connecticut General Statutes, the following are shared goals for the Lead by Example program:

- X
- Y
- Z

Lead by Example – State and Municipal Facilities

The State of Connecticut created a standardized ESPC Program for use by state agencies and municipalities, as required by Connecticut General Statutes 16a-37x. The program is intended to help state and municipal governments implement a portfolio of comprehensive energy savings measures with no upfront capital. The costs of the energy retrofits are paid for by guaranteed future savings from utility and maintenance budgets. ESPC projects will be implemented by qualified Energy Service Companies (QESPs) that are on contract with the State of Connecticut. In addition, project hosts will receive technical support from a pool of pre-qualified professional energy

The Green Bank participates in the implementation of the State's ESPC program by assistance and support with outreach and education about the state ESPC program as well as providing guidance to the state and municipalities on financing

CT Solar Lease

As discussed above, in the residential sector, the Green Bank has established the CT Solar Lease program, in partnership with state and regional banks, a tax equity investor, an insurer, and a servicer. Though primarily intended for residential customers, a portion of the Solar Lease facility has also been reserved for municipal or institutional projects, where it is offered as a 20-year power purchase agreement which enables the third-party owner of the PV system to access federal tax credits.

Institutional Off-Credit ESA Program

The Green Bank has previously tested an off-credit energy savings agreement (ESA) model through a $1 million pilot program called Campus Efficiency Now; two projects were contracted at private colleges in Connecticut. In that program, loans were made to a special purpose entity (SPE) that contracted separately for the project's construction, and the sale of the energy savings. For the energy savings, the SPE entered into an ESA with the project host to pay for the energy saved at a rate discounted from the host's retail utility rates, creating immediate savings for the host while assigning the performance risk and debt obligation to the SPE. Because it does not create a long term debt obligation for the host, these types of projects can be treated as an off-balance sheet and off-credit ownership and financing approach, which, as discussed above, is critical for credit constrained segments of the Institutional sector such as hospitals and private education facilities.

Seeking to expand on the Campus Efficiency Now pilot to enable both more and larger projects, the Green Bank intends to create or facilitate an off-credit ESA model for financing clean energy projects with private capital or through non-taxpayer supported bonds. Such a model has been tested in the

State of Maryland by the Maryland Clean Energy Center (MCEC), which, like the Green Bank, has bonding authority.

The Green Bank believes the off-credit ESA model is replicable in Connecticut, and the Green Bank will be able to utilize this model to raise financing for Institutional sector projects such as hospitals, private colleges/universities, or independent schools; it may also be a viable financing mechanism for state or municipal ESPC projects in addition to some commercial projects that are unable to utilize C-PACE.

Winn-LISC Open Market ESCO

In the fall of 2011, Winn Development applied for and was awarded a $5.25 million grant from HUD, with a letter of support from the Green Bank, to pilot an innovative energy efficiency loan fund designed to facilitate energy savings agreements (ESAs) in the multifamily low-income housing developments. The program operates in Connecticut, Massachusetts and New York.

The Green Bank has supported Winn through the program development process and, in August 2013, the Green Bank executed a *Master Credit Enhancement and Participation Agreement*, committing up to $1.87MM for Connecticut projects financed through this program.

Unfortunately, Winn has not made hoped-for progress in selling the program and closing loans because of structural issues with the financing that are not attractive to owners. The Winn team is pursuing an extension of the program with HUD, through FY2015, and currently believes that the program may be best suited to the implementation of solar PV. The Green Bank will continue to support Winn as they work to identify projects that can be successful.

Benchmarks

The Green Bank will benchmark Institutional sector program financing in the following way:

- Number of projects financed
- MW installed, average system size, and annual and lifetime MWh produced
- Ratio of public to private capital deployed
- Project square footage
- Total project investments ($)
- Project investments per capita
- Project investments per square foot
- Job years created
- Time from project conception to contracting

Key Performance Indicators

The Green Bank will track the following indicators of performance:

- Avoided greenhouse gas emissions
- Job years created
- Ratio of public to private capital deployed
- Delinquency and default rate
- Average energy production per project
- Percentage reductions in energy consumption
- Annual and lifetime MMBtu saved

- MW clean energy installed, average system size, and annual and lifetime MWh produced, where clean energy generation is installed
- Ratepayer funds expended (utility incentives or other)
- Number of applications received and approved
- Number of applications awarded ZRECs
- Number of applications that proceed to construction
- Average PV system size
- Delinquency and default rate
- Contractor engagement – percent of eligible contractors bringing in applications/repeat applications
- Outreach and education – number of institutions attending presentations

Objective Function

The objective functions for the average sized project underneath each program are computed below (see Table ~~18~~21). Objective functions for the LBE and Institutional ESA programs are very high because it is assumed that the Green Bank is playing primarily a facilitative role, and that no further credit enhancement will be necessary for these projects. Therefore, ratepayer funds are limited to program administrative costs (i.e. salaries).

Table ~~18~~11~~21~~. Objective Function for the Institutional Sector Programs

Program	Lifetime Energy Generated and/or Saved (MWh's / MMBtu)	Dollars of Ratepayer Funds at Risk ($'s)	(kWh's Generated and/or MMBtu Saved per $1 of Ratepayer Funds at Risk)
CT Solar Lease[53]	2,683 / 9,153	$89,143	30.1 / 0.1027

[53] Sample 100 kW project

Commercial and Industrial Sector

The Commercial and Industrial Sector is focused on the implementation of commercial and industrial property assessed clean energy (C-PACE) in order to provide cheaper, cleaner and more reliable sources of energy while creating jobs and supporting local economic development.

Comprehensive Energy Strategy and Integrated Resource Plan

The CES relies heavily on C-PACE financing to accomplish its goals for the C&I sector in Connecticut. The Executive Summary of the CES notes the goal to: "Leverage private capital through innovative financing mechanisms including Connecticut's first-in-the-nation Green Bank (the Clean Energy Finance and Investment Authority), standardized energy efficiency performance contracts, and the state's new Commercial Property-Assessed Clean Energy (C-PACE) program."

- In addition to referencing C-PACE financing as a way to meet the state's goals in the C&I sector around energy efficiency, the CES also notes several policy goals that would ramp up demand for C-PACE financing such as decoupling, benchmarking and energy efficiency standards.

- Throughout the CES, there is an expanded commitment to "all cost effective" and a goal of going deeper with energy efficiency is mentioned. C-PACE enables these deeper projects, with the average C-PACE project becoming 45 to 55% more efficient.

- The CES notes that the development of financing programs is critical to moderate ratepayer costs of energy efficiency programs over time. To that end, the Green Bank is working closely with the EEB to optimize incentives and ensure that the rebates and incentives are leading customers to do larger projects, possibly financed by C-PACE.

The CES has been of great benefit to the Green Bank in its research on the building composition in Connecticut. According to the CES, residential and commercial buildings are the largest users of energy in Connecticut, collectively accounting for 58% of the State's energy usage and 87% of its electricity usage annually. In a business-as-usual scenario (which assumes modest energy efficiency savings per year), consumption is projected to grow to 550 trillion British Thermal Units per year in 2050, nearly 20% higher than today's energy use of approximately 468 trillion BTUs. While buildings in Connecticut vary in their ownership and size, commercial and residential buildings consume energy in very similar ways. Over 60% of the energy used in buildings is for heating and cooling. The next highest uses are water heating in residential buildings and lighting in commercial buildings, representing about 15% of energy usage in each respective building type. Of the primary energy (that is, energy produced from raw fuels or otherwise found in nature) used by buildings today, 59% comes from electricity, 21% from oil, and 20% from natural gas. Electricity and natural gas use has increased while oil and biomass consumption has declined. Another common feature across building types is the prevalence of existing building stock (as opposed to new construction).

This data, coupled with data the Green Bank commissioned about the location, size and class of buildings in Connecticut from HR&A Associates, a leading real estate advisory firm, is important in determining our goals for this sector.

Conservation and Load Management Plan

Among the many goals outlined in the C&LM plan, there are several that impact the C&I sector and The Green Bank's C-PACE program. Indeed, it is noted that the companies should coordinate with the Green Bank on C-PACE financing. That coordination has been ongoing and fruitful.

- The focus on promoting deeper upgrades by aligning incentives to reward comprehensive projects is also a place of overlap.

- The focus on marketing in the C&LM plan is consistent with the Green Bank's goals of increasing volume for its financing products. During 2015 the Green Bank will integrate customer segmentation efforts and data driven analytics to increase market penetration in targeted Residential and C&I areas.

- As noted in the C&LM plan, the Companies will continue their efforts to leverage CEEF funds through promotion and enhancement of CEEF financing offerings, coordination with partners' complementary programs (CPACE, LBE-ESPC) in an effort to reduce financing costs, etc. We have seen many building owners go deeper with their projects when combining incentives with C-PACE financing. In fact, several projects meet the Savings to Investment Ratio (SIR) criteria of C-PACE due to utility incentives.

- C-PACE's ongoing collaboration with C&I Committee of the EEB includes the following:

    - Monthly meetings with United Illuminating and Northeast Utilities
    - Regular sharing of deal flow information
    - Joint outreach efforts and marketing
    - Streamlined approvals of C-PACE applications with EEB incentives.

TAM and SAM

The Total Addressable Market (TAM) for the C-PACE program is approximately 83% of Rentable Building Area (RBA) in Connecticut and the Share of Addressable Market (SAM) is approximately 0.2%.[54]

We calculate TAM as the total square feet of RBA for Commercial & Industrial buildings within C-PACE municipalities divided by the total square feet of RBA for all Commercial & Industrial buildings in the state of Connecticut. We calculate SAM as the total square feet of RBA for all closed C-PACE projects divided by the total square feet of RBA for all Commercial & Industrial buildings in C-PACE municipalities.

The TAM calculation shows that the program has secured over 4/5 of the commercial and industrial building stock in the state of Connecticut as eligible applicants for C-PACE, an impressive statistic for the

[54] HR&A CT Building Data 2013

program's first year of existence. The SAM calculation demonstrates that completed C-PACE projects account for roughly 0.2% of all Commercial & Industrial building area in C-PACE eligible municipalities, an equally important metric for the program.

Commercial Facilities

TAM for Commercial buildings is approximately 84%. SAM for Commercial buildings is approximately 0.5%.[55]

Industrial Facilities

TAM for Industrial buildings is approximately 77%. SAM for Industrial buildings is approximately 0.01%.[56]

Product or Program Overview

The Commercial and Industrial Sector has established the following program targets for FY 2015 (see Table ~~19~~22).

Table ~~19~~22. Commercial & Industrial Sector Fiscal Year 2015 Targets

Program	Projects	Capital Deployed	Clean Energy Deployed (MW)	Annual Clean Energy Generated and Saved (MWh / MMBtu)
C-PACE	63	$50,000,000	8.8	114,517

Meeting these targets would generate 10,000 MWh of clean energy (or 34,121 MMBtu's) and save 80,395 MMBtus annually and 244,000 MWh of clean energy (or 818,913 MMBtu's) and save over 2,000,000 MMBtus over the life of the projects.

For results to targets achieved in Fiscal Year 2015 – click here.

The Commercial and Industrial Sector has established the following program targets for FY 2016 (see Table 23).

Table 23. Commercial and industrial Sector Fiscal Year 2016 Targets

Program	Projects	Capital Deployed	Clean Energy Deployed (MW)	Annual Clean Energy Generated and Saved (MMBtu)
C-PACE	90	$53,000,000	9.0	160,000

55 *Ibid.*

56 *Ibid.*

In support of the joint efforts of the Connecticut Energy Efficiency Fund and the Connecticut Green Bank per Section 16-245m(d)(2) of the Connecticut General Statutes, the following are shared goals for the Small Business Energy Advantage (SBEA) and C-PACE financing products:

- X
- Y
- Z

Commercial and Industrial Property Assessed Clean Energy (C-PACE)

In January 2013, the Green Bank introduced the C-PACE program. C-PACE is one of the country's first statewide programs to provide 100 percent upfront financing for energy upgrades to commercial, industrial and nonprofit buildings. Under this program, property owners obtain financing needed to make key energy improvements, and then repay it as a benefit assessment charge on their property tax bill. Because the payments can be spread over a period of up to 20 years, owners save on energy costs immediately and for years to come. The financed improvements increase the building's value, while preserving the building owner's capital and credit lines for core investments.

C-PACE financing is available for a wide range of clean energy and energy efficiency improvements, including new boilers and chillers, upgraded insulation, new windows or solar installations. Energy audits and construction costs can also be financed through C-PACE.

C-PACE has been a notable success in deploying clean energy throughout the state. Eighty Connecticut municipalities, together accounting for 83 percent of the state's commercial and industrial building stock, have signed onto the program. Since launching C-PACE, the Green Bank has approved 30 projects totaling $23 million all financed with a $40 million warehouse facility using the Green Bank's balance sheet. This has resulted in the deployment of 3.7 MW of clean energy and will lead to an estimated 160 million kWh in electric savings and over 320 million MMBTU in fuel savings over the lifetime of the projects. Total savings in avoided electric and fuel costs will exceed $38M in aggregate for the benefited property owners.

Working with its group of qualified capital providers, the Green Bank auctioned its first group of transactions and secured private capital to purchase the initial $30 million portfolio of transactions that the Green Bank has and will originate. This has allowed the Green Bank to replenish its funding warehouse facility and leverage its resources at a ratio of 4:1 with the potential to achieve a leverage ratio of 9:1 through a subsequent financing round.

Benchmarks

Because there are several other states operating PACE programs, it is useful for the Green Bank to benchmark ourselves against the rest of the country. We will benchmark our progress in the following way:

- Number of projects completed
- Level of energy savings achieved

- Ratio of public to private capital deployed

We will benchmark ourselves against the best C-PACE programs in the country, including California, Florida, Michigan, New York, and Ohio.

Key Performance Indicators

Throughout the year, we will continually monitor the performance of the C-PACE program based on the following indicators:

- Number of applications coming in;
- Number of C-PACE towns opting into;
- Speed of approval process for applications;
- Size of the project and level of energy savings;
- Ratio of public to private capital deployed
- Growth into new markets (ex: multifamily)
- Successful innovation in marketing and outreach (ex: relationship managers)
- Number of trained contractors
- Number of new contractors bringing in applications
- Number of jobs created and environmental emissions reduced
- Amount of dollars saved by building owners using C-PACE financing

Objective Function

The objective functions for the average sized project underneath each program are computed below (see Table 24~~0~~).

Table ~~20~~12~~2~~4. Objective Function for the Commercial and Industrial Sector Programs

Program	**Lifetime Energy Generated and/or Saved** (MWh's / MMBtu)	**Dollars of Ratepayer Funds at Risk** (\$'s)[57]	**Objective Function** (kWh's Generated and/or MMBtu Saved per \$1 of Ratepayer Funds at Risk)
C-PACE – Solar PV			
• Small[58]	64,703	\$29,000	52.5 / 0.1795
• Medium[59]	151,424	\$95,600	37.5 / 0.1275
• Large[60]	1,290,076	\$500,595	60.5 / 0.2070
C-PACE – EE[61]	138,307	\$358,169	- / 0.3862
C-PACE – EEPV[62]	80,150	\$507,153	- / 0.1580

[57] Principal value of the C-PACE loans held by CEFIA after the sell down of 80% of the value of the transaction to a private capital investor.
[58] 55 kW small ZREC project
[59] 157 kW medium ZREC project
[60] 954 kW large ZREC project
[61] 290 Pratt Street in Meriden, CT

C-PACE – CHP[63]	9,295	$74,493	- / 0.1250
CT Solar Lease	2,683 / 9,153	$89,143	30.1 / 0.1027

Other Areas of Strategic Importance

Small Business Energy Advantage (SBEA)

While C-PACE is a tool that works for many building owners in the C&I sector, due to the rigor of the review process it is not a financing option well-suited for very small projects. The C&I Program will be working with the EEB to determine how the Green Bank should work with this sector in FY 2015.

Non-C-PACE Commercial Financing Product

In addition to C-PACE, the C&I program will engage a consultant to consider other financial offerings in the C&I market. For example, C-PACE does not work for condominiums and we would like to be sure that market is covered with an offering from the Green Bank. Also, we are learning that some borrowers like the idea of an off-balance sheet offering, so we will explore an Energy Services Agreement (ESA) model.

[62] 100 Roscommon in Middletown, CT
[63] YMCA in Meriden, CT

Multifamily Market Rate and Affordable Housing

The Green Bank is developing several multifamily and affordable housing (MFAH) programs, which is a new area of program development and a priority for the Green Bank. The Green Bank has established working relationships with key channel partners to begin sourcing transactions utilizing a variety of financing options.

Implementing energy improvements in the MFAH market has been difficult to achieve, both in Connecticut and nationally, because of challenges related to securing financing, split incentives between owners and tenants, lack of reliable performance data and case studies to build investor confidence, as well as various other challenges. Therefore, a key tenet of the Green Bank's MFAH strategy has been to identify and bring in national leaders, from within and outside Connecticut, with demonstrated ability to *"crack the multifamily housing nut"* and successfully build and close transactions and run programs. The Green Bank has several strong partnerships in place, each with nationally recognized MFAH experts on their teams, and who are bringing resources to Connecticut to build the market – attracted by the cutting edge clean energy leadership and activities underway in Connecticut.

As with all Green Bank programs, our approach is to use the minimum level of Green Bank funds necessary to support the market, and then to reduce the Green Bank's participation over time as the market takes off and the private sector takes over. The Green Bank has four major multifamily affordable housing initiatives:

1. *Building the Multifamily Market through C-PACE*
2. *Building the Multifamily Market through Community Development Financial Institution's (CDFI) and Strategic Partners*
3. *WINN-HUD open market ESCO*
4. *CT Housing Finance Authority Partnership*

Additionally, the Green Bank will be developing market rate multifamily financing options, with an initial focus on condominium financing to support natural gas conversions in communities where the gas companies are focused on low use and/or line expansion (although any financing developed will support the full range of clean energy measures).

Background

Connecticut's Multifamily and Affordable Housing (MFAH) sector presents a critical imperative and significant opportunity for investment in clean energy improvements, with a priority focus on affordable housing, and targeted to:

- Reduce energy costs for residents as well as energy and energy-related maintenance costs for building owners,
- Fund all cost effective energy measures, within the context of a building's lifetime capital improvement plan, including energy related capital improvements, and
- Improve the safety, health and comfort of low income residents.

This MFAH opportunity sits at the nexus of priorities established by the CES, *Governor Malloy's Commitment to Affordable Housing* including more than $360 million for State funded affordable housing projects for seniors, working families, young professionals and other residents, and the Green Bank's Comprehensive Plan. It includes an important partnership with the CT Housing Finance Authority (CHFA), which finances approximately 45% of the State's affordable, multifamily units[64] and has a *stated policy* to require cost effective energy efficiency measures in all multifamily developments as well as support for the use of renewable and alternative energy.

The Green Bank's multifamily initiative began with a review of the MFAH sector to identify priority opportunities and challenges as well as holding exploratory meetings to establish relationships with sector leaders and key stakeholders including: CHFA, U.S. Department of Housing and Urban Development (HUD), CT based Community Development Financial Institutions (CDFI's), Utilities (CL&P and UI), CT Housing Coalition, Community Action Councils, CT Department of Public Health (DPH), Operation Fuel, and various private and non-profit housing developers. The Green Bank's overarching strategy in building deployment capacity in the multifamily affordable housing sector is to identify and fill gaps and leverage Green Bank resources by supporting and partnering with organizations identified with a demonstrated track record of success both in Connecticut and nationally.

Market Opportunity

Deployment of cost effective energy efficiency and renewable energy improvements in multifamily housing is sorely lacking in Connecticut (and nationally) and presents significant opportunity for investment. The Green Bank estimates, conservatively, that potential annual utility cost savings for the multi-family housing sector is on the order of $125 million per year[65].

Much of this housing stock was built before 1970 and now faces significant needs for energy updates and other capital improvements. Approximately 45% of multifamily housing units in Connecticut are located in properties with 20 or more units, which are predominantly concentrated in the State's largest cities (Bridgeport, Hartford, New Haven, Stamford, Waterbury), as well as located near existing or planned natural gas lines. Many are heated by oil furnaces and electrical heating systems, offering significant opportunity for fuel conversion to natural gas as well as other clean energy measures.

The "Fuel Poverty" Imperative. Home energy bills present a significant financial burden to low-income residents in Connecticut, where about one in five households cannot afford to pay their energy bills. These findings are based on a *study recently commissioned by Operation Fuel*. The annual home energy affordability gap currently is about $700 million for more than 295,000 Connecticut households with

[64] Over the past 40 years, CHFA has provided financing for the acquisition, construction and/or rehabilitation of more than 35,800 units of affordable rental housing for families and the elderly across Connecticut.

[65] This number assumes approximately 250,000 units in multi-family buildings (defined as buildings with 5 or more units) with potential to reduce average annual utility costs on the order of about $500/unit).

incomes at or below 200 percent of the Federal Poverty Level. This means that the average low-income household owes about $2,363 more in energy bills than it can afford to pay[66].

The primary source of energy assistance for Connecticut's lower-income households is the federal *Low-Income Home Energy Assistance Program (LIHEAP)*. With a CT state allocation of about $76 million, LIHEAP covers less than 11 percent of the state's home energy affordability gap. As a result, Connecticut's lower-income families and elderly residents must often choose between energy, food and other basic necessities and look to organizations such as Operation Fuel for energy assistance.

Initiatives

The Green Bank's overall market development approach responds to the key gaps and challenges identified above and, with several strategic partners, are supporting the following initiatives:

1. ***C-PACE multifamily loans****, made on the basis of projected energy cost savings, and secured by a public benefit assessment and lien on the property.* C-PACE projects will include CHFA financed properties as well as market rate multifamily rental properties that can secure the lender consent required for C-PACE financing. Properties are anticipated to contain 100 units or more, given the project size needed to make C-PACE economics work. The Green Bank secured Urban Ingenuity as its C-PACE multifamily housing partner who will be responsible for sourcing C-PACE multifamily transactions, providing technical assistance to owners in developing and submitting applications, and structuring and financing C-PACE eligible energy upgrades.

2. ***Unsecured multifamily loans****, made on the basis of projected energy cost savings, with credit enhancements from the Green Bank,* predominantly anticipated to consist of loan loss reserves. Given the programmatic and financial barriers described above, many MFAH properties, especially those with existing HUD or Federal Housing Administration (FHA) financing or insurance, are banned from securing the lender consent required for C-PACE financing and, in most cases, can take on unsecured debt only. This category includes HUD funded public housing, all FHA and HUD funded or insured properties, as well as many of the underserved 3- to 6-unit buildings in our large cities, which are often over 100 years old, and in great need of energy and other capital improvements. The Green Bank has supported the establishment of the Multifamily Permanent Energy Loan Program with the Connecticut Housing Investment Fund, focused specifically on affordable multifamily. The Green Bank is providing a $300,000 loan loss reserve and an initial $1MM capitalization.

3. ***WINN-HUD Open Market ESCO,*** in the fall of 2011, WINN Development applied for and was awarded a $5.25 million grant from HUD, with a letter of support from the Green Bank, to pilot an innovative energy efficiency program designed to serve multifamily low-income housing developments. This HUD innovation initiative was established to facilitate "game-changing" solutions to effective investment of private capital to improve the energy efficiency of low-income multifamily housing. The WINN proposal – *Multifamily Energy Loan Fund* – created a loan fund to

[66] The Affordability Gap measures the dollar amount by which actual home energy bills exceed affordable home energy bills. If a Connecticut household has an annual income of $12,000 and an annual home energy bill of $3,000, that household has a home energy burden of 25% ($3,000 / $12,000 = 0.25). An *affordable* home energy burden is set at 6% of annual income.

facilitate energy savings agreements (ESA) in the multifamily (40-300 units) housing market. The program operates in Connecticut, Massachusetts and New York. The Green Bank has supported WINN through the program development process and, in August 2013, the Green Bank executed a *Master Credit Enhancement and Participation Agreement*, committing up to $1.87MM for Connecticut projects financed through this program.

4. ***CHFA Pilots,*** in 2013 the Green Bank and CHFA signed a Memorandum of Agreement (MOA) that recognized the importance and benefits of cooperation between the two organizations in accelerating the implementation of energy efficiency and renewable energy improvements for owners and tenants of affordable multifamily rental housing. To this end, and in an effort to streamline and coordinate program offerings, the Green Bank and CHFA continue to collaborate and share information related to proposed loan programs and funding availability, respective project pipelines, as well as energy monitoring and verification (EM&V) initiatives and requirements. CHFA and the Green Bank are collaborating on a pilot initiative to help inform multifamily EM&V and underwriting requirements. The pilot will be undertaken on five (5) master-metered properties previously identified by CHFA. The Pilot process includes, for each property, energy benchmarking and auditing, definition of project scope to include all cost effective energy measures, financing, implementation, commissioning, and post project energy performance monitoring and verification. Work will be carried out by the Green Bank's C-PACE and multifamily housing technical advisors, with oversight from the Green Bank's MFAH and C-PACE teams. The implementation of energy improvements for all 5 properties is anticipated to take about 1 year, with 3 years of energy monitoring post commissioning.

5. ***Credit Enhancement RFP*** – The Green Bank has $4MM allocated to an open RFP for credit enhancements to support project or program level multifamily financing, with a focus on the affordable market.

The Residential Multifamily Sector has established the following program targets for FY 2016 (see Table 25). This is the first time this sector has established program targets.

Table 25. Residential Multifamily Sector Fiscal Year 2016 Targets

Program	Projects	Capital Deployed	Clean Energy Deployed (MW)	Annual Clean Energy Generated and Saved (MMBtu)
Multifamily	43	$11,500,000	1.2	16,648
Total	**43**	**$11,500,000**	**1.2**	**16,648**

In support of the joint efforts of the Connecticut Energy Efficiency Fund and the Connecticut Green Bank per Section 16-245m(d)(2) of the Connecticut General Statutes, the following are shared goals for the multifamily financing products:

- X
- Y

- Z

MFAH Strategic Partners

As the Green Bank's MFAH Technical Assistance Partner, the team of New Ecology and CNT Energy will be recommended to multifamily property owners as a trusted energy advisor and owner's agent to help navigate the energy improvement process including: benchmarking, auditing, scoping, financing, implementing, commissioning and post-completion monitoring. New Ecology and CNT Energy are both nationally recognized leaders in building and operating successful MFAH energy improvement programs. They have been funded by the JPB Foundation of NY, focused on poverty alleviation, to develop the *National Delivery Network for Energy-Efficiency Services to Multifamily Affordable Housing Owners*. Connecticut has been strategically identified as one of their first locations, where this team has opened and staffed an office and will invest approximately $1,000,000 ($500,000 cash/ $500,000 in-kind) to help build the market.

MFAH Channel Partners

We have identified the following organizations as key channels partners for building the Green Bank's MFAH pipeline, and have begun to establish working relationships with each. CHFA, in particular, is a critical partner, with whom the Green Bank has been working closely on all our MFAH initiatives, including program development and sourcing deals.

- Connecticut Housing Finance Authority (CHFA)
- Connecticut Housing Coalition
- Community Action Councils
- Community Development Financial Institutions (CDFI's)
- Federal Department of Housing and Urban Development (HUD)
- Large multifamily property owners and developers, both private and non-profit
- Public Housing Authorities, both state and federally financed
- Utility companies CL&P and UI, including properties deferred from weatherization and other energy improvements due to health and safety hazards

New Initiatives

The Green Bank will be developing market rate financing programs with an initial focus on the condominium market. Condominiums are a prime target for natural gas conversions, particularly in communities that have previously been identified by the gas companies as having a large concentration of housing units on main with low use, and/or targeted for expansion of gas lines. The Green Bank's strategy will be to work with lenders active in the condo financing market and develop products that leverage the Green Bank's credit enhancements and encourage lenders to finance clean energy projects. The Green Bank will look to encourage lending in buildings with challenges that prevent the use of C-PACE financing, don't meet FHA guidelines, require longer maturities or more generous underwriting criteria, etc.

Distressed Municipalities and Equitable Distribution of Funds

Per Section 101 of Public Act 11-80, the Green Bank is to provide an equitable share of its funding for "small and large customers with a maximum average monthly peak demand of one hundred kilowatts in census tracts in which the median income is not more than sixty percent of the state median income".

As of FY 2013 and FY 2014, the Green Bank has approved, closed, and completed funding in FY 2013 of \$20.1M and FY 2014 of \$78.7M. Of that funding, \$6.4 million and \$11.5 million was in census tracts[67] below sixty percent of the state median income (see Table 26~~1~~), and \$7.7 million and \$19.8 million was in distressed municipalities[68] for FY 2013 and FY 2014 respectively (see Table 27~~2~~). About 30% of the system benefit funds collected from ratepayers is from economically disadvantaged communities.

Table ~~21~~26. Percentage of Green Bank Funding to Census Tracts below 60% of the State Median Income for FY 2013 and FY 2014

Funding	**Census Tracts Below 60% of State Median Income** (FY 2013)	**Census Tracts Below 60% of State Median Income** (FY 2014)
Approved Funding	\$17,771	\$4,316,517
Closed Funding	\$0	\$6,363,187
Completed Funding	\$6,367,989	\$662,786
Total Below 60% SMI Funding	\$6,385,760	\$11,450,620
Total Funding	\$20,072,450	\$78,731,843
% of Funding	**32%**	**15%**

Table ~~22~~27. Percentage of Green Bank Funding to Distressed Municipalities for FY 2013 and FY 2014

Funding	**Distressed Municipality Funding** (FY 2013)	**Distressed Municipality Funding** (FY 2014)
Approved Funding	\$123,322	\$10,351,763
Closed Funding	\$654,596	\$7,859,160
Completed Funding	\$6,914,819	\$1,601,769
Total Distressed Funding	\$7,692,738	\$19,812,692
Total Funding	\$20,072,450	\$78,731,843
% of Funding	**38%**	**25%**

To further invest its resources in economically disadvantaged communities, the Green Bank expects to:

- Support a portfolio of financing programs in the multifamily and affordable housing sector; and

[67] According to the Federal Financial Institutions Examination Council's website, there are 834 census tracts in Connecticut and 155 of those are below 60% State Household Median Income level of \$41,546.

[68] DECD ACS 2011 Median Income is \$69,243

- Continue to support targeted community-based strategies (i.e., Solarize and Energize) that promote clean energy in economically disadvantaged communities (e.g., Bridgeport and Windham).

FY 2015 Budget

The fiscal year 2015 budget can be found at – click here.   The financial statements for FY 2015 will be available by the end of 2015.

FY 2016 Budget

The fiscal year 2015 budget can be found at – click here.

FY 2015 Targets and Estimated Economic and Environmental Benefits

The FY 2015 targets established by the staff of the Green Bank are ambitious (see Table ~~23~~28).

Table ~~23~~28. FY 2015 Targets by Sector for the Connecticut Green Bank

Sector	Program Budget[69] ($000's)	Operations Budget ($000's)	Total Capital Deployed ($000's)	Clean Energy Deployed (MW)	Annual Clean Energy Generation (MWh)	Annual Energy Savings (MMBtu)
Statutory and Infrastructure	$35,900	$3,209	$207,100	37.~~2~~9	137,863	~~305,393~~775,920
Residential	$9,313	$3,629	$28,503[70]	6.8[71]	7,342[72]	~~4,809~~29,862
Institutional	$1,875	$1,002	$168,000	2.5	3,000	500,000
Commercial and Industrial	$10,000	$3,905	$50,000	8.8	10,000	114,516

By investing $135 million in programs and operations by the Green Bank in FY 2015 to attract and deploy nearly $450 million of capital deploying clean energy, will result in an estimated economic development benefit of 6,856 jobs –2,634 direct and 6,856 indirect and induced (see Table ~~24~~29).

Table ~~24~~29. Estimated Economic and Environmental Benefits of Achieving the FY 2015 Targets

	Direct Jobs	Indirect and Induced Jobs	Total Jobs[73]
Statutory and Infrastructure[74]	920	1,473	2,393
Residential	200	321	521
Institutional	1,243	1,995	3,238
Commercial and Industrial	271	433	704
Total	2,634	4,222	6,856

~~CEFIA~~ Connecticut Green Bank will work with the Department of Energy and Environmental Protection to create a tool, similar to the job calculator, to estimate environmental benefits such as greenhouse gas

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[69] Includes all program loans, investments, credit enhancements and incentiv~~e~~es (net of sell-off) that have targets developed

[70] Over 85% of the financing that occurs through the Residential Sector programs, will support the deployment of rooftop solar PV. The remaining is heavily weighted towards natural gas conversions.

[71] These solar PV projects are supported by the RSIP underneath the Statutory and Infrastructure Sector programs. They are simply noted here, but don't count towards the total.

[72] Ibid

[73] These job 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. The calculators used to produce the estimates were reviewed and approved by the Department of Economic and Community Development in December 2013.

[74] The estimate for CHP jobs created is a professional estimate made by CEFIA staff, and based on the Navigant Study findings. The estimate does not include AD projects as this technology was not included in the original study.

emissions resulting from clean energy production (i.e., MWh) and energy savings (i.e., MMBtu's) over the life of the projects.

FY 2016 Targets and Estimated Economic and Environmental Benefits

The FY 2016 targets established by the staff of the Green Bank are ambitious (see Table 30).

Table 30. FY 201~~5~~6 Targets by Sector for the Connecticut Green Bank

Sector	**Operations Budget**[75] ($000's)	**CGB Capital Deployed ($000's)**	**Total Capital Deployed** ($000's)	**Clean Energy Deployed** (MW)	**Annual Clean Energy Generation** (MWh)	**Annual Energy Savings/ Generated** (MMBtu)
Statutory and Infrastructure	$5,527	$42,074	$474,595	99.0	121,414	649,789
Residential	$5,494	$14,400	$57,537	9.4	11,577	66,388
Institutional	$1,123	$1,810	$122,000	2.0	2,453	321,369
Commercial and Industrial	$4,488	$6,530	$53,000	9.0	11,038	160,000
Total[76]	$16,632	$64,814	$672,580	111.2	136,425	1,175,787

By investing $81.4 million in programs and operations, the Green Bank will attract and deploy nearly $673 million of capital into clean energy projects, resulting in an estimated economic development benefit of 9,720 jobs –3,727 direct and 5,993 indirect and induced (see Table 31). It should be noted that in FY 2016, a study will be done to update the estimated economic benefits resulting from projects financed by the Connecticut Green Bank.

Table 31. Estimated Economic and Environmental Benefits of Achieving the FY 2016 Targets

	Direct Jobs	Indirect and Induced Jobs	Total Jobs
Statutory and Infrastructure[77]	2,173	3,499	5,672
Residential	412	662	1,074
Institutional	902	1,448	2,350
Commercial and Industrial	240	384	624
Total	3,727	5,993	9,720

Connecticut Green Bank will work with the Department of Energy and Environmental Protection to create a tool, similar to the job calculator, to estimate environmental benefits such as greenhouse gas emissions resulting from clean energy production (i.e., MWh) and energy savings (i.e., MMBtu's) over the life of the projects.

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75 Includes sector marketing budgets

76 Residential solar projects that receive financing from CGB also receive an incentive in RSIP so are counted in each sector's goal. They have been removed from the total to avoid double counting.

77 The estimate for CHP jobs created is a professional estimate made by CEFIA staff, and based on the Navigant Study findings. The estimate does not include AD projects as this technology was not included in the original study.

Key Definitions

Alternative Fuel Vehicles and Associated Infrastructure
Per Public Act14-136, an amendment to C.G.S. §4a-59 defines “clean alternative fuel” as natural gas, propane, electricity, or hydrogen when used as a motor vehicle fuel. C.G.S. §14-212(5) defines “motor vehicle” as all vehicles used on the public highways. “Associated infrastructure” is defined by the Connecticut Green Bank as structures, machinery, and equipment necessary and integral to refuel an alternative fuel vehicle.

Class I Renewable Energy
Conn. Gen. Stat. §16-1(a)(26) defines “Class I renewable energy source” as: “(A) electricity derived from (i) solar power, (ii) wind power, (iii) a fuel cell, (iv) geothermal, (v) landfill methane gas, anaerobic digestion or other biogas derived from biological sources, (vi) thermal electric direct energy conversion from a certified Class I renewable energy source, (vii) ocean thermal power, (viii) wave or tidal power, (ix) low emission advanced renewable energy conversion technologies, (x) a run-of-the-river hydropower facility that began operation after July 1, 2003, and has a generating capacity of not more than thirty megawatts, provided a facility that applies for certification under this clause after January 1, 2013, shall not be based on a new dam or a dam identified by the commissioner as a candidate for removal, and shall meet applicable state and federal requirements, including applicable site-specific standards for water quality and fish passage, or (xi) a biomass facility that uses sustainable biomass fuel and has an average emission rate of equal to or less than .075 pounds of nitrogen oxides per million BTU of heat input for the previous calendar quarter, except that energy derived from a biomass facility with a capacity of less than five hundred kilowatts that began construction before July 1, 2003, may be considered a Class I renewable energy source, or (B) any electrical generation, including distributed generation, generated from a Class I renewable energy source, provided, on and after January 1, 2014, any megawatt hours of electricity from a renewable energy source described under this subparagraph that are claimed or counted by a load-serving entity, province or state toward compliance with renewable portfolio standards or renewable energy policy goals in another province or state, other than the state of Connecticut, shall not be eligible for compliance with the renewable portfolio standards established pursuant to section 16-245a.”

Class II Renewable Energy
Conn. Gen. Stat. §16-1(a)(27) defines “Class II renewable energy source” as: “energy derived from a trash-to-energy facility, a biomass facility that began operation before July 1, 1998, provided the average emission rate for such facility is equal to or less than .2 pounds of nitrogen oxides per million BTU of heat input for the previous calendar quarter, or a run-of-the-river hydropower facility provided such facility has a generating capacity of not more than five megawatts, does not cause an appreciable change in the riverflow, and began operation prior to July 1, 2003.”

Class III Renewable Energy
Conn. Gen. Stat. §16-1(a)(44) defines “Class III source” as: “the electricity output from combined heat and power systems with an operating efficiency level of no less than fifty per cent that are part of customer-side distributed resources developed at commercial and industrial facilities in this state on or after January 1, 2006, a waste heat recovery system installed on or after April 1, 2007, that produces electrical or thermal energy by capturing preexisting waste heat or pressure from industrial or commercial processes, or the electricity savings created in this state from conservation and load management programs begun on or after January 1, 2006, provided on and after January 1, 2014, no such programs supported by ratepayers, including programs overseen by the Energy Conservation

Management Board or third-party programs pursuant to section 16-245m, shall be considered a Class III source, except that any demand-side management project awarded a contract pursuant to section 16-243m shall remain eligible as a Class III source for the term of such contract."

Clean Energy Fund (CEF)

A fund formed pursuant to Conn. Gen. Stat. 16-245n which is supported by a one mill per kilowatt hour charge to each end use customer of electric services in the state plus any federal funds as may become available to the state for clean energy investments. The fund is used by Connecticut Green Bank to promote investment in clean energy in accordance with a comprehensive plan developed by Connecticut Green Bank to foster the growth, development and commercialization of clean energy sources, related enterprises and stimulate demand for clean energy and deployment of clean energy sources that serve end use customers in this state and for the further purpose of supporting operational demonstration projects for advanced technologies that reduce energy use from traditional sources.

Comprehensive Energy Strategy (CES)

Pursuant to Conn. Gen. Stat. § 16a-3d, the comprehensive energy strategy is developed by DEEP every three years which assesses and plans for all energy needs in the state, including, but not limited to electricity, heating, cooling, and transportation, includes the findings of the IRP, C&LM Plan, CP, and Energy Assurance Plan.

Comprehensive Plan (CP)

Pursuant to Conn. Gen. Stat. § 16-245n, the comprehensive plan is developed by the Green Bank to foster the growth, development and commercialization of clean energy sources, related enterprises and stimulate demand for clean energy and deployment of clean energy sources that serve end use customers in the state as well as support operational demonstration projects for advanced technologies that reduce energy use from traditional sources.

Connecticut Energy Efficiency Fund (CEEF)

A fund formed pursuant to Conn. Gen. Stat. § 16-245m, supported by a charge of up to three mills per kWh on electric bills which is used to implement cost-effective energy conservation programs and market transformation initiatives in accordance with the Conservation and Load Management Plan approved by the Energy Efficiency Board and DEEP.

Connecticut Renewable Portfolio Standards (RPS)

Pursuant to Conn. Gen. Stat. § 16-245a, each electric supplier and electric distribution company is required to demonstrate by January 1, 2020 that not less than twenty per cent of the total output or services of any such supplier or distribution company shall be generated from Class I renewable energy sources and an additional three per cent of the total output or services shall be from Class I or Class II renewable energy sources.

Critical Facilities

Conn. Gen. Stat. § 16-243y(a)(2) defines "critical facility" as: "any hospital, police station, fire station, water treatment plant, sewage treatment plant, public shelter, correctional facility or production and transmission facility of a television or radio station, whether broadcast, cable or satellite, licensed by the Federal Communications Commission, any commercial area of a municipality, a municipal center, as identified by the chief elected official of any municipality, or any other facility or area identified by the DEEP as critical." It should be noted that DEEP considers grocery stores and gas stations as "other critical facilities" as well as part of the micro grid initiative.

Economically Viable
Economically viable means the costs are cheaper than the grid. For example, what makes solar viable?

- A large system with economies of scale resulting in a lower installed cost
- Panels must receive enough sun
- Installed cost must be low enough or the subsidy high enough
- Price of the alternative, grid-power, must be high enough.

Energize Connecticut
Energize Connecticut is an initiative of the Energy Efficiency Fund, the Clean Energy Finance and Investment Authority, the State and your local electric and gas utilities dedicated to empowering Connecticut citizens to make smart energy choices, now and in the future.

Green Connecticut Loan Guaranty Fund
A fund formed by the Connecticut Green Bank pursuant to Conn. Gen. Stat. § 16a-40e and Conn. Gen. Stat. § 16a-40f.~~,–~~ The Green Connecticut Loan Guaranty Fund provides the Green Bank with access to $18 million to attract lending institutions to participate in clean energy financing programs for individuals, non-profit organizations, and small businesses through a first loss credit enhancement. The program is to be designed in consultation with the ECMB and CHEFA.

~~the fund is used for the purpose of guaranteeing loans made by participating lending institutions to a participating qualified nonprofit organization for eligible energy conservation projects, including for two or more joint eligible energy conservation projects.~~

Integrated Resources Plan (IRP)
Pursuant to Conn. Gen. Stat. § 16a-3a, the integrated resource plan is developed by the DEEP, in consultation with the electric distribution companies, for the procurement of energy resources, including, but not limited to, conventional and renewable generating facilities, energy efficiency, load management, demand response, combined heat and power facilities, distributed generation and other emerging energy technologies to meet the projected requirements of customers in a manner that minimizes the cost of all energy resources to customers over time and maximizes consumer benefits consistent with the state's environmental goals and standards.

Levelized Cost of Energy (LCOE)
Levelized cost of electricity (LCOE) is a summary measure of the overall competiveness of different generating technologies. It represents the per-kilowatt hour cost (in real dollars) of building and operating a generating plant over an assumed financial life and duty cycle. Key inputs to calculating LCOE include capital costs, fuel costs, fixed and variable operations and maintenance (O&M) costs, financing costs, and an assumed utilization rate for each plant type.

Low Emission Renewable Energy Credit (LREC)
An LREC is a Class I Renewable Energy Credit from a low-emissions project as defined in Conn. Gen. Stat. § 16-244t. LREC-qualified projects are Connecticut generation projects that are located behind company customer meters, achieve commercial operation on or after July 1, 2011, and have emissions of no more than 0.07 pounds per megawatt-hour (MWh) of nitrogen oxides, 0.10 pounds per MWh of carbon

monoxide, 0.02 pounds per MWh of volatile organic compounds, and one grain per 100 standard cubic feet. To qualify for the LREC/ZREC Program, LREC projects may not be larger than 2,000 kilowatts (kW).

Micro Grid

Conn. Gen. Stat. § 16-243y(a)(5) defines "microgrid" as: "a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid and that connects and disconnects from such grid to enable it to operate in both grid-connected or island mode."

Net Metering

Pursuant to Conn. Gen. Stat. § 16-243h net metering is the process by which electric suppliers and electric distribution companies are required to interconnect and give a credit for any electricity generated by customers from Class I renewable energy sources or hydropower facility of less than two megawatts. The amount of electricity the customer produces shall be deducted from the amount the customer uses in each monthly billing period and any excess generation shall be credited toward the next monthly billing period. At the end of each year, the electric distribution company or electric supplier shall compensate the customer-generator for any excess kilowatt-hours generated, at the avoided cost of wholesale power.

Renewable Energy and Efficient Energy Finance Account

The Renewable Energy and Efficient Energy Finance Account of $8 million may support grants, investments, loans or other forms of financing assistance to clean energy projects. The program is to be designed in consultation with the DEEP, DECD, and the Office of the Treasurer and priority shall be given to projects that use major system components manufactured or assembled in Connecticut.

Renewable Energy Credit (REC)

A REC represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source. Connecticut Statutory Framework - Pursuant to Conn. Gen. Stat. § 16-245a, RECs are used to satisfy the Class I, II, and III RPS obligations mandated by Conn. Gen. Stat. §§ 16-245; 16-243q. Electric suppliers may procure RECs by long-term contracting mechanisms, purchasing eligible certificates issued by the New England Power Pool Generation Information System or by purchasing eligible renewable electricity and associated attributes from residential customers who are net producers. Additionally there are two subcategories of RECs.

Serviceable Addressable Market (SAM)

SAM is a market for which the technology makes economic sense. A SAM is a segment of the TAM that should be targeted and must meet select criteria of what makes the market serviceable. TAM and SAM are not static. In other words, what is technically possible or economically viable today will change in the future. TAM and SAM represent measurements at a point in time.

Solar Home Renewable Energy Credit (SHREC)

SHREC means a Class I renewable energy credit created by the production of one megawatt hour of electricity generated by one or more qualifying residential solar photovoltaic systems with an approved incentive from the Connecticut Green Bank on or after January 1, 2015.

Special Capital Reserve Fund (SCRF)

SCRF allows quasi-public agencies to issue bonds for self-supporting projects or programs that are backed by the State of Connecticut, lowering the cost of capital for the program. SCRF has historically been used to help launch new financing programs in Connecticut, including CDA, CHESLA, CHFA, CHEFA, CRRA, and UCONN student fees. Pursuant to Conn. Gen. Stat. § 16-245mm, the Green Bank received $~~50~~ 100 million in SCRF authorization, for self-sufficient financing for energy efficiency/clean energy programs.

Total Addressable Market (TAM)

TAM is maximum technical potential of a market. A TAM describes a goal in relation to a market. Focusing on a market permits identification of customers. Market definition permits comparison of financing goals. TAM helps the Green Bank understand how market size changes in relation to subsidy level, technology cost, and financing costs. The Green Bank uses the TAM data to make tailored financial offerings to each customer, listing terms and savings that demonstrate economic gains of clean energy.

Zero Emission Renewable Energy Credit (ZREC)

A ZREC is Class I Renewable Energy Credit from a zero emissions project as defined in Conn. Gen. Stat. § 16-244r. ZREC-qualified projects are Connecticut generation projects that are located behind company customer meters, achieve commercial operation on or after July 1, 2011, and emit no pollutants. To qualify for the LREC/ZREC Program, ZREC projects may not be larger than 1,000 kW.

845 Brook Street, Rocky Hill, CT 06067
T 860.563.0015
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Memo

To: Board of Directors of the Connecticut Green Bank

From: Brian Farnen, CLO and General Counsel, Matt Ranelli, Chair of the Audit, Compliance and Governance Committee

Date: July 10, 2015

Re: Overview of Compliance Reporting and the Board of Directors and Committees for FY 2015

Overview

This memo provides a summary report of the FY 2015 governance as it pertains to the Board of Directors and its Committees. For an overview of the governance process, please see the Bylaws of the Connecticut Green Bank.

This summary report also includes Statement of Financial Interest (SFI) filing requirements, report filings that are statutorily required by the Connecticut General Assembly for the Connecticut Green Bank, and review of governance documents (i.e., bylaws, operating procedures, etc.).

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

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)[1]	Ex Officio	No

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[1] It should be noted that Catherine Smith and Mun Choi currently serve on the Connecticut Innovations Board of Directors.

Board of Directors

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. A quorum for a meeting of the Board of Directors is six (6) voting members at each meeting. 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)

- **Staff Lead** – Bryan Garcia, President and CEO

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 (see Table 2).

Table 2. Summary of Board of Directors Meetings for FY 2015

Date	Regular or Special Meeting	Attendees / % Attendance	# of Resolutions Approved[2]
July 3, 2014	Special	7 / 70%	1
July 18, 2014	Regular	9 / 90%	13
August 26, 2014	Special	8 / 80%	4
October 17, 2014	Regular	8 / 73%	8
December 2, 2014	Special	8 / 73%	10
December 19, 2014	Regular	8 / 73%	6
January 23, 2015	Special	9 / 82%	12
April 17, 2015	Regular	7 / 64%	9
June 19, 2015	Regular	6 / 55%	3
Total	4 Special Meetings 5 Regular Meetings **9 Total Meetings**	**73%**	**66**

Overall, the attendance for each meeting established a quorum – 6 of the 11 voting members present – in order to enable business decisions, and on average there were 8 of 11 members present at each meeting, of which 40% attended on average by phone.

For a link to the materials from the Board of Directors meetings that is publicly accessible – click here.

Statement of Financial Interest

It is required by state ethics laws 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). With

[2] Excludes approval of meeting minutes.

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 3):

Table 3. 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%

Of the SFIL filings by Senior Staff and the Board of Directors, 23 were filed online and 1 was submitted in writing. On May 18, 2015, the Connecticut Green Bank received a letter from Carol Carson, Executive Director of the Office of State Ethics congratulating us "for the timely submission of 100% of the 2014 Statements of Financial Interests," where 85% of state agencies, offices, commissions, and quasi-publics achieved 100% compliance.

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. A quorum for a meeting of the ACG Committee is two (2) voting members at each meeting. Note, that if there aren't enough voting members of the ACG Committee present at a meeting, then the Chair and/or Vice Chair of the Connecticut Green Bank can participate in the meeting to establish a quorum. 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)

- **Staff Lead** – Brian Farnen, CLO and General Counsel

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 (see Table 4).

Table 4. Summary of Audit, Compliance and Governance Committee Meetings for FY 2015

Date	Regular or Special Meeting	Attendees / % Attendance	# of Resolutions Approved
July 17, 2014	Regular	3 / 100%	2
October 15, 2014	Regular	3 / 100%	1
December 2, 2014	Special	3 / 100%	1
April 22, 2015	Regular	2 / 66%	2
Total	1 Special Meeting 3 Regular Meetings **4 Total Meetings**	**92%**	**6**

[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

Overall, the attendance for each meeting established a quorum – 2 of the 3 voting members present – in order to enable business decisions, and on average there were 3 of 3 members present at each meeting, of which 33% attended on average by phone.

For a link to the materials from the ACG Committee meetings that is publicly accessible – click here.

Review of Governance Documents and Statutory Reporting
With respect to annual review of governance documents and statutory reporting, the following applies:

- Annual review by the ACG Committee of the Governance Documents (i.e., Bylaws, Operating Procedures, and Statement of Purpose) completed on July 17, 2014 – for Bylaws only.

- As a result of state auditor findings in FY 2014, we are tracking statutory responsibilities and reporting with a checklist attached hereto as Exhibit A.

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. A quorum for a meeting of the B&O Committee is two (2) voting members at each meeting. Note, that if there aren't enough voting members of the B&O Committee present at a meeting, then the Chair and/or Vice Chair of the Connecticut Green Bank can participate in the meeting to establish a quorum. 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)

- **Staff Lead** – Mackey Dykes, VP and COO

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 (see Table 5).

Table 5. Summary of Budget and Operations Committee Meetings for FY 2015

Date	Regular or Special Meeting	Attendees / % Attendance	# of Resolutions Approved
February 25, 2015	Special	2 / 66%	1
April 27, 2015	Regular	3/100%	1
May 29, 2015	Regular	3/100%	0
June 11, 2015	Regular	3/100%	1
Total	1 Special Meeting 3 Regular Meetings **4 Total Meetings**	**92%**	**3**

[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

Overall, the attendance for each meeting established a quorum – 2 of the 3 voting members present – in order to enable business decisions, and on average there were 3 of 3 members present at each meeting, of which 25% attended on average by phone.

For a link to the materials from the B&O Committee meetings that is publicly accessible – click here.

Deployment Committee

The Deployment Committee of the Connecticut Green Bank is comprised of four (4) ex officio and appointed voting members. A quorum for a meeting of the Deployment Committee is three (3) voting members at each meeting. Note, that if there aren't enough voting members of the Deployment Committee present at a meeting, then the Chair and/or Vice Chair of the Connecticut Green Bank can participate in the meeting to establish a quorum. 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)

- **Staff Lead** – Bryan Garcia, President and CEO, and Bert Hunter, EVP and CIO

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 (see Table 6).

Table 6. Summary of Deployment Committee Meetings for FY 2015

Date	Regular or Special Meeting	Attendees / % Attendance	# of Resolutions Approved
August 20, 2014	Special	3 / 75%	1
September 16, 2014	Special	3 / 75%	7
November 14, 2014	Special	*6 / 100%	8
November 21, 2014 I	Special	*4 / 66%	-
November 21, 2014 II	Special	5 / 83%	1
December 19, 2014	Special	3 / 75%	-
February 10, 2015	Regular	4 / 100%	-
March 3, 2015	Regular	3 / 75%	2
May 14, 2015	Regular	4 / 100%	5
Total	6 Special Meetings 3 Regular Meetings **9 Total Meetings**	**83%**	**24**

Overall, the attendance for each meeting established a quorum – 3 of the 4 voting members present – in order to enable business decisions, and on average there were 4 of 4 members present at each meeting, of which 75% attended on average by phone.

[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*

For a link to the materials from the Deployment Committee meetings that is publicly accessible – click here.

Joint Committee of the EEB and the CGB

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. A quorum for a meeting of the Joint Committee is three (3) voting members at each meeting. 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)

- **Staff Lead** – Bryan Garcia, President and CEO of the Connecticut Green Bank

For FY 2015, the Joint Committee of the EEB and the Connecticut Green Bank met four (4) times, including four (4) regularly scheduled meetings (see Table 7).

Table 7. Summary of Joint Committee Meetings for FY 2015

Date	Regular or Special Meeting	Attendees / % Attendance		# of Resolutions Approved
		Voting	Non-voting (CGB)	
July 16, 2014	Regular	4 / 80%	2 / 100%	-
October 22, 2014	Regular	5 / 100%	1 / 50%	1
January 21, 2015	Regular	5 / 100%	2 / 100%	-
April 22, 2015	Regular	4 / 80%	2 / 100%	1
Total	0 Special Meetings 4 Regular Meetings **4 Total Meetings**	**90%**	**90%**	**2**

Overall, the attendance for each meeting established a quorum – 3 of the 5 voting members present – in order to enable business decisions, and on average there were 4 of 5 members present at each meeting, of which 0% attended on average by phone.

For a link to the materials from the Joint Committee meetings that is publicly accessible – click here.

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[7] Note – these members are representatives from the Connecticut Green Bank.

EXHIBIT A

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CONNECTICUT GREEN BANK

Connecticut Green Bank	**Statutory Reporting Requirement Checklist**												
Report Coordinator: Matt Macunas													
		Date Filed with OFA:											
		FY14				FY15				FY16			
	Individual Responsible for Filing with OFA	9/30/2013	12/31/2013	3/31/2014	6/30/2014	9/30/2014	12/31/2014	3/31/2015	6/30/2015	9/30/2015	12/31/2015	3/31/2016	6/30/2016
Section 1-123 subsection(b): Quarterly Financial Cash Flow Report. Such Report shall include, but not be limited to, for each fund and account of the agency: (1) The beginning fiscal year balance;(2) all funds expended and all revenue collected by the end of the quarter; and (3) total expenditures and revenues estimated at the end of the fiscal year.	G. Bellas	03/14/14	03/14/14	04/21/15	04/21/15								
Section 1-123 subsection (c): Quarterly Personnel Status Report. Such report shall include, but not be limited to: (1) The total number of employees by the end of the quarter.	C. Baisden	06/17/14	06/17/14	06/17/14	08/05/14	10/02/14	01/12/15	04/12/15					
		Date Filed with:											
		FY14				FY15				FY16			
	Individual Responsible for Filing of Complete Report	Governor	Auditors of Public Accounts	Legislative Program Review and Investigations Committee (2 copies)		Governor	Auditors of Public Accounts	Review and Investigations Committee (2 copies)		Governor	Auditors of Public Accounts	Review and Investigations Committee (2 copies)	
Section1 -123 subsection (a): Annual Report	B. Farnen/M. Dykes	12/30/2014	12/30/2014	12/30/2014	12/30/2014								
Section 16-245aa subsection (d): CGB shall report on the effectiveness of the Renewable Energy and Efficient Energy Finance program to the joint standing committee of the General Assembly having cognizance of matters relating to energy	B. Garcia	January 1, 2013	January 1, 2014	January 1, 2015	January 1, 2016								
	Date Filed:	2/8/2013	1/15/2014	15-Mar-2015									

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CONNECTICUT
GREEN BANK

Memo

To: Board of Directors

From: Matt Macunas (Legislative Liaison & Marketing Manager)

CC: Brian Farnen (General Counsel and CLO) and Bryan Garcia (President and CEO)

Date: June 30, 2015

Re: 2015 Special Legislative Session Summary

The first special legislative session of 2015 convened June 29th to wrap up unresolved budget issues from the end of the regular legislative session. The following legislative items impact the Connecticut Green Bank and passed the General Assembly.

The Green Bank's **Renewable Energy and Energy Efficiency Fund** incurred a reduction in bonding capacity as a result of Section 191 of Senate Bill 1501, *An Act Authorizing and Adjusting Bonds of the State for Capital Improvements, Transportation and Other Purposes*. This legislation cancels $10 million of the total $18 million in REEEF bond authorizations, leaving $8 million available for use. The **Green Loan Guarantee Fund** of $18 million was untouched. To place the REEEF reduction in perspective: Senate Bill 1501 cancelled or reduced 127 bond authorizations worth an aggregate $272.5 million across 19 state and quasi-public agencies.

We expected this reduction based on conversations with legislative leaders and plan to request the remaining bond funds this fiscal year as part of our FY 2016 budget.

On the other side of the ledger, the Green Bank increased its **Special Capital Reserve Fund**-backed bonding authority by an amount commensurate with a major state agency, considering this year's allocations. Section 228 of SB 1501 increases, from $50 million to $100 million, the amount of SCRF-backed bonds the Green Bank may issue. The bill summary recognizes that SCRF-backed bonds are contingent liabilities of the state; if a SCRF is exhausted, then the General Fund automatically replenishes it regardless of the state spending cap. Although the bonding authority is increased as requested, the accompanying language submitted by the Green Bank, DEEP and Office of the Treasurer to the Office of Policy and Management related to the treatment of energy savings performance contract was not included in today's legislation. Per the OPM Undersecretary for Legislative Affairs there was disagreement on this language, which would have deemed lease payments related to performance contracting as being appropriated. The additional SCRF support will be used to support the State's Lead by Example program.

The **municipal and quasi-public set-aside** language encountered during the regular legislative session is incorporated into budget implementer bill 1502, *An Act Implementing Provisions of the State Budget for the Biennium Ending June 30, 2017 Concerning General Government, Education and Health and Human Services.* Section 58 of the bill subjects quasi-public agencies to set-aside provisions when using state funds. As an entity primarily using ratepayer funds and not state General Fund monies, the Green Bank is not anticipated to be affected unless the Green Bank uses funds through the State Bond Commission (i.e. the Renewable Energy and Energy Efficiency Fund and the Green Loan Guarantee Fund)..

HARC, Inc: A C-PACE Project in Hartford, CT

Address	900 Asylum Ave, Hartford, CT 06105			
Owner	HARC, Inc. (f/k/a The Greater Hartford Association for Retarded Citizens, Inc.)			
Proposed Project Description	PV solar installation, lighting and HVAC upgrades			
Proposed C-PACE Assessment	$479,810			
Assessment Term (*years*)	17			
Term Remaining (*months*)	Pending Construction Completion			
Annual Interest Rate	5.7%			
Annual C-PACE Assessment	$44,444			
Savings-to-Investment Ratio	1.05			
Average Debt-Service Coverage Ratio	[redacted]			
Loan-to-Value Ratio	[redacted] [redacted]			
Projected Energy Savings (*mmBTU)*		RE	EE	Total
	Per year	270	1,114	1,384
	Over Term	4,775	26,609	31,384
Estimated Cost Savings	Per year ($)	1,170	45,188	46,358
	Over Term ($)	19,900	768,184	788,084
Objective Function	65.4 kBTU per ratepayer dollar at risk			
Location	City of Hartford			
Type of Building	Office			
Year of Build	1977			
Building Size (*total sf*)	99,604 sf.			
Year Acquired by Current Owner	1995			
Appraised Value	[redacted]			
Status of Mortgage Lender Consent	[redacted]			
Est. Date of Construction Completion	Pending closing			
Current Status	Pending Deployment Committee Approval			
Energy Contractors	[redacted]			
Additional Comments	[redacted]			

Carmon Funeral #2: A C-PACE Project in South Windsor

<table>
<tr><td>Address</td><td colspan="2">419 Buckland Road, South Windsor, CT</td></tr>
<tr><td>Owner</td><td colspan="2">Carmon & Company LLC[(1)]</td></tr>
<tr><td>Proposed Project Description</td><td colspan="2">Installation of 24 kW PV system</td></tr>
<tr><td>Proposed Assessment</td><td colspan="2">$116,074</td></tr>
<tr><td>Term (years)</td><td colspan="2">20</td></tr>
<tr><td>Term Remaining (months)</td><td colspan="2">Pending Construction Completion</td></tr>
<tr><td>Annual Interest Rate</td><td colspan="2">6.0%</td></tr>
<tr><td>Annual C-PACE Assessment</td><td colspan="2">$10,043</td></tr>
<tr><td>Savings-to-Investment Ratio</td><td colspan="2">1.07</td></tr>
<tr><td>Average Debt Service Coverage Ratio</td><td colspan="2">[redacted]</td></tr>
<tr><td>Loan-to-Value Ratio</td><td colspan="2">[redacted]</td></tr>
<tr><td>Lien-to-Value Ratio</td><td colspan="2">[redacted]</td></tr>
<tr><td rowspan="3">Estimated Energy Savings and/or Production (MMBtu)</td><td></td><td>RE</td></tr>
<tr><td>Per year</td><td>98</td></tr>
<tr><td>Over loan</td><td>1,877</td></tr>
<tr><td rowspan="2">Estimated Cost Savings</td><td>Per year</td><td>$10,702</td></tr>
<tr><td>Over loan</td><td>$214,047</td></tr>
<tr><td>Objective Function</td><td colspan="2">16.17 kBTU saved per ratepayer dollar at risk</td></tr>
<tr><td>Location</td><td colspan="2">South Windsor, CT</td></tr>
<tr><td>Type of Building</td><td colspan="2">Commercial</td></tr>
<tr><td>Year of Build</td><td colspan="2">1973</td></tr>
<tr><td>Building Size (total sf)</td><td colspan="2">7,920</td></tr>
<tr><td>Year Acquired by Current Owner</td><td colspan="2">1986</td></tr>
<tr><td>Appraised Value</td><td colspan="2">[redacted]</td></tr>
<tr><td>Status of Mortgage Lender Consent</td><td colspan="2">[redacted]</td></tr>
<tr><td>Current Status</td><td colspan="2">Pending Board of Directors Approval</td></tr>
<tr><td>Energy Contractors</td><td colspan="2">[redacted]</td></tr>
<tr><td>Additional Comments</td><td colspan="2">[redacted]</td></tr>
</table>

Carmon Funeral #1: A C-PACE Project in Windsor

<table>
<tr><td>Address</td><td colspan="2">807 Bloomfield Ave, Windsor, CT</td></tr>
<tr><td>Owner</td><td colspan="2">Carmon Properties LLC[1]</td></tr>
<tr><td>Proposed Project Description</td><td colspan="2">Installation of 99 kW PV system</td></tr>
<tr><td>Proposed Assessment</td><td colspan="2">$389,124</td></tr>
<tr><td>Term (years)</td><td colspan="2">15</td></tr>
<tr><td>Term Remaining (months)</td><td colspan="2">Pending Construction Completion</td></tr>
<tr><td>Annual Interest Rate</td><td colspan="2">5.5%</td></tr>
<tr><td>Annual C-PACE Assessment</td><td colspan="2">$38,433</td></tr>
<tr><td>Savings-to-Investment Ratio</td><td colspan="2">1.13</td></tr>
<tr><td>Average Debt Service Coverage Ratio</td><td colspan="2">[redacted]</td></tr>
<tr><td>Loan-to-Value Ratio</td><td colspan="2">[redacted]</td></tr>
<tr><td>Lien-to-Value Ratio</td><td colspan="2">[redacted]</td></tr>
<tr><td rowspan="3">Estimated Energy Savings and/or Production (MMBtu)</td><td></td><td>RE</td></tr>
<tr><td>Per year</td><td>400</td></tr>
<tr><td>Over loan</td><td>5,803</td></tr>
<tr><td rowspan="2">Estimated Savings</td><td>Per year</td><td>$43,117</td></tr>
<tr><td>Over loan</td><td>$646,749</td></tr>
<tr><td>Objective Function</td><td colspan="2">14.9 kBTU saved per ratepayer dollar at risk</td></tr>
<tr><td>Location</td><td colspan="2">Windsor, CT</td></tr>
<tr><td>Type of Building</td><td colspan="2">Commercial</td></tr>
<tr><td>Year of Build</td><td colspan="2">1988</td></tr>
<tr><td>Building Size (total sf)</td><td colspan="2">16,272 (getting improvements; 20,772 total parcel)</td></tr>
<tr><td>Year Acquired by Current Owner</td><td colspan="2">2011</td></tr>
<tr><td>Appraised Value</td><td colspan="2">[redacted]</td></tr>
<tr><td>Status of Mortgage Lender Consent</td><td colspan="2">[redacted]</td></tr>
<tr><td>Current Status</td><td colspan="2">Pending Board of Directors Approval</td></tr>
<tr><td>Energy Contractors</td><td colspan="2">[redacted]</td></tr>
<tr><td>Additional Comments</td><td colspan="2">[redacted]</td></tr>
</table>

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CONNECTICUT GREEN BANK

Memo

To: Board of Directors of the Connecticut Green Bank

From: Bryan Garcia, Dale Hedman, and Kerry O'Neill

Date: July 10, 2015

Re: Residential Solar Investment Program – Steps 8 through 10 Recommendations

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Note – this memo is subject to change. The Deployment Committee is meeting on Tuesday, July 14, 2015 to discuss the merits of the staff proposal. If changes are made to this memo, a tracked changes version will be distributed to the Board of Directors on Wednesday, July 15, 2015.

Background

On March 2, 2012, the Connecticut Green Bank launched the Residential Solar Investment Program ("RSIP"). Per Section 106 of Public Act 11-80 (now codified at Connecticut General Statute Sec. 16-245ff), the RSIP required that a minimum of 30 MW of new residential solar PV be installed in Connecticut on or before December 31, 2022, at a reasonable payback to the customer all the while developing a sustainable market for contractors. The RSIP provides to residential customers, via solar PV contractors, direct financial incentives in the form of a one-time expected performance-based buy-down ("EPBB") or a 6-year performance-based incentive ("PBI") for the purchase and/or lease of qualifying PV systems respectively.

The success of the RSIP over its first three years resulted in an improvement to the policy in the 2015 legislative session. As a result of the leadership of Governor Malloy, Public Act 15-194 "An Act Concerning the Encouragement of Local Economic Development and Access to Residential Renewable Energy" was passed with bipartisan support. The improved policy includes, but is not limited to the following:

- **<u>Target</u>** – resets the goal from no less than 30 MW to no more than 300 MW – a tenfold increase from PA 11-80;
- **<u>SHREC</u>** – establishes a Solar Home Renewable Energy Credit (SHREC) whereby the EDCs must purchase RECs from and at a price[1] set by the Connecticut Green Bank over 15 years through a master purchase agreement approved by the Public Utility Regulatory Authority. The policy takes effect January 1, 2015 with Step 6 of the RSIP; and

[1] The price shall not exceed the lesser of the small ZREC or $5 below the alternative compliance payment of the Class I RPS

- **Permitting** – incorporates the desire for municipalities to improve permit processing to lower soft costs of solar PV systems.

To date, through the RSIP, we have approved, in progress, and completed over 80 megawatts of projects while reducing the level of subsidies by nearly 80 percent since 2012 through seven steps – see Table 1. About 40 percent (or 32 MW) of the installations are homeownership.

Table 1. Installed Capacity by Step for Approved, In Progress, or Completed Projects (as of June 26, 2015)

RSIP Incentive Step	**Approved** (kW)	**In Progress** (kW)	**Completed** (kW)	**Total** (kW)	**Average Incentive** ($/W$_{STC}$)
Step 1	-	17	1,170	1,187	$1.78
Step 2	-	-	6,194	6,194	$1.64
Step 3	115	120	13,000	13,235	$1.23
Step 4	3,111	1,011	16,401	20,523	$1.03
Step 5	5,948	921	8,056	14,925	$0.75
Step 6	10,014	1,362	2,815	14,191	$0.51
Step 7	11,319	499	103	11,921	$0.39
Total	**30,508**	**3,929**	**47,738**	**82,175**	**$0.89**

More than 56 MW of solar PV deployment were the result of Steps 1 through 5, while about 26 MW of solar deployment will result from Steps 6 and 7.[2] The investment of over $360 million in residential solar PV in Connecticut through the RSIP to date has created nearly 5,600 job-years (i.e., 2,142 direct and 3,449 indirect and induced) and will reduce over 1 MTCO_2 emissions over the 25-year life of the projects.

Of the more than 13,000 projects approved under the Connecticut Green Bank's RSIP and Connecticut Clean Energy Fund's Small Solar Program, the following penetration rates were achieved in census tracts with the following area medium incomes (AMI) (see Table 2).

Table 2. Statewide Residential Solar PV Deployment by Income Level and Census Tract

Income Level (AMI)	**# of Census Tracts**	**Tract Population**	**# of Projects**	**Projects per Capita**	**Installed Capacity[3]** (kW)	**Installed Capacity per Capita**
Less than 60%	158	586,109	410	0.00070	2,370.43	0.00404
60-80%	77	348,375	731	0.00210	4,765.66	0.01368
80-100%	186	825,379	2,462	0.00298	16,857.01	0.02042
100-120%	173	753,320	3,875	0.00514	28,646.97	0.03803
More than 120%	230	1,053,233	5,652	0.00537	43,629.57	0.04142
Total	**824**	**3,566,416**	**13,310**	**0.00368**	**96,269.64**	**0.02699**

This data suggests that residential solar PV is predominantly deployed in moderate and higher income communities in Connecticut – about 25% of the market is less than 100% AMI or the low-to-moderate (LMI) market. Another way to look at the challenge of solar PV adoption in the LMI market is that the markets for residential solar PV in the 60-80% AMI and 80-100% AMI

[2] It should be noted that Section 106 of PA 11-80 applies to Steps 1 through 5 of the RSIP, while PA 15-194 applies to Steps 6 and beyond – projects approved after January 1, 2015.

[3] Note that lower income bands have a smaller average installed system size than higher income bands: 5.8 kW for <60% AMI, 6.5 kW for 60-80%, 6.8 kW for 80-100%, 7.4 kW for 100-120%, 7.7 kW for >120%.

bands would need to triple and double respectively in order to be the same on a per capita basis as 100% AMI and above. The Board of Directors and Staff of the Connecticut Green Bank seek to improve the deployment of residential solar PV in low to moderate income communities.[4] As outlined previously to the Board, there are a variety of tools and strategies for achieving deeper penetration of solar in LMI communities, including enactment of a community (or shared) solar policy in the state, tiered RSIP incentives, targeted outreach and unique business models geared towards this hard to reach segment, sub-metering, and multifamily deployment. Not all policies or approaches will work in all market segments. For instance, renters will benefit from a community solar policy, multifamily strategies and sub-metering, while homeowners will benefits from tiered RSIP incentives. In this memo, an LMI tier in Steps 8 through 10 is proposed to address the LMI homeownership market segment.

RSIP – Proposed Schedule of Incentives for Steps 8 through 10

The staff proposes the following incentive for Steps 8 through 10 of the RSIP:

- **<u>Race to the Solar Rooftop</u>** –The total capacity target for Step 8 is 30.0 MW, Step 9 is 30.0 MW, and Step 10 is 30.0 by June 30, 2016, whichever comes sooner. This is equal to the 90.0 MW target for FY 2016 approved by the Connecticut Green Bank Board of Directors on June 19, 2015. We propose that no more than 4.5 MW (5% or 750 projects) of the total 90.0 MW through Step 10 be established as its own "Race to the Rooftop" for proposed LMI incentives. This additional category will be available as long as the EPBB and PBI incentives are still available for such step.

- **<u>Launch Date</u>** – Step 8 would begin on August 7, 2015, Step 9 would commence immediately upon 30.0 MW of approved projects reached in the "Race to the Rooftop" in Step 8, and Step 10 would commence immediately upon 30.0 MW of approved projects reached in the "Race to the Rooftop" in Step 9.

- **<u>Incentive Level</u>** – we are proposing incentive levels for non-LMI (i.e., above 100% AMI) and LMI (i.e., below 100% AMI) market segments, including:

  Non-LMI Incentives
  In order to continue to differentiate the incentive levels for the EPBB and HOPBI (see Table 3) given the legislative guidance of comparable economic incentives as well as national best practice on incentive levels,[5] we are proposing the following incentive levels:

  - **<u>EPBB</u>** – for Step 8, the EPBB will remain the same as Step 7. For Steps 9 and 10, the EPBB will decline by 5% each step; and

  - **<u>PBI</u>** – for Steps 8 through 10, the PBI will decline by 15% each step.

  - **<u>HOPBI</u>** – The Homeowner Performance Based Incentive is no longer needed nor available starting with Step 8 as Public Act 15-194 addressed the previous legislative error from 2014 and net metering incentives are now available to both the EPBB and PBI.

[4] See *Market Analysis of Residential Solar Deployment and Housing Characteristics of CT's Low Income Sector* memo to the Board of Directors on December 12, 2014.
[5] "A Survey of State and Local PV Program Response to Financial Innovation and Disparate Federal Tax Treatment in the Residential PV Sector" by Mark Bolinger and Edward Holt in LBNL-181290 (June 2015).

The incentive level for the EPBB is roughly $0.01/kWh more than the PBI over a 15-year period – making the incentive levels more economically comparable. LBNL suggests that the economic disparity between the EPBB (i.e., homeownership) and PBI (i.e., third-part ownership) is $0.042/kWh when you factor in the value of the federal investment tax credit and accelerated depreciation.[6]

Table 3. Schedule of Incentives for Steps 8 through 10 for Non-LMI Households

RSIP Incentive Step	**EPBB** ($/W)			**PBI** ($/kWh)	
	≤5 kW	5 to 10 kW	>10 kW	≤10 kW	>10 kW
Step 1	$2.450	$1.250	$0.000	$0.300	$0.000
Step 2	$2.275	$1.075	$0.000	$0.300	$0.000
Step 3	$1.750	$0.550	$0.000	$0.225	$0.000
Step 4	$1.250	$0.750	$0.000	$0.180	$0.000
Step 5	$0.800		$0.400	$0.125	$0.060
Step 6	$0.675		$0.400	$0.080	$0.060
Step 7	$0.540		$0.400	$0.064	$0.060
Step 8	$0.540		$0.400	$0.054	$0.054
Step 9	$0.513		$0.400	$0.046	$0.046
Step 10	$0.487		$0.400	$0.039	$0.039

LMI Incentives

Given the priority of expanding residential solar PV in Connecticut into the low to moderate income market segments, and to attempt to ensure that the 300 MW policy target provides an opportunity to reach all household income levels in the state, we are proposing a low income schedule of incentives for Steps 8 through 9 – Step 10 is to be determined (see table 4).

Table 4. Schedule of Incentives for Steps 8 through 10 for LMI Households

RSIP Incentive Step	**PBI** ($/kWh)	
	≤10 kW	>10 kW
Step 8	$0.110	$0.055
Step 9	~~$0.110~~TBD	~~$0.055~~TBD
Step 10	TBD	TBD

The LMI incentive levels are 12% less than Step 5 for the PBI of the RSIP for Steps 8 and 9 of the proposed LMI PBI incentive, and are to be determined in Step 10. This incentive level is a little more than twice the non-LMI incentive for the PBI.

No more than 4.5 MW of incentives shall be provided through the LMI “Race to the Rooftop” incentives.

[6] Ibid.

SHREC

The value of the SHREC is inclusive of not only the incentives offered under the RSIP, but it also includes the administrative costs of the program to the Connecticut Green Bank[7] and the anticipated securitization costs (or estimated investment returns) from investors willing to provide the Green Bank with upfront capital to support the program. This memo provides the value of the incentives offered through the RSIP only – and does not include administrative costs nor securitization costs.

RSIP Incentive

For each step of the RSIP, depending upon the percentage of incentives accessed – through non-LMI and LMI – an estimated equivalent 15-year REC price can be determined (see Table 5). This means that the incentive provided by the Connecticut Green Bank through the RSIP is equivalent to a 15-year stream of payments (i.e., $/kWh) based on the performance of a solar PV system.

Table 5. Estimate of the Nominal Value of the RSIP Incentive Over a 15-Year Period ($/kWh)

	Non-LMI		LMI
RSIP Step	EPBB	PBI	PBI
Step 8	$0.0324	$0.0223	$0.0450
Step 9	$0.0308	$0.0189	$0.0450
Step 10	$0.0293	$0.0161	TBD

A best case, expected case, and worst case scenarios were analyzed to determine the range of value that the RSIP incentive is likely to be over a 15-year period – between $15 to $30 per as part of the SHREC price (see Table 6).

Table 6. Estimated Best to Worst Case of RSIP Incentive at Equivalent 15-Year Price ($/REC)

RSIP Step	Best Case[8]	Expected Case[9]	Worst Case[10]
Step 8	$22.30	$25.03	$33.03
Step 9	$18.90	$22.08	$31.51
Step 10	$16.10	$19.63	$30.09

Low-to-Moderate Income Household Impact

Connecticut residents with lower incomes are burdened with a disproportionate share of their income being spent on energy costs, yielding a significant energy affordability gap that has been identified by Operation Fuel[11]. In preparing the proposed LMI incentive for Steps 8 and 9, Green Bank staff performed an analysis of the financial impact of going solar at the household level for various AMI bands (see Table 10). This analysis examined the energy burden, defined as the

[7] As well as the electric distribution companies – Eversource Energy and United Illuminating
[8] Assumes 90.0 MW PBI
[9] Assumes 4.5 MW LMI PBI, 71.3 MW PBI, and 14.2 MW EPBB; for Step 10 of LMI, assumes PBI of $0.045/kWh
[10] Assumes 4.5 MW LMI PBI and 85.5 MW EPBB; for Step 10 of LMI, assumes PBI of $0.045/kWh
[11] Connecticut's energy affordability gap is discussed in this study by Operation Fuel: http://www.operationfuel.org/wp-content/uploads/Connecticut-2014-HEAG-Final.pdf.

percent of income spent on energy, before and after going solar. The analysis included the following assumptions: a 20-year lease for a 6-kW system at an $85 monthly cost for 100% AMI or lower and $95 monthly cost above 100% AMI. This lease pricing approximates the LMI offer we believe would exist in the market with the approval of the proposed tiered incentive. For the escalating lease option, the escalation rate is set at 1.5% per annum. The model utilizes a proxy of an oil-heated household and New Haven area AMI for a 3 person household (which is approximately a mid-case for regional differences in AMI across the state). In order to obtain starting average energy costs by income band, state average household energy cost data for an oil heated home was used, and scaled up or down appropriately based on bedroom count by income.

Table 10. Reduction in Energy Burden as a Result of Solar PV Lease

New Haven Area (UI) (Oil Household)	Household Income	Average Household Energy Costs	% of Income Spent on Energy - *Starting*	1st year Annual Solar Lease Savings ($)	1st Year % Savings of Energy Costs	% of Income Spent on Energy - *Ending*
60% AMI	$45,060	$2,884	6.4%	$423[12]	14.7%	5.5%
80% AMI	$59,250	$2,963	5.0%	$427[13]	14.4%	4.3%
100% AMI	$75,060	$3,453	4.6%	$425[14]	12.3%	4.0%
120% AMI	$90,072	$3,873	4.3%	$308[15]	7.9%	4.0%

Table 10 shows that for 80% AMI and 100% AMI households, the energy burden after going solar is roughly at the starting energy burden of a 120% AMI household. Note that the energy burden of a 60% AMI household is still above 5% after going solar, demonstrating the challenge of a tiered incentive to meet the needs of this market segment. A policy akin to community solar will likely be more successful at meeting the needs of this hardest to reach market segment of <60% AMI households, while the LMI tiered incentive is ideally suited to the 60% - 100% AMI households.

Staff also analyzed the economics of going solar with an energy efficiency package for the same profile of households (see Table 11). For the energy efficiency package, a 20-year energy services agreement (ESA) was assumed at a cost of $15 a month. A low end efficiency package was modeled as equivalent to Home Energy Solutions (HES) core services (including lighting, water saving measures, light weatherization, air sealing, and duct sealing) and a high end efficiency package equivalent to HES core services plus insulation.

Table 11. Reduction in Energy Burden as a Result of Solar PV Lease and Energy Efficiency ESA

New Haven Area (UI) (Oil Household)	Household Income	Average Household Energy Costs	% of Income Spent on Energy - *Starting*	1st Year Annual Solar Lease Savings ($)	1st Year Annual Energy Efficiency Savings (Low to High)	1st Year Annual Total Energy Savings	1st Year % Savings of Energy Costs	% of Income Spent on Energy - *Ending*

12 60% AMI Lifetime Savings: $27,581 for fixed lease vs. $24,395 for escalating lease
13 80% AMI Lifetime Savings: $27,718 for fixed lease vs. $24,532 for escalating lease
14 100% AMI Lifetime Savings: $27,646 for fixed lease vs. $24,460 for escalating lease
15 120% AMI Lifetime Savings: $25,327 for fixed lease vs. $21,766 for escalating lease

60% AMI	$45,060	$2,884	6.4%	$423	$70 to $543	$493 to $966[16]	17.1% to 33.5%	4.3% to 5.3%
80% AMI	$59,250	$2,963	5.0%	$427	$70 to $543	$497 to $970[17]	16.8% to 32.8%	3.4% to 4.2%
100% AMI	$75,060	$3,453	4.6%	$425	$70 to $543	$495 to $968[18]	14.3% to 28.0%	3.3% to 3.9%
120% AMI	$90,072	$3,873	4.3%	$308	$70 to $543	$378 to $851[19]	9.8% to 22.0%	3.4% to 3.9%

Table 11 illustrates the additional benefits of combining efficiency measures with the installation of solar PV. Note that in the first year annual energy efficiency savings, the lower number represents savings from the low end efficiency package net of the ESA payments and the higher number represents savings from the high end efficiency package net of the ESA payments. However, the reverse is true for the ending % of income spent on energy, where the lower percentage number represents the portion of income spent on energy with the installation of the higher efficiency package, since the higher efficiency package results in a higher annual energy savings. This analysis demonstrates that even a 60% AMI household could achieve the same percent of income being spent on energy after going solar and installing a higher efficiency package as the starting energy burden of a 120% AMI household.

Resolution

WHEREAS, Public Act 15-194 “An Act Concerning the Encouragement of Local Economic Development and Access to Residential Renewable Energy” (the “Act”) requires the Connecticut Green Bank (“Green Bank”) to design and implement a Residential Solar Photovoltaic (“PV”) Investment Program (“Program”) that results in no more than three-hundred (300) megawatts of new residential PV installation in Connecticut before December 31, 2022 and creates a Solar Home Renewable Energy Credit (“SHREC”) requiring the electric distribution companies to purchase through 15-year contracts the Renewable Energy Credits (“RECs”);

WHEREAS, as of June 26, 2015, the Program has thus far resulted in approximately eighty-two megawatts of new residential PV installation application approvals in Connecticut – about 52 MW prior to January 1, 2015 and 26 MW after January 1, 2015 – and when complete and commissioned will achieve about twenty-five percent of the target of three-hundred megawatts established per Public Act 15-194;

WHEREAS, pursuant to Conn. Gen Stat. 16-245a, a renewable portfolio standard was established that requires that Connecticut Electric Suppliers and Electric Distribution Company Wholesale Suppliers obtain a minimum percentage of their retail load by using renewable energy;

WHEREAS, real-time revenue quality meters are included as part of solar PV systems being installed through the Program that determine the amount of clean energy production from such systems as well as the associated RECs which, in accordance with Public Act 15-194 will be sold to the Electric Distribution Companies through a master purchase

[16] 60% AMI Lifetime Savings: $26,981 to $38,806 for fixed lease vs. $23,795 to $35,620 for escalating lease
[17] 80% AMI Lifetime Savings: $27,118 to $38,943 for fixed lease vs. $23,932 to $35,757 for escalating lease
[18] 100% AMI Lifetime Savings: $27,046 to $38,871 for fixed lease vs. $23,860 to $35,685 for escalating lease
[19] 120% AMI Lifetime Savings: $24,727 to $36,552 for fixed lease vs. $21,166 to $32,991 for escalating lease

agreement entered into between the Green Bank, Eversource Energy, and United Illuminating, and approved by the Public Utility Regulatory Authority;

WHEREAS, pursuant to the Act, the Green Bank has prepared a declining incentive block schedule ("Schedule") that offers direct financial incentives, in the form of the expected performance based buy down ("EPBB") and performance-based incentives ("PBI"), for the purchase or lease of qualifying residential solar photovoltaic systems, respectively; ~~and~~

WHEREAS, pursuant to the Act, to address willingness to pay discrepancies between communities, the Green Bank will provide additional incentive dollars to improve the deployment of residential solar PV in low to moderate income communities; and~~.~~

WHEREAS, the Deployment Committee recommended on July 14, 2015 that the Board approve of the Schedule of Incentives as set forth in Tables 3 and 4 of the memo dated July 10, 2015 with one revision changing the new Low to Moderate Income incentive for Step 9 to "to be determined."

NOW, therefore be it:

RESOLVED, that Board approves of the Schedule of Incentives as set forth in Tables 3 and 4 of the memo dated July 10, 2015 to achieve 90.0 MW of solar PV deployment over FY 2016 – 30.0 MW from Step 8, 30.0 MW from Step 9, and 30.0 from Step 10.

RESOLVED, that per Public Act 15-194, the Board instructs staff to limit approval of direct financial incentives to no more than one hundred megawatts of new qualifying residential solar photovoltaic systems, in the aggregate, between the date of passage of Public Act 15-194 and April 1, 2016.

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

CONNECTICUT GREEN BANK

Memo

To: Board of Directors of the Connecticut Green Bank

From: George Bellas, Dale Hedman, and Kerry O'Neill

Date: July 10, 2015

Re: Residential Solar Investment Program – Assessment of Tax, Administrative and Marketing Implications of Incentive Designation

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Background

On December 19, 2014, the Board of Directors of the Connecticut Green Bank approved of Steps 6 and 7 of the Residential Solar Investment Program (RSIP). As part of the approval, the Board of Directors required per Resolution #7:

> *"…the Board hereby directs Green Bank staff to assess the tax, marketing, and administrative implications of (1) providing a performance incentive upfront (i.e., HOPBI-EPBB), (2) providing a performance incentive over time (i.e., PBI), (3) proving a performance incentive at a future point in time (i.e., all incentive goes directly to the homeowner as opposed to the contractor, and (4) transferring the REC to the homeowner in lieu of the RSIP by the end of the Fiscal Year 2015."*

This memo provides an overview of the assessment of tax, marketing, and administrative implications of the various types of incentives. It seeks to answer the following questions:

- **Taxes** – how do the different incentive mechanisms result in more (or less) value to the customer in terms of the state and federal incentives?
- **Marketing** – what are the challenges to marketing the different incentive mechanisms from the customer and contractor perspective?
- **Administrative** – how does administering different incentive mechanisms increase or decrease the burden on the Connecticut Green Bank?

The three types of incentives currently offered through the RSIP include:

- **EPBB** – paid upfront to the contractor on behalf of the customer to buy down the acquisition cost of a system.
- **HOPBI** – paid to the contractor on behalf of the customer to buy down the acquisition cost of a system once the system has met a 30 day production target.
- **PBI** – paid out quarterly over a 6-year period to a third-party owner.

The three additional incentive-types that are to be analyzed per the Board resolution include:

- **Future Point in Time** – incentive paid to the homeowner at a future point in time, not to the contractor upfront.
- **PBI** – paid out quarterly over a 6-year period to a homeowner.
- **REC Transfer** – homeowner or third-party owner would not receive an incentive through the RSIP, but would instead sell the renewable energy credits (RECs) generated by their system to a competitive supplier or electric distribution company.

The tax, marketing, and administrative implications were analyzed for each of these incentive types.

Tax Implications

Value Proposition of Various RSIP incentives

In assessing the tax implications of the RSIP on the homeowner, we are seeking to maximize the value to the customer in terms of the federal (i.e., Investment Tax Credit) and state (i.e., RSIP incentives) incentives. To determine and compare the value to the customer, the following assumptions were used:

- System Size – 1 kW
- Installed Cost – $4,000/kW
- Capacity Factor – 13%
- System Degradation – 0.5%
- Incentive Level – Proposed Step 8
- Discount Rate – 3.0%
- ITC – 30.0%
- Tax Rates – assumes fixed tax rates over a long period of time

The following chart compares the value to the customer of different incentive types after taxes based upon the CGB's current interpretation of applicable tax codes (see Table 1).

Table 1. Net Present Value to the Customer of Federal and State Incentives after Taxes for 1 kW Solar PV System at Varying Tax Rates for Step 8

Incentive Types	Tax Rates		
	25%	20%	15%
EPBB	$1,548	$1,548	$1,548
PBI – Homeowner	$1,531	$1,555	$1,580
PBI – Corporate[1]	$1,414	$1,430	$1,447
Future Point in Time	$1,547	$1,572	$1,598
REC Transfer[2]	$1,374-$1,632	$1,389-$1,663	$1,403-$1,694

The findings of this tax analysis and the value to the customer indicate the following:

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[1] Assumes corporate tax rates apply to third-party owner

[2] The REC price into the future is assumed to be between the high supply case and the CT IRP analyzed by the Connecticut Green Bank as part of the SHREC policy analysis.

- **Future Potential Value** – developing options for “Future Point in Time” and “REC Transfer” may provide greater value to the customer for federal and state incentives after taxes – especially as the RSIP incentives continue to decline. However income tax implications and the risks of spot market REC prices may dissuade households, not third-party owners, from pursuing either of these options; and

- **Delivering Value** – the RSIP program has done a pretty good job in trying to help the customer maximize the federal and state value after taxes through its existing program design.

Proposed Tax Treatment of 4 Options Presented in Board Resolution

- **Option 1 – EPBB and the HOPBI**

  Currently, based on the CGB’s interpretation of IRC Section 136(a), the CGB does not consider the upfront EPBB and HOPBI payments to the contractor on behalf of the homeowner to be taxable income to the homeowner. As a result, the Step 8 incentive of $540 for the 1 kW system in the example above would be deducted from the installed cost of $4,000 to arrive at an out of pocket cost to the homeowner of $3,460. The homeowner would then calculate the 30% IRC Section 25D Residential Energy Efficient Property credit on $3,460 to arrive at a credit of $1,038 against income tax liability. This assumption is reflected in the EPBB analysis above

  On May 6, 2015 the CGB filed a request with the Internal Revenue Service (IRS) for a Private Letter Ruling (PLR) regarding the CGB’s current tax treatment of the EPBB and HOPBI incentive payments. The rulings requested were as follows:

  1. The amount of the subsidiary provided under both the HOPBI and EPBB subsidiaries is not income to the residential system owner under Section 61 of the Code but constitutes a subsidy (directly or indirectly) by a public utility to a customer for the purchase or installation of an energy conservation measure, and therefore excluded from gross income under Section 136 (a); and

  2. Neither the Green Bank nor a contractor is required to report the value of such subsidy on forms 1096 or 1099 which would otherwise be issued by one of such persons to the residential system owner.

  On June 23, 2015 the IRS requested further information as part of their review of the facts presented in the PLR. We hope to receive a ruling in the next 60 days. Should the IRS rule that the EPBB and HOPBI payments are taxable income to the homeowner, the calculation of the 30% Residential Energy Efficient Property credit would then be based on a cost of $4,000. The increase in the credit available to the homeowner would then be offset by the increased federal and state tax liability on the taxable income.

- **Option 2 – PBI**

  Currently the CGB provides a PBI to commercial entities that own systems and lease them to homeowners. Since the PBI is not a subsidy for the acquisition of the system itself but for the performance of an installed system subsequent to acquisition, the CGB considers these payments taxable income to the commercial entity and issues the entity a Form 1099 for payments made each year. The CGB would consider the issuance of

PBI payments to residential owners of systems in the same light and issue the homeowner a Form 1099 each year a PBI payment is made to the homeowner. In this scenario the homeowner would be eligible for a credit of 30% of the $4,000 out of pocket cost to acquire the system. The homeowner would have a federal and state tax liability at the rate in effect when the PBI is received.

- **Option 3 – Future Point in Time to Homeowner**

  In this scenario the homeowner would receive a payment at a later date not for the acquisition of the system but rather subsequent to acquisition based on some type of system performance metric. As is the case in Option 2 above, the CGB would consider these payments to the homeowner to be taxable income and issue the homeowner a Form 1099 in the year of payment. The homeowner would then have a federal and state tax liability in the year of payment. In the year of acquisition the homeowner would be able to utilize a 30% credit against income tax liability based on their $4,000 out of pocket cost to acquire the system.

- **Option 4 – REC Transfer**

  In this scenario the homeowner, or the contractor on behalf of the homeowner, would not receive any payments from CGB. Thus the homeowner would pay the full cost to acquire the system to the contractor ($4,000) and be eligible to take the 30% credit on the out of pocket acquisition cost of the system. Should the homeowner then sell future RECs generated from the system to a third party, it would be the third party's responsibility to issue the homeowner a Form 1099 in the year RECs are sold by the homeowner. CGB would not have any tax reporting responsibilities.

In summary, once the CGB receives the PLR ruling from the IRS we will engage our outside tax counsel to prepare a tax memorandum summarizing the tax treatments discussed above for presentation to the Committee.

Marketing Implications

The market for solar purchases has been shrinking in the last two years as the third party ownership has come to dominate the Connecticut market. In 2015, just over 20% of approved systems were purchase, as oppose to third-party ownership. The majority of system purchases are being sold by the mid-size and small independent installers. The Green Bank worked hard over the past two years to transition this group to become comfortable including loan options in their sales materials, and this bore fruit in the success of the CT Solar Loan with Sungage Financial and the Smart-E Loan. The GoSolarCT.com website has become the trusted source in the market for all the information a customer needs to go solar, including financing options. This could be a resource to customers and installers if a change were to be made in how the incentive for purchases was delivered to the market.

Below is a summary of the marketing implications of each of the incentive types:

- **EPBB** – no change to current practices for purchase model, the installer is gearing the sale towards the system cost after the state incentive (out of pocket at purchase) and the cost after the federal tax incentive is realized, and will usually present loan options that show the economics to the homeowner initially, and after the federal tax incentive is realized;

- **PBI** – this approach would require the customer to come out of pocket with cash or to finance the value of the PBI on day one so the installer could be paid; it would also require the customer to claim income from the PBI on several years of tax returns (for the duration of PBI payments); savvier installers would likely adjust their sales materials to reflect this change in the homeowner's cash flows, but less sophisticated installers would likely simply focus the sale on what they need to be paid to install the system and ignore the PBI value although the Green Bank could provide the market with some tools to assist in the sales process;

- **Future Point in Time** – this approach would require the customer to come out of pocket with cash or to finance the value of the future incentive on day one so the installer could be paid; it would also require the customer to claim income from the incentive on their tax; this option would be easier for installers to communicate to customers than the PBI, since it is only one future payment; the Green Bank could provide the market with some tools to assist in the sales process; and

- **Transfer of REC** – in this approach ideally the installer would take on the REC monetization process on behalf of the homeowner and adjust their system cost based on their estimated future REC revenues; it is possible that a few dedicated and savvy homeowners would take on this process themselves; alternatively we could see a third party enter the market to provide this service and offer homeowners an upfront payment; since other states in the region utilize a model like this, it should be possible to work with installers to develop appropriate sales tools to explain this to homeowners.

Given the uncertainty with the federal tax credit and the declining portion of the market that is purchase as opposed to third party ownership, this would be a difficult time to introduce a change in the purchase incentive. We expect the solar purchase market to slow down significantly by the middle of 2016 as it awaits resolution at the federal level. It is possible that a change now in how purchase incentives are handled could have a negative impact on the purchase market immediately, until 2017.

Administrative Implications

The residential solar PV incentive program administered by both the Connecticut Clean Energy Fund (from 2005 through 2011) and the Connecticut Green Bank (from 2012 through the present) has improved over the years. EPBB and PBI incentive administration have become the standard for the program – undergoing several process improvements to keep the time to incentive approval by staff as constant as possible in spite of growing demand. Consideration for the inclusion of paying out the incentive at a future point in time, or not paying out an incentive at all but instead transferring the REC in lieu of the incentive, offer different administrative challenges.

Here is a breakdown of the administrative implications of each of the incentive types:

- **EPBB** – one-time payment to the contractor upfront (Normal);

- **PBI** – 24 time payment over 6-years based on performance (Harder);

- **Future Point in Time** – one-time payment to the household at a future point in time may also require that the Connecticut Green Bank issue a 1099 Form to the household (Harder); and

- **Transfer of REC** – no payments or administration at all from the contractor or the customer to the Connecticut Green Bank (Easier).

The Connecticut Green Bank has been implementing lean practices for continuous process improvement to ensure efficient administration of the RSIP. The opportunity to transition the RSIP to the Class I RPS and REC markets represents a mid-term opportunity. The SHREC policy is the bridge between the RSIP and the Class I RPS market. Following the achievement of 300 MW of residential solar PV through the RSIP, the transfer of the REC option will be the future for residential solar PV in Connecticut.

Summary

In assessing the tax, marketing and administrative implications of the different incentive types under the RSIP shows the following results (see Table 2).

Table 2. Incentive Type and Implications on Taxes, Marketing, and Administration

Incentive Type	Tax Implications	Marketing Implications	Administrative Implications
EPBB	Normal	Normal	Normal
PBI	Normal	Harder	Harder
Future Point in Time	Slightly More[3]	Harder	Harder
Transfer REC	Slightly More[4]	Harder	Easier

This analysis points out the following take-away messages for consideration by the Board and Staff to further improve the RSIP:

- **Additional Incentive Options** – providing the additional options for accessing the RSIP incentive through the "Future Point in Time" to the customer and "Transfer of the REC" in lieu of the RSIP incentive should be considered because they provide an opportunity for potentially more value to the customer and reduced administrative costs;

- **Broad Communications** – beginning to communicate to contractors and customers the equivalent REC value – or $ per kWh – of the RSIP incentive over a 15-year period will help orient these stakeholders to the future market;

- **Direct Communications** – initiating direct communications with third-party ownership installers (e.g., Solar City) about the opportunity to monetize the REC given the state or regional RPS markets in lieu of the RSIP incentive; and

- **On Bill Delivery of REC Value** – working to provide an option to pay the customer the value of the REC through their utility bill either through the on bill financing program in development or other mechanism.

[3] For lower tax rates
[4] Depending upon future REC prices, the value of future RECs may be more than the upfront RSIP incentive