CONNECTICUT GREEN BANK SM

Board of Directors

Meeting Date

February 22, 2019

CONNECTICUT
GREEN BANK

Board of Directors

Mary Sotos

Deputy Commissioner of Energy,

DEEP

Binu Chandy

Deputy Director,

DECD

Betsy Crum

Former Executive Director, Women's Housing Institute

Shawn Wooden

Treasurer, State of Connecticut

Thomas M. Flynn

Managing Member, Coral Drive Partners LLC

Matthew Ranelli, Secretary

Partner, Shipman & Goodwin LLP

Eric Brown

Senior Counsel, CT Business & Industry Association

Kevin Walsh

GE Energy Financial Services' Power and Renewable Energy

John Harrity

President, Connecticut State Council of Machinists

845 Brook Street, Rocky Hill, CT 06067
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CONNECTICUT
GREEN BANK

February 15, 2019

Dear Board of Directors:

We have our first regularly scheduled meeting of the Board of Directors for 2019 next week Friday, February 22, 2019 from 9:00-11:00 a.m. in the Colonel Albert Pope Board Room of the Green Bank at 845 Brook Street, Rocky Hill, CT 06067.

On the agenda we have the following items:

- **Consent Agenda** – approval of the meeting minutes for December 14, 2018 and Position Description for Director of Infrastructure Programs. As we continue to work through various transitions with senior staff retirements (i.e., George Bellas and Dale Hedman), I have promoted Selya Price to this position. Also, to be included will be our financial statements through December of 2018, which will be sent out by COB on Wednesday, February 20, 2019.

- **Cash Flow Update** – we will discuss the status of our cash position. These statements will be sent out by COB on Wednesday, February 20, 2019.

- **Governance** – given the Gubernatorial transitions, and the loss of Commissioner Smith and Commissioner Klee, we have new member(s) to the Board of Directors. Mary Sotos, Deputy Commissioner of DEEP, has been designated to the Board of Directors by Commissioner Katie Dykes.

- **Incentive Business** – we will provide an update on the SHREC securitization, as well as an update on the RSIP program, including public policy. As part of the RSIP update, we wanted to share some data with you in regard to reaching minority populations. A memo will be sent out by COB on Wednesday, February 20, 2019 on that.

- **Investment Business** – we have a C-PACE transaction and an update on the various FuelCell Energy projects. The C-PACE transaction detail will be sent out by COB on Wednesday, February 20, 2019.

- **Other Business** – I will provide an update on the strategic retreat we held at the Pocantico Conference Center of the Rockefeller Brothers Fund, and we can take-up other business as appropriate.

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. Have a great weekend!

Sincerely,

Bryan Garcia
President and CEO

AGENDA

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

Friday, February 22, 2019
9:00-11:00 a.m.

Staff Invited: Craig Connolly, Mackey Dykes, Brian Farnen, Bryan Garcia, Bert Hunter, Jane Murphy, Selya Price, Eric Shrago, and Kim Stevenson

1. Call to order

2. Public Comments – 5 minutes

3. Consent Agenda – 5 minutes

4. Cash Flow Update of the Connecticut Green Bank – 15 minutes

5. Governance – 5 minutes

    a. Welcome to New Member(s)
    b. Election of Vice Chair

6. Incentive Business Updates and Recommendations – 45 minutes

    a. SHREC Update
    b. RSIP Update – Program and Policy

7. Investment Business Updates and Recommendations – 15 minutes

    a. C-PACE Transaction – Fairfield
    b. FuelCell Energy Project Financings (Updates)

8. Other Business – 30 minutes

    a. Strategic Retreat (Update)
    b. Other Business

9. Adjourn

Next Regular Meeting: Friday, April 26, 2019 from 9:00 -11:00 a.m.
Connecticut Green Bank, 845 Brook Street, Rocky Hill, CT

RESOLUTIONS

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

Friday, February 22, 2019
9:00-11:00 a.m.

Staff Invited: Craig Connolly, Mackey Dykes, Brian Farnen, Bryan Garcia, Bert Hunter, Jane Murphy, Selya Price, Eric Shrago, and Kim Stevenson

1. Call to order

2. Public Comments – 5 minutes

3. Consent Agenda – 5 minutes

Resolution #1

Motion to approve the meeting minutes of the Board of Directors for December 14, 2018

Resolution #2

Motion to approve the position descriptions for Director of Infrastructure Programs

4. Cash Flow Update of the Connecticut Green Bank – 15 minutes

5. Governance – 5 minutes

   a. Welcome to New Member(s)
   b. Election of Vice Chair

Resolution #3

Motion to elect a Director to serve as the Vice Chairperson of the Board of Directors pursuant to the Connecticut Green Bank bylaws.

6. Incentive Business Updates and Recommendations – 45 minutes

   a. SHREC Update
   b. RSIP Update – Program and Policy

7. Investment Business Updates and Recommendations – 15 minutes

a. C-PACE Transaction – Fairfield

Resolution #4

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 **$645,286** construction and (potentially) term loan under the C-PACE program to 1305 Post Road, LLC., the building owner of 1305 Post Road, Fairfield, 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 Committee dated February 20, 2019, 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 affect the above-mentioned legal instruments.

b. FuelCell Energy Project Financings (Updates)

8. Other Business – 30 minutes

a. Strategic Retreat (Update)
b. Other Business

9. Adjourn

Next Regular Meeting: Friday, April 26, 2019 from 9:00 -11:00 a.m.
Connecticut Green Bank, 845 Brook Street, Rocky Hill, CT

CONNECTICUT GREEN BANK SM

Board of Directors Meeting

February 22, 2019

Colonel Albert Pope Board Room

Board of Directors

Agenda Item #1

Call to Order

Board of Directors

Agenda Item #2

Public Comments

CONNECTICUT GREEN BANK

Board of Directors

Agenda Item #3

Consent Agenda

Consent Agenda

Resolutions 1 and 2

1. **Meeting Minutes** – approval of the meeting minutes of December 14, 2018

2. **Position Description** – approval of position description for Director of Infrastructure Programs

- **Financial Statements** – through December 2018

Board of Directors

Agenda Item #4

Cash Flow Update

Cash Flow Update

- No material change since December Report
- We expect the securitization to close by late March
- The major “use” (portfolio re-acquisition) is tied to securitization timing (so nil effect on cash)
- Working Capital Line ($5m) to be closed in April

Cash Flow Update

CONNECTICUT GREEN BANK

January 2019 BoD

Investment and Incentive Segments Combined

Cash on hand at end of month (000's):	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Projected	Projected	Projected	Projected	Projected
	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Investment Segment	$ 16,495.0	$ 16,234.6	$ 17,562.9	$ 18,784.5	$ 20,598.0	$ 26,112.9	$ 12,973.9	$ 12,684.8	$ 14,388.1	$ 19,391.0	$ 20,393.4	$ 20,561.1	$ 2,003.1
Incentive Segment	$ (5,484.9)	$ (7,527.7)	$ (2,746.5)	$ (3,343.2)	$ (6,593.0)	$ (678.3)	$ 3,600.5	$ (203.0)	$ 554.0	$ 3,520.8	$ 2,743.8	$ 2,845.1	$ 1,927.0
Combined	$ 11,010.1	$ 8,706.9	$ 14,816.5	$ 15,441.3	$ 14,005.0	$ 25,434.5	$ 16,574.4	$ 12,481.8	$ 14,942.1	$ 22,911.8	$ 23,137.2	$ 23,406.2	$ 3,930.2

December 2018 BoD

Investment and Incentive Segments Combined

Cash on hand at end of month (000's):	Actual	Actual	Actual	Actual	Actual	Actual	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
Investment Segment	$ 16,495.0	$ 16,234.6	$ 17,562.9	$ 18,784.5	$ 20,598.0	$ 26,112.9	$ 8,473.0	$ 8,726.5	$ 16,335.9	$ 18,978.3	$ 19,735.0	$ 19,076.8	$ 1,539.8
Incentive Segment	$ (5,484.9)	$ (7,527.7)	$ (2,746.5)	$ (3,343.2)	$ (6,593.0)	$ (678.3)	$ 902.2	$ 262.3	$ (68.6)	$ 4,331.6	$ 3,697.3	$ 2,279.2	$ 3,198.6
Combined	$ 11,010.1	$ 8,706.9	$ 14,816.5	$ 15,441.3	$ 14,005.0	$ 25,434.5	$ 9,375.2	$ 8,988.7	$ 16,267.3	$ 23,310.0	$ 23,432.3	$ 21,356.0	$ 4,738.4

CONNECTICUT GREEN BANK

Board of Directors

Agenda Item #5

Governance

Welcome New Member(s)
Board of Directors

Shawn Wooden
Connecticut Treasurer
(Represented by Bettina Bronisz)

Mary Sotos
Deputy Commissioner of Energy
(Designee of DEEP Commissioner)

Board of Directors

Agenda Item #6a

Incentive Business Updates and Recommendations

SHREC Update

SHREC
Update

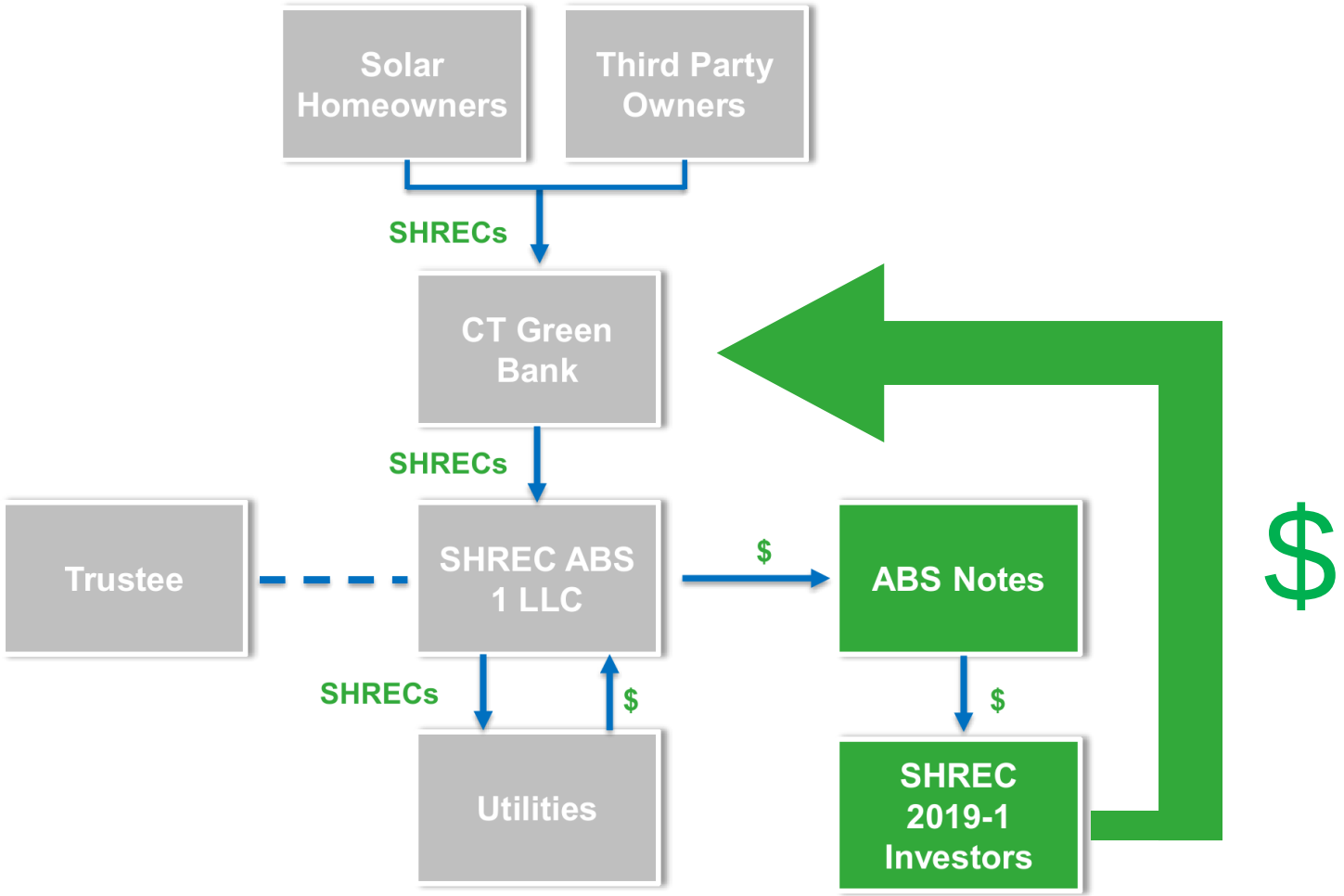
- **Structure** - RBC provided structure options that maximize the value of the issuance (i.e. maximize funds we will receive at a reasonable interest, market-appropriate interest rate)
- **Rating Agency** – Kroll is reviewing the structure options and will provide feedback on the rating for the transaction in the last week of Feb / first week of March
  - Confident of investment grade rating for majority 'tranche' of the issuance
  - Examining credit rating "trade-offs"
- **Investor discussions** – Finance team members are meeting 9 interested investors (asset managers, institutional investors, insurance companies & hedge funds) in last week of Feb at industry conference
- **Timeline:**
  - **Aiming to finalize pricing in first week of March**
  - **Aiming to close transaction by end of March**

SHREC

Update - 2

SHREC 2019-1

Transaction Diagram

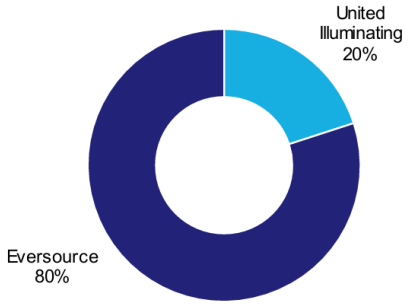


SHREC
Update - 3

SHREC 2019-1
Opportunity

Investment Grade Utility Payers

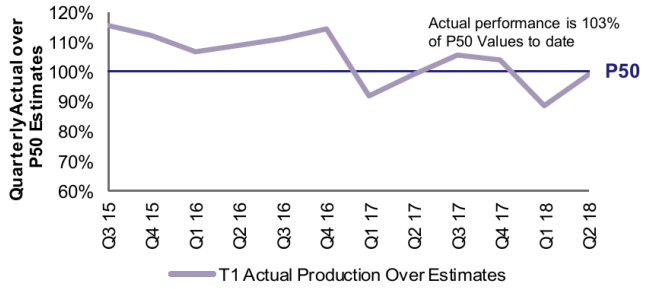
- Unlike other solar ABS transactions which rely on consumers to make payments on loans/leases, SHREC 2019-1 receives payments from Connecticut's two IG rated utilities
- Eversource (A3/A+) and United Illuminating (Baa1/A-) purchase 80% and 20% of the SHRECs generated, respectively



Strong Historical Performance

- Quarterly vintages continue to exhibit strong performance relative to P50 estimates
- Tranche 1 has exceeded P50 estimates, while Tranche 2 performance is stabilizing as the underlying systems mature

Tranche 1 Actual over Estimated Production

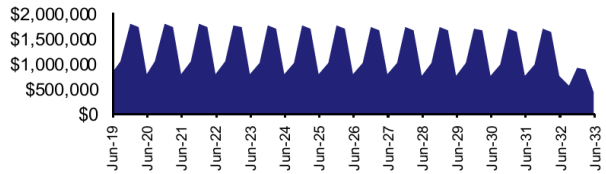


Note: Systems younger than 6 months excluded

Fixed Price for SHRECs

- The purchase price of a SHREC is set by the MPA and is fixed over the 15 year life of each tranche
- SHRECs generated by Tranche 1 systems are purchased at $50/SHREC while Tranche 2 are purchased at $49/SHREC

Tranche 1 and Tranche 2 Projected Cash Flow



Robust Transaction Structure

- SHREC 2019-1 Kroll-rated senior-subordinated structure has been optimized for the current market and includes investor-friendly features
  - DSCR Early Amortization Event trigger results in an acceleration if production is lower than expected
  - DSCR Sequential Interest Amortization Event trigger provides extra protection for the Class A
  - Liquidity Reserve covers 6 months of interest

Board of Directors

Agenda Item #6b

Incentive Business Updates and Recommendations

RSIP Update – Program and Policy

RSIP

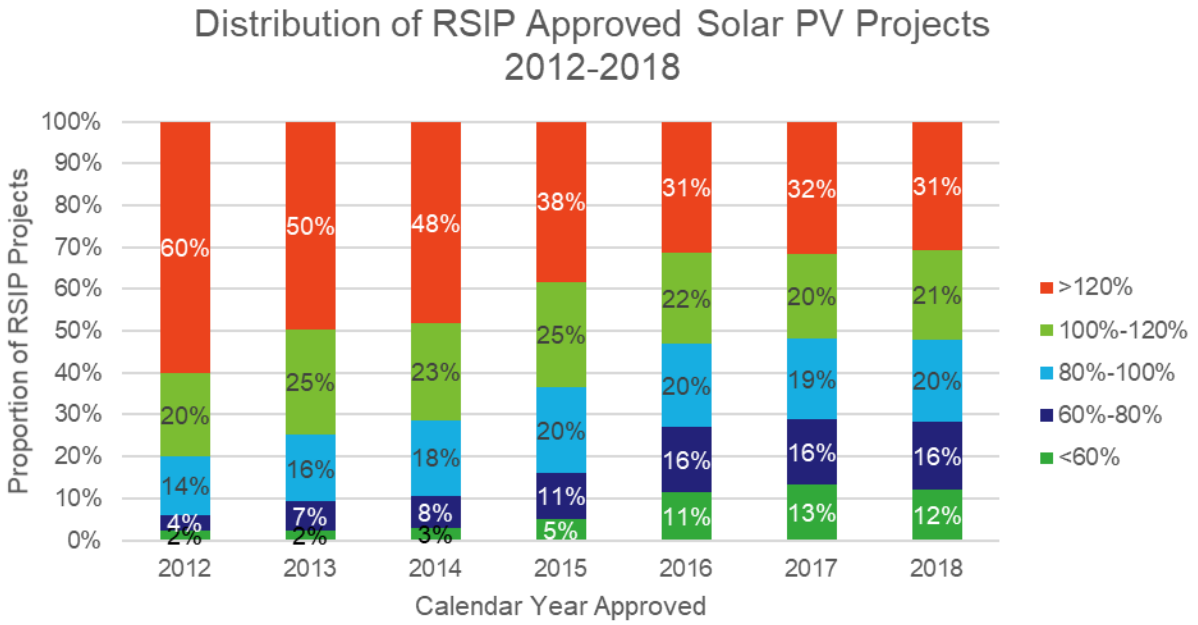
Minority Progress Update

- Feb 2019 analysis of RSIP performance in reaching LMI households
- Looked at distribution of minority populations in CT by census tract and compared to RSIP

The analysis shows that the RSIP and in particular, the *Solar for All* Program, has been effective at reaching minority communities, and in some instances penetration in minority communities outperforms penetration in white neighborhoods.

RSIP Continues Progress Reaching LMI Communities

Census Tract Income Level (AMI)	# Projects	Total Owner-Occupied 1-4 Unit Homes	Percent of Homes with Solar
<60%	2,285	61,818	3.7%
60%-80%	3,635	93,965	3.9%
80%-100%	6,313	172,275	3.7%
100%-120%	8,363	220,022	3.8%
>120%	10,187	332,800	3.1%
Grand Total	30,783	880,880	3.5%



National study shows disparities in solar adoption when considering race and ethnicity

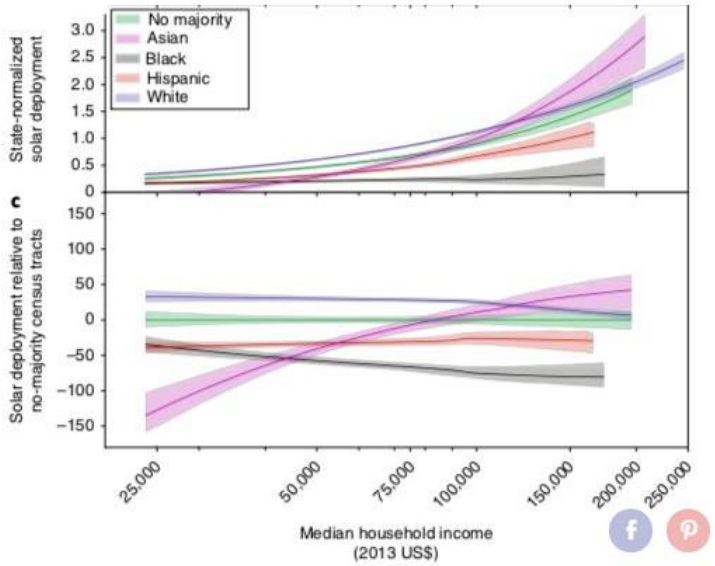
RESIDENTIAL SOLAR

Report Finds Wide Racial and Ethnic Disparities in Rooftop Solar Installations

New research underscores that the rooftop solar industry has environmental justice issues to consider.

EMMA FOEHRINGER MERCHANT | JANUARY 14, 2019

Would RSIP progress in reaching LMI communities translate to minority households?



Source: Nature Sustainability

Race/Ethnicity – Distribution of Population and Owner Occupied Homes

CONNECTICUT GREEN BANK

- Census tracts were categorized by the percent of the population that identified as a certain race or ethnicity

	Number of Census Tracts	Total Population	Percent of Population
Majority Hispanic	55	178,863	5.0%
Majority Black	26	97,565	2.7%
Majority White	633	2,816,730	78.8%
No Majority Race	114	480,939	13.5%
Grand Total	828	3,574,097	100%

	Number of Owner-Occupied 1-4 Unit Homes	Percent of all Owner-Occupied 1-4 Unit Homes
Majority Hispanic	14,568	1.7%
Majority Black	13,953	1.6%
Majority White	787,514	89.4%
No Majority Race	64,845	7.4%
Grand Total	880,880	100%

Race/Ethnicity – Distribution compared to RSIP

- RSIP Distribution **on par or exceeds** distribution of OOH in minority census tracts, **inclusive of income**

	Percent of 1-4 Unit Owner-Occupied Homes	Percent of RSIP Projects
Majority Hispanic	1.7%	1.6%
Majority Black	1.6%	2.2%
Majority White	89.4%	85.6%
No Majority Race	7.4%	10.6%
Grand Total	100%	100%

Income Band (% of AMI)	Majority Hispanic		Majority Black		Majority White		No Majority Race	
	% of OO Homes	% of RSIP	% of OO Homes	% of RSIP	% of OO Homes	% of RSIP	% of OO Homes	% of RSIP
<60%	19.67%	16.89%	7.61%	8.93%	23.05%	15.54%	49.68%	58.64%
60%-80%	1.27%	1.51%	6.01%	7.32%	69.27%	57.91%	23.44%	33.26%
80%-100%	0.70%	0.81%	1.38%	2.22%	95.36%	93.76%	2.56%	3.22%
100%-120%	--	--	0.55%	0.85%	96.57%	93.84%	2.88%	5.31%
>120%	--	--	--	--	99.59%	99.37%	0.41%	0.63%
Grand Total	**1.65%**	**1.60%**	**1.58%**	**2.21%**	**89.40%**	**85.60%**	**7.36%**	**10.59%**

Solar for All outperforms RSIP

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- The Solar for All Partnership with PosiGen shows even stronger penetration in minority communities

	Percent of 1-4 Unit Owner-Occupied Homes in Connecticut	Percent of Solar for All PosiGen Projects
Majority Hispanic	1.7%	6.6%
Majority Black	1.6%	8.3%
Majority White	89.4%	46.4%
No Majority Race	7.4%	38.7%
Grand Total	**100.0%**	**100.0%**

Income Band (% of AMI)	Majority Hispanic		Majority Black		Majority White		No Majority Race	
	% of OO Homes	% of Projects	% of OO Homes	% of Projects	% of OO Homes	% of Projects	% of OO Homes	% of Projects
<60%	19.7%	17.26%	7.6%	12.65%	23.0%	3.57%	49.7%	66.52%
60%-80%	1.3%	2.41%	6.0%	13.08%	69.3%	35.61%	23.4%	48.89%
80%-100%	0.7%	1.44%	1.4%	3.16%	95.4%	91.67%	2.6%	3.74%
100%-120%	0.0%	0.00%	0.6%	2.36%	96.6%	74.75%	2.9%	22.90%
>120%	0.0%	0.00%	0.0%	0.00%	99.6%	94.71%	0.4%	5.29%
Grand Total	**1.7%**	**6.58%**	**1.6%**	**8.31%**	**89.4%**	**46.44%**	**7.4%**	**1.7%**

RSIP vs *Solar for All* – installations per owner-occupied home

	% RSIP Installations	% SFA Installations	RSIP Installs per OOH	SFA installs per OOH	RSIP % Increase/Decrease from installs per OOH in white-majority tracts	SFA % Increase/Decrease from installs per OOH in white-majority tracts
Majority Hispanic	1.60%	6.58%	0.0338	0.0091	1%	666%
Majority Black	2.21%	8.31%	0.0488	0.0120	46%	910%
Majority White	85.60%	46.44%	0.0335	0.0012	0%	0%
No Majority Race	10.59%	38.67%	0.0503	0.0121	50%	911%
Grand Total	100.00%	100.00%	0.0349	0.0023	4%	93%

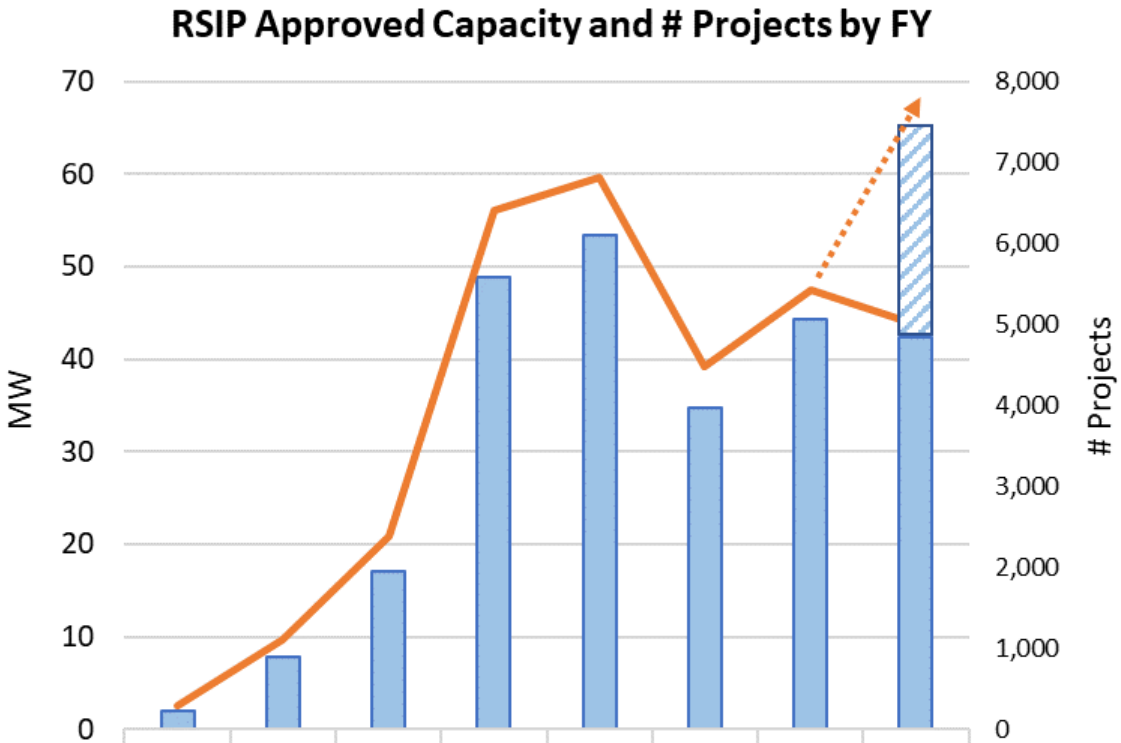
- Overall the RSIP has **46% more installations** per owner-occupied home in **majority black** census tracts, and **50% more installs** in **no majority race** census tracts than majority white tracts
- Overall SFA has **910% more installations** per owner-occupied home in **majority black** census tracts, and **911% more installs** in **no majority race** census tracts, and **666% more installs** in **majority Hispanic** census tracts than majority white tracts

RSIP

Program Progress toward 300 MW (as of 2/18/19)

- **251 MW** or 31,893 projects approved
- 213 MW or 27,477 projects completed

- 42 MW approved in FY19 thus far, 73% of 58 MW (updated from 48 MW)
- Could reach 65+ MW for FY19 based on 5-6 MW/month
- Could reach 300 MW approved by Sept/Oct 2019



	2012	2013	2014	2015	2016	2017	2018	2019
Sum of Final system size (MW)	1.9	7.9	17.1	48.8	53.4	34.8	44.3	42.3
Count of Project Number	288	1,109	2,383	6,401	6,808	4,474	5,434	4,996

RSIP
Policy Update

- As the Green Bank approaches the statutory RSIP target of 300 MW, its focus is to achieve the public policy objective of **fostering the sustained, orderly development of a state-based solar industry**.
- Section 7 of PA 18-50, "An Act Concerning Connecticut's Energy Future," specifies that current net metering policy (compensating solar PV at the avoided retail electricity rate) will end when RSIP ends, to be replaced by two tariff-based options for residential solar PV customers.
  - Green Bank is participating in docket 18-08-33 at the Public Utilities Regulatory Authority (PURA) on design and implementation of Section 7 tariff structure.
  - Because the utilities need more time to prepare metering and billing infrastructure for the tariff options, a transition tariff or policy is needed – for example, this could be net metering without RSIP after 300 MW and until utility infrastructure is ready, or possibly net metering plus an RSIP incentive for LMI projects.
- In the current legislative session, the solar industry and supporters proposed that implementation of Section 7 be paused, net metering continue, RSIP extended to 400 MW, LREC/ZREC extended for 2 years, virtual net metering and shared solar tariff caps be lifted, and a study conducted on value of solar and the best policies for sustained orderly development of the solar industry.

Board of Directors

Agenda Item #7a

Investment Business Updates and Recommendations

C-PACE Transaction - Fairfield

1305 Post Road, Fairfield
Ratepayer Payback

- **$645,286** for a 181.4 kW solar PV system and roof upgrades
- Projected savings are **16,239 MMBtu** versus **$645,286** of ratepayer funds at risk.

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 Fairfield as it collects the C-PACE benefit assessment from the property owner.

1305 Post Road, Fairfield
Terms and Conditions

- **$645,286** construction loan at 5% and term loan set at a fixed 6.25% over the 20-year term
- **$645,286** loan against the property
  - Property valued at **REDACTED**
  - Loan-to-value ratio equals **REDACTED**; Lien-to-value ratio equals **REDACTED**
- DSCR > **REDACTED**

1305 Post Road, Fairfield
The Five W's

- **What?** Receive approval for a $645,286 construction and (potentially) term loans under the C-PACE program to 1305 Post Road, LLC to finance the construction of specified energy upgrade
- **When?** Project to commence 2019
- **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?** 1305 Post Road, LLC, the property owner of 1305 Post Road, Fairfield CT
- **Where?** 1305 Post Road, Fairfield CT

1305 Post Road, Fairfield
Project Tear Sheet

CONNECTICUT GREEN BANK

REDACTED

1305 Post Road, Fairfield
Key Financial Metrics

CONNECTICUT GREEN BANK

REDACTED

Board of Directors

Agenda Item #7b

Investment Business Updates and Recommendations

FuelCell Energy Project Financings

FuelCell Energy
Project Financings

- **Since last board meeting – great progress**
  - **New London Subbase 7.4mw Fuel Cell (FCE)**
    - ~$23m Construction Loan Commitment from 5th 3rd Bank
    - ~$18m Term Loan "take out" Commitment from Liberty Bank & Amalgamated Bank
    - $5m Term Loan (subordinated) Commitment from Green Bank
    - Closing "in days"
  - **Bridgeport FuelCell Park Acquisition financing facility**
    - $25m Term Loan Commitment from Liberty Bank & Amalgamated Bank
    - $6m Term Loan (subordinated) Commitment from Green Bank
    - Closing set for March
  - **Final terms of amortization profile being negotiated**
  - **Might involve some "sculpting" of Green Bank's amortization but with ultimate maturity dates in line with Board approval**

Board of Directors

Agenda Item #8

Other Business

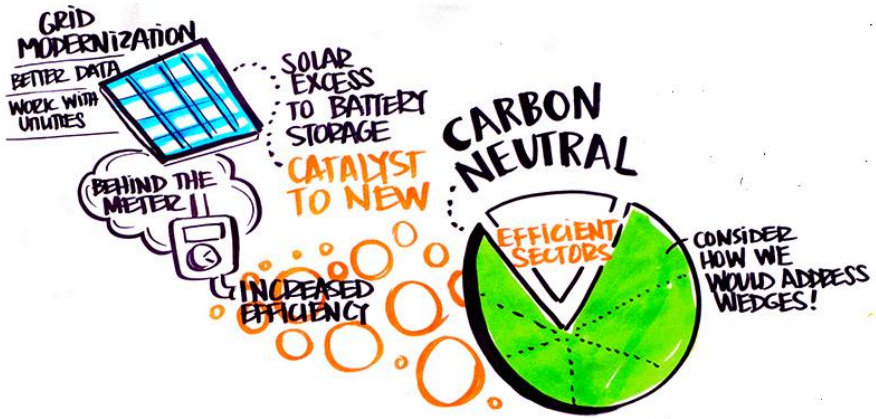
Strategic Retreat
FY 2020 Comprehensive Plan

- **Comprehensive Plan** – existing plan is for FY 2017-FY 2019…next plan focused on increasing scale (i.e., Green Bank 2.0)

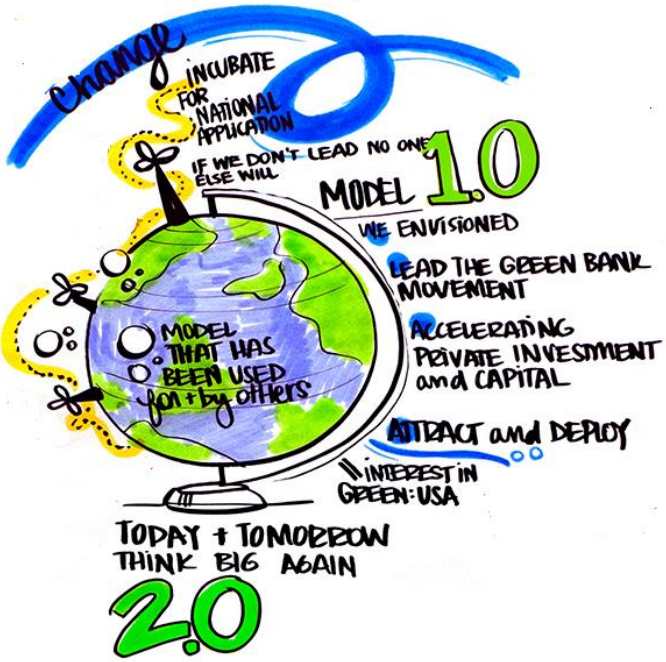
- **Pocantico Conference Center** – held an offsite two-day facilitated (including graphic artist) conference with 28 participants

- **Agenda** – broken down into 5 parts:
  - Welcome, Introductions, and Review
  - Products and Programs (enter, grow, exit)
  - Keynote (inclusive capitalism)
  - Sources of Funding (current and potential)
  - Headlines

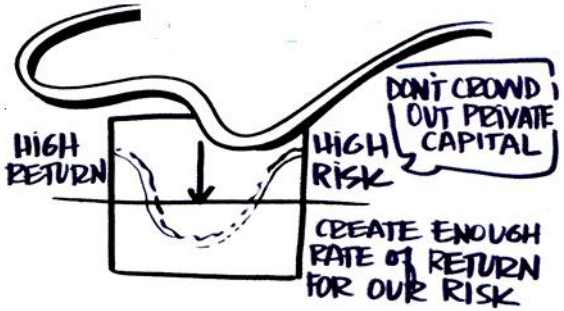
Key Findings
Highlights



Commitment to Address Climate Change



Scale Investment in CT with Impact in CT and Beyond



Pursuit of Financial Sustainability

Recommendations
Draft

- **Bonding** – realize our bonding potential to "scale-up" our impact…"crawl before we walk and then run!"
  - Build the Team
  - Develop a Bond Indenture
  - Issue Bond(s)

- **Investment Strategy** – integrate bonding into strategy, while:
  - Establish portfolio investment targets (e.g., amount, return, risk, maturity, etc.)
  - Establish leverage ratio target, without losing site of financial sustainability
  - Revisit investment criteria to serve as screen for supporting investment strategy

- **Comprehensive Plan** – pursue a Green Bank 2.0 strategy
  - Develop a powerful vision (e.g., "a peaceful and healthy planet for humanity")
  - Use climate change and "wedges" to help structure the plan
  - Get back to community engagement in a "Green Bank" way

Strategic Retreat

Headlines 2030 (Local and Global)

the ct mirror

January 2030

1 Million Connecticut Households become Carbon Neutral as a Result of Green Bank Programs

HARTFORD, CT– It may have taken Connecticut 10 years for **1 million of its households to become carbon neutral**, but its early leadership from **Governor Lamont setting a carbon neutral goal**, **Connecticut General Assembly passing a bipartisan Connecticut Green New Deal**, and the **Connecticut Green Bank making the state an attractive place for investment**, were keys to demonstrating how confronting climate change can be done. In its first loan, the National Green Bank provided Connecticut with $1 billion, which it **leveraged to attract $10 billion of investment in its growing green economy**. This investment, in conjunction with innovative regulatory structures **unlocked access to new technologies modernizing and decarbonizing the grid**, with **low-to-moderate income families leading the way**!

The Economist

January 2030

As a Result of the National Green Bank, the US on Track to Exceed the Paris Agreement

LONDON, UK– The **global efforts to reduce GHG emissions is now being led by the United States**. **Boston Thomas**, President and CEO of the National Green Bank, states "By leveraging public resources to mobilize private investment, the **US is investing $850 per person per year in its green economy**." Thomas, whose **education was funded by his grandparents who purchased mini green bonds issued by Connecticut's Green Bank**, and whose career spans executive roles in the private and public sectors including **titans like Greenworks Lending** and **Inclusive Prosperity Capital**, now leads the international green bank movement.

Comprehensive Plan

Next Steps

- **Memo** – summary memo to be distributed to the Board of Directors (End of February)
- **Meetings** – one-on-one meetings with members of the Board of Directors to solicit their feedback (March and April)
- **Competition** – Aspen Institute to hold international case study competition on the Connecticut Green Bank – soliciting ideas from 25 business schools from around the world (April)
- **Plan and Budget Process** – collect and assemble information into a new Comprehensive Plan structure, including FY 2020 targets and budget (May and June)

Legislative Activity

Concept	Status
Ratepayer fund protection	Multiple bills, Gov. Lamont budget address
Green Bank scope	SB 927 raised 2/21
USDA qualification	Concept raised 2/14
BOD fix	Concept raised 2/14
PA 18-50 Sec. 7	Multiple bills
C-PACE: EVs, SIR change, collections	Unincorporated so far
Property Tax exemption	Unincorporated so far (seeking meeting 2/25)
Tesla direct sales	Seeking positioning from BOD

Board of Directors

Agenda Item #9

Adjourn

Board of Directors of the Connecticut Green Bank Draft Meeting Minutes

Friday, December 14, 2018
9:00 – 11:00 a.m.

A meeting of the Board of Directors of the **Connecticut Green Bank (the "Green Bank")** was held on Friday, December 14, 2018 at the office of the Connecticut Green Bank, 845 Brook Street, Rocky Hill, CT, in the Colonel Albert Pope Board Room.

1. **Call to order**

Chair Catherine Smith called the meeting to order at 9:02 a.m.

Board members participating: Bettina Bronisz, Thomas Flynn (by phone), John Harrity, Rob Klee (by phone), Gina McCarthy, Matt Ranelli, Catherine Smith

Members Absent: Eric Brown, Betsy Crum, Kevin Walsh

Staff Attending: George Bellas, Mackey Dykes, Brian Farnen, Bryan Garcia, Dale Hedman, Bert Hunter, Chris Magalhaes (representing Inclusive Prosperity Capital), Jane Murphy, Selya Price, Eric Shrago, Kim Stevenson, Louise Venables (by phone), and Mike Yu (by phone) and Cheryl Samuels

2. **Public Comments**

Commissioner Smith requested public comments – there were none.

3. **Consent Agenda**

Resolution #1

Motion to approve meeting minutes of the Board of Directors for October 26, 2018 by John Harrity.
2nd by Bettina Bronisz
Motion unanimously approved

4. **Cash Flow Update of the Connecticut Green Bank**

a. Mr. Bellas began by advising the Board that December 2018 is projected to be a fairly significant investment funding month. Scheduled investments include $9.5 million for PosiGen ($4.5 million of which will use IPC funding), approximately $4.0 million for the SBEA program $3.5 million forthe New London Sub Base fuel cell project and some CPACE projects as well.
b. Incoming funds include the final draw down of $5.0 million against the $16 million line of credit SHREC warehouse facility with Webster Bank and Liberty Bank..
c. No significant investment fundings are projected for January and February, however,, March is projected to be an active month. Staff is projecting the closing of the SHREC securitization which will result is approximately $37.0 million in proceeds after closing costs and reserve set asides. $16.5 million of these proceeds will be used to payoff the outstanding SHREC warehouse line of credit and $13.5 million to purchase the Hannon CPACE portfolio.
d. Commissioner Smith asked about cash balances at the end of the current fiscal year. Mr. Bellas indicated the available cash balance is projected to be approximately $4.7 million at end of June, 2019. Ms. Smith voiced concern about cash needed to fund future operations based on this significant decrease in available cash. Mr. Bellas noted that in June 2019 Green Bank must fund its 2nd transfer of $14.0 million to the State general fund as part of the cash sweeps enacted by the legislature to balance the current State budget. This transfer is the primary cause of the decrease in the available cash balance at the end of June.
e. Commissioner Smith asked if cash is not available to both make the $14.0 million transfer and fund near term operations, would we not move forward with the Hannon transaction or extend the repayment terms under the SHREC LOC? Mr. Bellas and Mr. Hunter responded that Green Bank will manage cash flows through a variety of cash raising and cash use deferring mechanisms as appropriate to ensure that adequate cash is available.

5. **Committee Recommendations & Updates**

a. Budget & Operations Committee

- With the B&O Committee recommendations team is making great progress. Solar capacity in the CI&I sector is slow but hope to pick up soon. Ms. Smith asked for additional background? Mr. Dykes explained that the ZREC auction was late this year and results are just coming out and we'll see if projects begin to move forward now.
- Mr. Shrago stated residential side has seen increases and multi-family projects are good as well with increased activity for RSIP. The Committee is recommending an increase in the targets for RSIP for number of projects, capital deployed and capacity.
- Mr. Shrago further spoke about REC's and income and Mr. Garcia voiced that changing REC prices are what keep him up at night with regards to the revenues in the budget. Mr. Garcia explained REC income went down due to lower REC prices than assumed, which is a good thing for consumers because it means the Class I RPS policy is being met at lower costs. With a review of current and potential future REC values, Green Bank team has set a standard price for REC's at what team feels is a good balance for proper budget planning and secured future REC pricing.
- Mr. Shrago went on to say the employee compensation will be adjusted regarding

the CGB overhead which was closer to 90%. Additionally, the delayed transition of staff to IPC added additional costs to Green Bank. These and other expenses outlined are being offset in the proposed budget.

- Ms. Smith shared that Tesla has an additional battery with solar battery storage and Mr. Garcia stated that team and various battery technology providers are working on how to store additional solar power in battery storage.
- Ms. Bronisz asked a question regarding the provision for line loss; what is the % of portfolio for adjustments? Page 16 of the financials details the answer to that question which Mr. Garcia stated is formulaic.
- Mr. Hedman was asked about the cost of meters and the opportunities for that data or energy generation to be used. Although nothing permanent has been established yet, Mr. Hedman stated he is working with utility companies to share meter information to determine how the power grid will relieve solar availability and spoke of battery storage as well.

Resolution #2

Motion to approve the resolution to revised the FY 2019 targets and budget by John Harrity.
2nd by Bettina Bronisz
Motion Unanimously Approved

Resolution #2

WHEREAS, the Connecticut Green Bank Staff has assessed program and product performance, as well as use of resources year to date,

WHEREAS, the Connecticut Green Bank Board of Directors Budget and Operations Committee has reviewed and recommended the approval of these new targets and the proposed revisions to the Fiscal Year 2019 Budget,

NOW, therefore be it:

RESOLVED, the Connecticut Green Bank Board of Directors approves the fiscal year 2019 target and budget adjustments outlined above.

6. **Investment Business Recommendations**

a. FuelCell Energy ("FCE") – Groton Subbase Project

- Mr. Hunter recalled for the Board their approval at the October 2018 Board meeting of a $5 million subordinated term loan for this project. This project entails work by FCE and its subcontractors to install a 7.4 megawatt fuel cell plant to supply electricity to the customers of the Connecticut Municipal Electric Energy Cooperative ("CMEEC") and to provide resiliency for the U.S. Naval Submarine Base at New London. The project will interconnect with Groton Public Utilities and through a separate funding process will establish a microgrid to enhance resiliency for the base. In September, the Governor announced a $5 million state grant to establish the microgrid in order to strengthen storm resiliency and provide energy security. The power is to be supplied to CMEEC by FCE under a 20 year power purchase agreement with construction financing to be provided by Fifth Third Bank and with long term project financing to be provided under a 15-year facility with

funding from Webster Bank and Liberty Bank.

- The proposed $3.5 million construction facility being proposed by staff would fit under the $5 million exposure for Green Bank approved in October and would supplement funding from the construction lender. Contrary to expectations, the construction lender is requiring FCE advance 100% of its equity support for the project prior to advance of construction loans. This leaves a gap of $7 million of FCE. The Green Bank construction facility would absorb half of this gap.
- Mr. Magalhaes of IPC detailed funding initiatives for this future FCE plant. Our construction loan will be collateralized by the pledge of a minimum deposit balance account which would include a deposit account control agreement to ensure coverage.
- For full disclosure, Mr. Farnen noted that there is a scandal involving some management and staff of CMEEC. Those staff have been suspended and interim management has been put in place. The scandal has nothing to do with this project.
- Per Mr. Hunter the utilities of CMEEC have an obligation by contract to pay for the electricity supplied by the fuel cell plant under the PPA and specific performance requirements have to be achieved before payments are issued by the construction lender to ensure job completion. Ms. Smith asked if there were any issue where this would not happen due to bankruptcy of the contractor? Mr. Hunter advised there is contract assurance that job will be completed even in the case of bankruptcy. Mr. Ranelli had a question regarding the funding to which Mr. Magalhaes responded that Green Bank would not have a lien on the assets but will have other collateral and cash collateral requirements. Per Mr. Hunter, the construction lender will have a first priority lien on the project assets, but Green Bank will have a pledge of FCE's ownership interest in the project company and a pledge of cash, but we would not have an interest in the project company assets as these are pledged to the construction lender. Mr. Magalhaes states this is a $45 million project to which funding is necessary from the construction lender for FCE to have funds available for other projects.
- Term Funding to be as follows: $5Mil from Green Bank (subordinated to senior debt), $18Mil of senior debt for a total of $23Mil of debt.
- It was noted that capital gains taxes can be deferred for some time depending on when company may sell the asset.
- Discussion continued with a question from Mr. Ranelli regarding Green Bank exposure; per Mr. Magalhaes $3.5Mil in February 2019 and $5Mil in July 2019. Mr. Ranelli asked who was to hold this cash and can it be held in escrow? The cash will be in an account held by FCE but subject to a deposit account control agreement. Ms. Smith stated FC is currently liquid and solvent and Mr. Harrity stated he has worked with FC in the past and they have a very reliable history. He went on to say that this is a very important project that the U.S. Navy is excited as the project shows a method for future self-sufficiency. Ms. Smith agreed with these sentiments as she was on the phone with the Navy and OEA representatives and they are committed to working on dual projects which are good for Green Bank and the private community.
- Mr. Ranelli asked if there was insurance on the construction phase and liability insurance as well. Mr. Hunter confirmed that policies are in place for all the standard and required insurance necessary for this type of project.

Resolution #3

Motion to approve the FuelCell Energy–Groton Subbase Project by Bettina Bronisz.
2nd by John Harrity
Motion Unanimously Approved

Resolution #3

WHEREAS, FuelCell Energy, Inc., of Danbury, Connecticut ("FCE") has used previously committed funding (the "Bridgeport Loan") from the Connecticut Green Bank ("Green Bank") to successfully develop a 15 megawatt fuel cell facility in Bridgeport, Connecticut (the "Bridgeport Project"), and FCE has operated and maintained the Bridgeport Project without material incident, is current on payments under the Bridgeport Loan, and has received approval from the Green Bank for funding from the Green Bank (the "Triangle Loan") to develop a 3.7 megawatt high efficiency fuel cell project in Danbury, Connecticut (the "Triangle Project");

WHEREAS, FCE has requested financing support from the Green Bank to develop a 7.4 megawatt fuel cell project in Groton, Connecticut located on the U.S. Navy submarine base and supported by a power purchase agreement ("PPA") with the Connecticut Municipal Electric Energy Cooperative ("CMEEC") (the "Project") and the Green Bank Board of Directors (the "Board") approved a $5,000,000 credit facility (the "Term Facility") at its meeting held October, 26, 2018;

WHEREAS, staff has been requested to consider in addition to the Term Facility a $3,500,000 bridge facility (the "Bridge Facility") to be utilized by FCE during the construction of the project, with the Bridge Facility to be repaid from a combination of advances under the Construction Facility from Fifth Third Bank and a full payment corporate-parent guaranty from FCE, and other security as set forth in the memorandum to the Green Bank Board of Directors ("Board") dated December 14, 2018;

WHEREAS, Green Bank staff recommends that the Green Bank Board of Directors ("Board") approve of the Bridge Facility, in an amount not to exceed $3,500,000.

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors hereby approves the Bridge Facility in an amount not to exceed $3,500,000 for the Project, as a ***strategic selection and award*** pursuant to Green Bank Operating Procedures Section XII; and

RESOLVED, that the President of the Green Bank and any other duly authorized officer is authorized to take appropriate actions to provide the Bridge Facility to FCE (or a special purpose entity wholly-owned by FCE) in an amount not to exceed $3,500,000 with terms and conditions consistent with the memorandum submitted to the Board dated December 14, 2018, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 180 days from the date of authorization by the Board of Directors; 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 Bridge Loan.

b. FuelCell Energy – Bridgeport Project
   - Mr. Hunter began by advising that FCE has agreed to purchase this project from Dominion for approximately $36Mil and during negotiations on the Groton Project asked Green Bank to work on funding for the Bridgeport project. Green Bank will be utilizing its current funding of a cash collateral account for the current arrangements and use this $6 million in funding to attract $25 million of senior

loans.

- The Green Bank's current loan payments will start amortizing in about 4 years as interest only payments will be received until about year 2022. With the new loan, amortization will start much sooner. There is less exposure overtime with the proposed loan.
- Mr. Magalhaes reviewed a diagram and comparison of original loan versus refinanced loan. Mr. Ranelli questioned the payback amount to which Mr. Magalaes responded that FCE is the best option for their purchase. Mr. Ranelli asked if Green Bank is potentially crowding out other private investors? Mr. Hunter confirmed there are other options – but not as economic for FCE. The purpose of Green Bank involvement is to mainstream through traditional commercial banks FCE's project financing which prior to this transaction did not seek out traditional commercial bank loans whereby FCE would retain project ownership. Mr. Ranelli asked again if there were other funding options to which Mr. Hunter said no, not if loan was to be worked out by year-end. Ms. Smith did declare that we would exceed our own return on investment; 7-year term of loan but Green Bank would get this investment back sooner.

Resolution #4

Motion to approve the FuelCell Energy–Groton Subbase Project by Bettina Bronisz. 2nd by Rob Klee
Motion Unanimously Approved

Resolution #4

WHEREAS, in early 2008, the Connecticut Clean Energy Fund ("CCEF") released a Request for Proposals in the third round of solicitations for renewable energy projects to participate in statutorily mandated Project 150, an initiative aimed at increasing clean energy supply in Connecticut by at least 150MW of installed capacity and the program is designed to encourage financing of renewable energy projects through the stability of long-term energy purchase agreements for grid-tied projects;

WHEREAS, FuelCell Energy, Inc. ("FCE") submitted a proposal for the 14.9 MW fuel cell project located in Bridgeport, CT (the "Project") in response which, after thorough review, was ultimately selected and ranked by CCEF as the number one project out of the nine projects submitted in the third round;

WHEREAS, CCEF, by Board resolution dated October 27, 2008, approved grant funding for the Project in an amount of $1,550,000 subject to conditions set forth in the Project 150 Program;

WHEREAS, the Connecticut Green Bank ("Green Bank"), by Board resolution dated November 30, 2012, approved loan financing for the Project in an amount not to exceed $5.8 million for the purposes of funding Project development costs and an operational and performance reserve account;

WHEREAS, the Green Bank has maintained its commitment to the growth, development, and commercialization of renewable energy sources and related enterprises, and to stimulate demand for renewable energy and the deployment of renewable energy sources that serve end use customers in Connecticut, including projects that utilize fuel cell technology;

WHEREAS, the Green Bank intends to refinance the original $5.8 million loan approved for the Project (the "Original Use Loan"), which has since increased in principal to $6,026,165 due to capitalized interest, as a subordinate loan secured by all Project assets and cashflows for the purpose of participation in a financing facility that facilities FCE's acquisition of the Project from its current owner (the "Refinanced Loan");

NOW, therefore be it:

RESOLVED, that the Board of Directors hereby approves the conversion of the Original Use Loan to the Refinanced Loan as described in the Project Qualification Memo submitted by the staff to the Board of Directors and dated December 14, 2018 (the "Memorandum") as a Strategic Selection and Award pursuant to the Green Bank Operating Procedures Section XII given the special capabilities, uniqueness, strategic importance, urgency and timeliness, and multi-phase characteristics of the Bridgeport Fuel Cell Project;

RESOLVED, that the Board of Directors authorizes the Green Bank staff to execute definitive documentation based on the terms and conditions set forth in the Memorandum;

RESOLVED, that the Board of Directors' approval is conditioned upon the completion of Green Bank staff's due diligence review, including review and reasonable satisfaction with all relevant project documentation;

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 Refinanced Loan.

c. Small Business Energy Advantage – Purchase Commitment Revision

- Mr. Dykes discussed the recapitalization of the Small Business Energy Advantage (SBEA). After a Request for Proposal (RFP) was released, the Green Bank received the lowest cost solution from Amalgamated Bank with the proposal of Green Bank's $5Mil participation which was approved by the Board at its October 26, 2018 meeting.
- Green Bank staff is currently requesting that Green Bank's participation be raised to $5.6Mil as previously presented to the Board in a December 6, 2018 memo.
- Ms. Smith asked if there is 0% of interest to borrower, does Green Bank now receive interest? Mr. Dykes stated there is a quarterly purchase of loans at a discount to which those purchased by Green Bank would receive interest.
- Mr. Ranelli said the legislature likes this deal and that it should be promoted. Mr. Garcia acknowledged Eric Brown as Chair of the Joint Committee for all of his work on coordinating the deal through the Joint Committee and EEB.

Resolution #5

Motion to approve the SBEA – Purchase Commitment Revision by Matt Ranelli.
2nd by Rob Klee
Motion Unanimously Approved

Resolution #5

WHEREAS, pursuant to Conn. Gen. Stat. Section 16-24n the Connecticut Green Bank ("Green Bank") has a mandate to develop programs to finance clean energy investment for small business, industrial, and municipal customers in the State;

WHEREAS, recapitalizing the Small Business Energy Advantage ("SBEA") program with private sector capital is a recognized priority in the Green Bank's Comprehensive Plan and is a goal of the CT Energy Efficiency Board and Green Bank Joint Committee;

WHEREAS, The Connecticut Light and Power Company d/b/a Eversource Energy and The United Illuminated Company (together, the "Utilities") have requested the Green Bank's assistance sourcing low cost private sector capital;

WHEREAS, the Green Bank released a Request for Proposals for Small Business Energy Advantage Program Alternative Financing Solutions (the "RFP") on May 2, 2018;

WHEREAS, Amalgamated Bank responded to the RFP with a comprehensive and flexible solution offering the lowest cost capital to recapitalize the SBEA program;

WHEREAS, Green Bank staff, together with Utility staff and the EEB, selected Amalgamated's proposal to recapitalize the SBEA program and the Green Bank's Board of Directors (the "Board") approved at its October 26, 2018 meeting Green Bank's

$5,000,000 participation as a subordinated lender in a loan purchase facility proposed by Amalgamated;

WHEREAS, Green Bank staff now recommends that the Green Bank support the recapitalized SBEA Loan Purchase Facility by raising its participation in the loan purchase facility with Amalgamated from $5.0 million previously approved to $5.6 million as set forth in the memorandum submitted to the Board dated December 6, 2018; and

WHEREAS, all other terms and conditions set forth in the memorandum submitted to the Board dated October 26, 2018 remain substantially the same as presented to the board, including the fact that Eversource will continue to make funding available from the Connecticut Energy Efficiency Fund ("CEEF") to reimburse loan losses and administrative costs associated with the recapitalized SBEA program.

NOW, therefore be it:

RESOLVED, that the President of the Green Bank and any other duly authorized officer of the Green Bank, is authorized to execute and deliver agreements with the relevant parties (including but not limited to Amalgamated, the Utilities, and CEEF) to invest in the SBEA Loan Purchase Facility in an amount not to exceed $5.6 million with terms and conditions materially consistent within the memorandums submitted to the Board dated October 26, 2018 as modified by the memorandum dated December 14, 2018, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 270 days from the date of authorization by the Board; and 5

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

7. **Incentive Business Updates and Recommendations**

a. RSIP & SHREC Securitization Update
   - Kroll needs to be provided FICO scores to rate Green Bank's SHREC securitization; the delay in providing that FICO information is resulting in a delay in obtaining the rating. A credit rating agency is working with Green Bank in order to obtain those FICO scores and will visit and take photos at the Rocky Hill office as part of their due diligence. Mr. Klee asked what they hoped to learn about Green Bank with visit and photos. The credit rating agency apparently needs to verify that Green Bank actually, physically exists and that there is a legitimate reason and use of the FICO scores they would provide. This is part of their due diligence to ensure information is used appropriately. Mr. Shrago added that there is a document from the Green Bank's SOC process which should also satisfy the credit rating agency's requirements for due diligence.
   - Ms. Bronisz asked the cost of obtaining these scores? Mike Yu stated the cost is less than expected … at about $4k.
   - Ms. Smith asked if Green Bank could obtain an aggregate figure rather than one score for each household? Mike Yu answered that Green Bank's rating may be affected by an aggregate score. Per Mr. Hunter, this is the only holdup at this time and, although there are other options to secure an "investment grade" rating, such as by using the SCRF (Special Capital Reserve Fund). However, if Green Bank used the SCRF now it would be a crutch for the future and would be hard to get

investors to not expect the benefit of the SCRF.

- Mr. Yu feels optimistic of transaction and relationship with the credit rating agency. Once Kroll receives the FICO scores, he feels they should be able to move forward. It will be about 6-8 weeks to produce the legal documents necessary to which Feb/Mar is the timeline where Green Bank may be able to receive funds.

b. Electric Efficiency Partners (EEP) Program – Battery Storage Proposal

- Mr. Garcia presented the review of Residential Solar PV; how much solar is being produced and how much energy is being used, when, and, how much energy is being produced (in off-peak times) so it can be stored in batteries for use in high-peak times—per household. Challenge by state statute is a 2:1 payback ratio with a cost-effective test in order to pay for incentives.
- Referring to the slide which defines the source of resources which incentivizes involvement. Statute notes that projects receiving funding from Conservation and Load Management Fund are ineligible to receive funding through the EEP Program. Regarding financing, CDA-CI was named in statute so it can be utilized for funding and an application to PURA must be submitted for approval of involvement. Green Bank is in discussions with CDA-CI on potential future financing program.
- Mr. Garcia shared that Green Bank is working with battery storage partners to determine how they can contribute and come in to CT with their work and offerings. The goals being to reduce no less than 30 MW of summer and winter peak through a combination of residential solar PV and battery storage while supporting the sustained orderly development of a local state-based industry. Ms. Price contributed that PV energy is getting issued to the grid and that it is currently being used by other customers but during the day which is not as valuable as in peak times—utilities using grid as a 'battery' per se. Referring to use of chart; where battery is getting storage of energy and showing battery usage at another time. Also a percentage of solar energy in the battery is being stored for bad weather in case of grid going down. Ms. Price went on to say that team is working on figuring out techniques to give clients use so they can control meter usage. Ms. Smith discussed her Solar PV system. Mr. Garcia reminded everyone of prior 'brown-outs' in hot summer months a decade ago, but that now-a-days with all the behind-the-meter solar PV during peak times that solar energy is lowering prices for all consumers. All agree that VT is making strides in grid control and green initiatives.
- Mr. Garcia said team has reviewed the follow-up and the next steps in the timeline. Next week Green Bank will file a Tech Application. Mr. Harrity responded that this is a great step forward for resiliency and that there is a big buzz on batteries in the Transition Team for Governor-elect Lamont, but that they thought study needed to be made first, which clearly isn't the case with the Green Bank proposal. Mr. Ranelli stated that another Board of which he is a member has emergency medical equipment notifications with related utilities and he asked if same can be added to the PURA application. Mr. Garcia stated he would investigate adding that and Ms. Smith added "Great!"

8. **Other Business**

a. Line of Credit

- Ms. Venables presented the revolving credit with Union Savings Bank was originally approved by the Board but did not work out so a RFP was issued again

and team found Amalgamated Bank. Proposal includes a $5Mil max, two interest rates (4.3% fixed and 1.6% variable daily rate), up front fee of $20k with 0.2% on unused portion, 2 draws/month and collateral as outlined. DSCR – tested quarterly and bank is ready to work with Green Bank now.

- Mr. Hunter shared that this is the first time Green Bank is working with an institutional Line of Credit (LOC) as excess cash reserves were previously used as LOC. Process and procedures were planned, developed and reviewed and will be implemented before the draws are utilized. This LOC and SHREC line are current funding.
- Ms. Smith asked if the Board would be notified as part of the procedures of taking a draw from LOC or needing approval from the Board for a LOC draw? Per Mr. Farnen, Board can outline or determine that authority - for one example, anything over $100k could require additional Board approval when the which Ms. Smith confirms putting limits on funding usage might be a good idea to which Mr. Ranelli agreed. Ms. Bronisz indicated trust in staff for making funding decisions with a possible monthly review by the Board of LOC draws. Mr. Hunter also shared that re-authorization of continuing the LOC would be required by the Board after a year. Mr. Farnen also pointed out that further authorization would need to be obtained due to the SHREC related credit facility with Webster.
- Ms. Bronisz voiced surprise that write-up for RFP's was on website only and asked if team could expand notices to the Hartford Courant where Green Bank may have received a larger response? Ms. Venables confirmed they reached out to at least 10 institutions that responded to the RFP and there were 4 interested and 2 bids received. Ms. Bronisz confirmed there are other websites available to post RFP's and Mr. Shrago asked this information be provided for team to utilize in the future. Ms. Bronisz also recommended to include adding a stipulation for a cap on legal fees as part of RFP submission/review. Ms. Smith asked that Ms. Venables take note of this information for future RFP requests.

Resolution #6

Motion to approve the Line of Credit with Amalgamated Bank by John Harrity.
2nd by Bettina Bronisz
Motion Unanimously Approved

Resolution #6

WHEREAS, Connecticut Green Bank ("Green Bank") staff has submitted to the Green Bank Board of Directors ("Board") a proposal for Green Bank to enter into an agreement with Amalgamated Bank ("Amalgamated") for a $5,000,000 secured revolving line of credit ("Revolving Credit Facility") whereby the Revolving Credit Facility would be used in order to meet the Green Bank's short-term liquidity and working capital needs; and

WHEREAS, the selection of Amalgamated as the provider of the Revolving Credit Facility follows the completion of a Request for Proposals ("RFP") process in accordance with Green Bank operating procedures that closed October 19, 2018;

WHEREAS, along with a general repayment obligation by the Green Bank, Amalgamated would be secured by a first priority security interest in, and an absolute assignment of all cash flows associated with, the CT Solar Lease 1 Notes portfolio (the "Collateral"); and

WHEREAS, Green Bank staff recommends that the Board approve the proposed Revolving Credit Facility, generally in accordance with memorandum summarizing the Revolving Credit Facility and the terms of the summary term sheet, both presented to the Board on December 14, 2018.

NOW, therefore be it:

RESOLVED, that the Board approves Green Bank to enter into the Revolving Credit Facility with Amalgamated and approves of Amalgamated as a competitive selection to be the sole source provider of the Revolving Credit Facility; and

RESOLVED, that the President, Chief Investment Officer and General Counsel of Green Bank; and any other duly authorized officer of Green Bank, is authorized to execute and deliver on behalf of Green Bank any of the definitive agreements related to the Revolving Credit Facility and any other agreement, contract, legal instrument or document as he or she shall deem necessary or appropriate and in the interests of Green Bank and the ratepayers in order to carry out the intent and accomplish the purpose of the foregoing resolutions.

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

b. Strategic Planning for FY 2020 & Beyond
   - Mr. Garcia presented a look back at a 2011 retreat and comments that employees made at that time as to expectations and what Green Bank would look like in 2020. Several humorous comments were shared and Mr. Garcia pointed out that there has been a dramatic shift in Green Bank since then and many employee changes as well.
   - Mr. Garcia asked Board and employees to 'save the date' of February 6-7, 2019 for the next off-site retreat to reflect on transitions and the future.

c. Farewells and New Beginnings
   - It was announced that Ms. Gina McCarthy will be resigning from the Board of Directors on January 8, 2019, the same day as the last day of Governor Malloy's time as the Governor of Connecticut.
   - It was further announced that there will be two employee retirees in early 2019; Mr. Dale Hedman and Mr. George Bellas. Mr. Hedman will remain employed about 2-days a week with Ms. Selya Price stepping in to new role. Mr. Bellas will also be in office about 2-days a week come February with Ms. Jane Murphy stepping in to new role. As respected and admired employees of Green Bank, all voiced hope that these individuals would permit Green Bank to call on them for advice and support in the future.
   - Mr. Bellas spoke about joining first CEFIA back in 1975 and transitioning to Green Bank. He thanked the Board for all his years with Green Bank.
   - Mr. Hedman shared Mr. Bellas' sentiment with "Ditto".
   - Ms. McCarthy shared that Bryan [Garcia] has such a good attitude in his leadership, has taken on risks that have benefited Green Bank and has created a strong and positive staff at Green Bank. She went on to say that Ms. Smith is a terrific fiduciary with attention to the {necessary} details. She gave "thanks for

letting me be part of" the Green Bank as she learned a lot and feels CT and the Green Bank have made a big difference in how Green Banks are operating. She also thanked Cheryl [Samuels] for her assistance with her Board responsibilities.

- Mr. Harrity shared that Dale and George are why Green Bank is so good; going at it like yeomen and yet being modest about their accomplishments. However, he stated, they will love retirement and not having to get up and out in the morning. To Gina, he felt honored to serve on the Board with her and that she added so much to the initiatives of the Green Bank.
- Ms. Bronisz shared that George and Dale have done great work at Green Bank and have set the bar very high for other quasi CT organizations and other Green Banks. To Gina she has not known her very well but Ms. Bronisz' college age daughter does and is impressed with Gina's work as she begins her own career in environmental endeavors.
- Mr. Ranelli expressed how little we knew back in 2011 (referring to the prior retreat reference). There was no blueprint and no model but was put into terms that people would buy into. He likened it into building the plane while it's taking off. The triple threats of Dale, George and Gina have taken all those individual steps which have all made a difference to Green Bank initiatives. He also states that Green Bank will need to establish an alumni status so current team can call on them and obtain their expertise in the future.
- Mr. Klee (by phone) wishes he was at the Rocky Hill office to give them all hugs. To Dale and George, he hopes they feel they have emeritus status and consider having employees call on them so they can find out how they did things "way back when." He loves Gina who is a leading, calming, energizing person when there were difficult times in discussions.
- Ms. Smith shared that George took the lead and a leap (of faith) when he joined Green Bank from Connecticut Innovations and making the transition and creating something new and different going forward. Thanks to Dale and George for their steadfast belief in where we're going. She also thanked Gina for her commitment to the Board. She herself is not certain of appointments in the future as the new CT administration takes over in January 2019 but she has asked to continue to serve on the Green Bank Board. She believes in the objectives and goals of the Green Bank organization and has good wishes for its continued success.

9. **Adjourn**

Motion to adjourn Board meeting made by John Harrity.
2nd by Gina McCarthy
Meeting concluded at 11:15 a.m.

Respectfully submitted,

_____
Catherine Smith, Chairperson

CONNECTICUT GREEN BANK

DIRECTOR OF INFRASTRUCTURE PROGRAMS

Position Grade: 18
Direct Reports: As Assigned
Salary Range: $104,617-$167,388

Reports to: President and CEO
Wage Hour Class: Exempt
Hours Worked: 40
Effective Date: January 1, 2019

SUMMARY:

The Director of Infrastructure Programs oversees the development and implementation of:

(1) Connecticut Green Bank programs that are required by statute
(2) Connecticut Green Bank programs and projects that are focused on infrastructure.

The Green Bank, a quasi-public authority, is the nation's first state "Green Bank," leveraging public and private funds to drive investment and scale up clean energy deployment in Connecticut. Working at the Green Bank means being part of a dynamic team of talented people who are passionate about implementing the new green bank model, stimulating the growth of clean energy in Connecticut, strengthening our economy, and protecting our environment.

EXAMPLES OF DUTIES:

- Initiates and manages the design of Connecticut Green Bank's statutory and infrastructure programs and projects, including the Residential Solar PV Investment Program, as well as the Electric Efficiency Partners Program (i.e., battery storage for RSIP) should a positive determination be made by PURA .
- Works with the Clean Energy Finance Team to attract private capital to statutory and infrastructure projects (i.e., SHREC securitization);
- Develops and implements strategies to reduce the cost of residential solar PV systems and ratepayer incentives for the systems;
- Works with the Marketing Team to develop strategies to increase participation in Connecticut Green Bank statutory and infrastructure programs and projects;
- Works with the Department of Energy and Environmental Protection and the Energy Efficiency Board, as well as other key stakeholders, to align programs where possible and ensure Connecticut's infrastructure programs take advantage of shared resources and programmatic synergies;
- Ensures all operational (i.e. staff and policies) and organizational (i.e. contracting and reporting) requirements are being implemented and carried out;
- Manages the selection of consultants, where necessary, to support the program in areas where Connecticut Green Bank does not have specific in-house expertise;
- Works in collaboration with the President, General Counsel, and Managing Director of Marketing to integrate comprehensive strategies to advance clean energy;

- Contributes to the development of Connecticut Green Bank's comprehensive plan with a particular emphasis on strategy related to the statutory and infrastructure programs and projects;
- Works with the Board of Directors and the President to lead the development of clean energy programs and initiatives;
- Regularly updates the Board of Directors, with support from the President and Executive Vice President and CIO on the development and progress of statutory and infrastructure programs and projects;
- Represent Connecticut Green Bank on appropriate task forces, committees, and boards relevant to clean energy finance;
- Represents Connecticut Green Bank to the public in speaking engagements; and
- Supervises Connecticut Green Bank staff including managers, associates, and assistants.

MINIMUM QUALIFICATIONS REQUIRED
KNOWLEDGE, SKILL AND ABILITY:

- Strong knowledge and experience in clean energy finance and/or policy;
- Familiarity with the finance and energy industries;
- Considerable experience in program/project management;
- Ability to work in a team environment as a lead contributor, manager, and facilitator;
- Strong knowledge of business operations and general management including supervisory experience;
- Considerable ability to develop programs, manage stakeholder processes toward results, and interpret energy policy;
- Understanding of the interaction in clean energy markets between finance and demand;
- Demonstrated ability to understand various scientific and energy-related technological principles and applications, and integrate those concepts into the overall project, program, or CT Green Bank;
- Expertise in scalable models for financing building upgrades through a variety of financial products (i.e., ESAs, ESCOs, PPAs);
- Ability to work with external stakeholders including strong facilitation, negotiation, and coordination skills;
- Considerable interpersonal skills, as well as oral and written communications skills;
- Ability to market the benefits of clean energy financing products to potential customers;
- Knowledge of State and Federal energy policies and regulations that support clean energy finance; and

EXPERIENCE AND TRAINING:

General Experience:
A Bachelor's Degree (but a Master's degree is preferred) in environmental science, engineering, economics, political science, business administration, or related field. Seven (7) to ten (10) years of experience in energy policy and clean energy finance. Experience supervising staff and working across departments is preferred. Experience working with and facilitating collaborative outcomes with various stakeholder groups in energy policy design and project development.

Special Experience:

Two (2) years of the general experience must have been in supervising staff and with full responsibility for a program implementation.

Substitutions Allowed:

1. A Master's Degree in environmental science, engineering, economics, business administration or other related field may be substituted for one additional year of the general experience
2. A professional certification in a relevant field may substitute for one additional year of experience

Physical Requirements:

1. Frequent communications, verbal and written
2. Frequent use of math/calculations
3. Visually or otherwise identify, observe and assess
4. Repetitive use of hands and fingers -typing and/or writing

Physical Demands: The physical demands described here are representative of those that must be met by an employee to successfully perform the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions. While performing the duties of this job, the employee is frequently required to sit; use hands to finger, handle, or feel; reach with hands and arms and talk or hear. The employee is occasionally required to stand and walk. The employee must occasionally lift and/or move up to 20 pounds. Specific vision abilities required by this job include close vision.

Work Environment: The work environment characteristics described here are representative of those an employee encounters while performing the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions. The noise level in the work environment is usually moderate.

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CONNECTICUT GREEN BANK

Memo

To: Connecticut General Assembly – Energy & Technology Committee

From: Bryan Garcia (President & CEO)

Cc Board of Directors of the Connecticut Green Bank, Brian Farnen (General Counsel and CLO), Matt Macunas (Manager and Legislative Liaison), Dale Hedman (Managing Director of Statutory & Infrastructure Programs), Eric Shrago (Managing Director of Operations), and Selya Price (Associate Director of Infrastructure Programs)

Date: January 11, 2019

Re: Progress report on the Connecticut Green Bank Residential Solar Investment Program

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Overview

This memo provides an update on progress toward the goals of the Connecticut Green Bank (Green Bank) Residential Solar Investment Program (RSIP). This program was first legislatively enabled through Section 106 of Public Act No. 11-80[1] and more recently updated by Public Act No. 15-194[2] and Public Act No. 16-212[3], amending the CT General Statutes at Section 16-245ff[4]. The Green Bank is providing progress updates on the following provisions of Section 16-245ff:

> (4)(b) The Connecticut Green Bank, established pursuant to section 16-245n, shall structure and implement a residential solar investment program established pursuant to this section that shall support the deployment of not more than three hundred megawatts[5] of new residential solar photovoltaic installations located in this state on or before (1) December 31, 2022, or (2) the deployment of three hundred megawatts of residential solar photovoltaic installation, in the aggregate, whichever occurs sooner, provided the bank shall not approve direct financial incentives under this section for more than one hundred megawatts of new qualifying residential solar photovoltaic systems, in the aggregate, between July 2, 2015, and April 1, 2016. The procurement and cost of such program shall be determined by the bank in accordance with this section.

[1] PA 11-80: https://www.cga.ct.gov/2011/ACT/Pa/pdf/2011PA-00080-R00SB-01243-PA.pdf, "An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut's Energy Future"
[2] PA 15-194: https://www.cga.ct.gov/2015/act/pa/pdf/2015PA-00194-R00HB-06838-PA.pdf, "An Act Concerning the Encouragement of Local Economic Development and Access to Residential Renewable Energy"
[3] PA 16-212: https://www.cga.ct.gov/2016/act/pa/pdf/2016PA-00212-R00SB-00366-PA.pdf, "An Act Concerning Administration of the Connecticut Green Bank, the Priority of the Benefit Assessments Lien under the Green Bank's Commercial Sustainable Energy Program and the Green Bank's Solar Home Renewable Energy Credit Program,"
[4] https://www.cga.ct.gov/2017/pub/chap_283.htm#sec_16-245ff
[5] All solar PV capacity units in this progress report are provided in direct current (DC). The performance of PV modules and arrays are generally rated according to their maximum DC power output (watts).

(4)(d)(3) provide incentives that decline over time and will foster the sustained, orderly development of a state-based solar industry;[6]

(4)(j) On or before January 1, 2017, and every two years thereafter for the duration of the program, the Connecticut Green Bank shall report to the joint standing committee of the General Assembly having cognizance of matters relating to energy on progress toward the goals identified in subsection (b) of this section.

In addition to reporting on CT General Statute Section 16-245ff (4)(b), the Green Bank is providing updates on RSIP progress in deploying residential solar PV in low-to-moderate income households. We also provide considerations in the transition of the residential solar PV market to a post-RSIP market where there is a public policy requirement to ensure that local state-based residential solar PV contractors are a viable and thriving economic development industry.[7]

RSIP Progress toward 300 MW

As of December 31, 2018, 31,222 projects totaling 244.6 MW (DC) of residential solar PV have been approved through the RSIP, or 81.5% of the 300 MW (DC) public policy goal under Section 16-245ff.

As the Green Bank supports the market in meeting the installed capacity goal of the public policy through declining incentives offered through the RSIP, it now turns its focus to achieving the public policy objective of fostering the sustained, orderly development of a state-based solar industry as the compensation structure for residential ratepayers shifts from net metering to a tariff that assures a reasonable rate of return for participating residential ratepayers.

RSIP Progress

As previously reported in 2017, between July 2, 2015 and April 1, 2016, 5632 projects or 43.8 megawatts[8] (MW) were approved. This was less than the time-based 100 MW deployment cap required by PA 15-194.

[6] Section 16-245ff (4)(d): The Connecticut Green Bank shall develop and publish on its Internet web site a proposed schedule for the offering of performance-based incentives or expected performance-based buydowns over the duration of any such solar incentive program. Any such direct financial incentives shall only apply to the first twenty kilowatts of direct current of the qualifying residential solar photovoltaic system. Such schedule shall: (1) Provide for a series of solar capacity blocks the combined total of which shall be a maximum of three hundred megawatts and projected incentive levels for each such block; (2) provide incentives that are sufficient to meet reasonable payback expectations of the residential consumer and provide such consumer with a competitive electricity price, taking into consideration the estimated cost of residential solar installations, the value of the energy offset by the system, the cost of financing the system, and the availability and estimated value of other incentives, including, but not limited to, federal and state tax incentives and revenues from the sale of solar home renewable energy credits; **(3) provide incentives that decline over time and will foster the sustained, orderly development of a state-based solar industry;** (4) automatically adjust to the next block once the board has issued reservations for financial incentives provided pursuant to this section from the board fully committing the target solar capacity and available incentives in that block; and (5) provide comparable economic incentives for the purchase or lease of qualifying residential solar photovoltaic systems or power purchase agreements from such systems. The Connecticut Green Bank may retain the services of a third-party entity with expertise in the area of solar energy program design to assist in the development of the incentive schedule or schedules. The Department of Energy and Environmental Protection shall review and approve such schedule. Nothing in this subsection shall restrict the Connecticut Green Bank from modifying the approved incentive schedule to account for changes in federal or state law or regulation or developments in the solar market when such changes would affect the expected return on investment for a typical residential solar photovoltaic system by ten per cent or more. Any such modification shall be subject to review and approval by the department.

[7] Based on provision (4)(d), in particular (4)(d)(3) of Section 16-245ff, pertaining to fostering the sustained, orderly development of a state-based solar industry.

[8] All solar PV capacity units in this progress report are provided in direct current (DC). The performance of PV modules and arrays are generally rated according to their maximum DC power output (watts).

As of December 31, 2018, a total of 31,222 or 244.6 MW of RSIP projects had been approved for incentives, representing 81.5% of the legislative target of 300 MW. Of the total, 26% are homeowner owned projects, incentivized with Expected Performance Based Buydowns (EPBBs) (i.e., one-time, upfront rebates), and 74% are third party owned projects (i.e., leases and power purchase agreements), incentivized with Performance Based Incentives (PBIs) (i.e., incentives provided on a per kWh basis, quarterly over six years for electricity produced through leases and power purchase agreements). While the EPBB and PBI are administered differently and over different time periods, they are, as required by statute, economically comparable on a net present value basis.

Table 1 below summarizes RSIP benefits since program inception, including projects approved from March 2012 through December 31, 2018. The fleet of almost 245 MW of RSIP projects is anticipated to produce over 278 million kWh of electricity annually or nearly 7 million MWh over the 25-year project lifetimes. Total job-years created are 12,116, of which 4,823 are direct and 7,294 are indirect and induced.[9] Nearly 3.9 million tons of carbon dioxide emissions will be avoided over the project lifetimes. [10]

Table 1. RSIP Benefits for Projects Approved CY 2012-2018

CY	# Projects	Capacity Approved (kW STC)	Expected Annual Generation (kWh)	Expected Lifetime Generation (MWh)	Direct Jobs Created	Indirect and Induced Jobs Created	Total Jobs Created	Lifetime Tons CO2 Avoided
2012	791	5,524	6,291,288	157,282	157	252	409	89,074
2013	1,464	10,405	11,849,056	296,226	272	438	710	166,563
2014	4,496	33,373	38,005,179	950,129	857	1,381	2,238	540,139
2015	7,039	54,137	61,651,028	1,541,276	1,383	2,227	3,610	880,316
2016	5,660	44,942	51,179,919	1,279,498	855	1,297	2,152	711,902
2017	4,528	35,996	40,991,781	1,024,795	489	639	1,128	552,337
2018	7,244	60,195	68,550,336	1,713,758	810	1,059	1,870	923,316
TOTAL	**31,222**	**244,572**	**278,518,587**	**6,962,965**	**4,823**	**7,294**	**12,116**	**3,863,647**

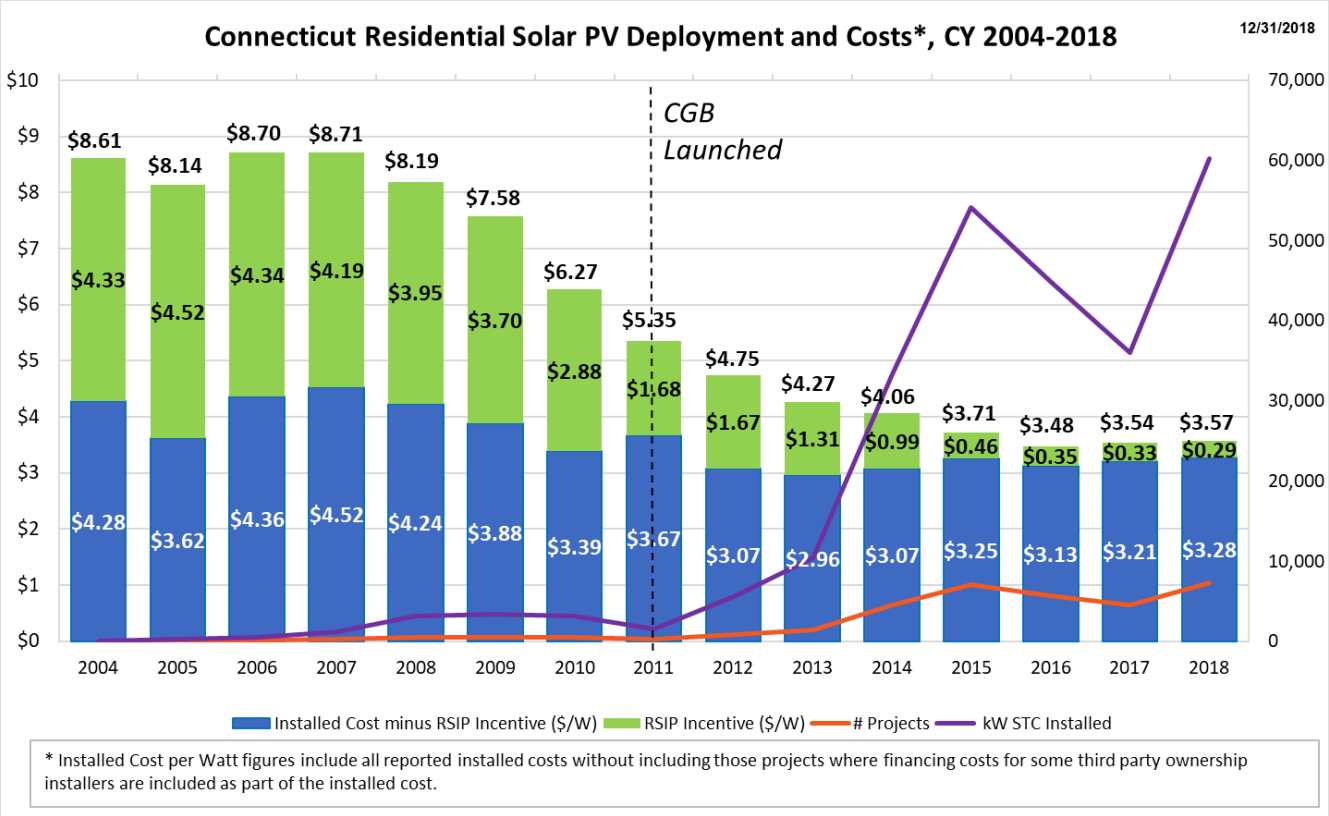
In addition to the above benefits of over 278 million kWh of solar energy expected to be produced annually by nearly 245 MW of solar PV projects approved through RSIP, this solar PV capacity can help meet peak load demand. Though solar PV does not coincide exactly with the system peak, solar PV provides significant load reduction during the hours the sun is shining and provides savings during the system peak. For examples, behind-the-meter distributed solar PV reduced New

[9] Jobs methodology was developed by Navigant Consulting for the Connecticut Green Bank in consultation with the Department of Economic and Community Development – https://www.ctgreenbank.com/wp-content/uploads/2018/03/CGB_DECD_Jobs-Study_Fact-Sheet.pdf. It should be noted that a tax revenue methodology was also developed by Navigant Consulting for the Connecticut Green Bank in consultation with the Department of Revenue Services – https://www.ctgreenbank.com/wp-content/uploads/2018/09/CGB-Eval-Tax-Methodology-7-24-18.pdf

[10] Air emissions methodology developed by the Connecticut Green Bank in consultation with the US Environmental Protection Agency and the Department of Energy and Environmental Protection – https://www.ctgreenbank.com/wp-content/uploads/2018/01/CGB-Eval-IMPACT-091917-Bv2.pdf. It should be noted that a public health methodology was also developed by the Connecticut Green Bank in consultation with US Environmental Protection Agency, Department of Public Health, and Department of Energy and Environmental Protection – https://www.ctgreenbank.com/wp-content/uploads/2018/03/CGB-Eval-PUBLICHEALTH-1-25-18-new.pdf. These numbers are also referenced in the Green Bank Comprehensive Annual Financial Report for fiscal year ended June 30, 2018, available at: https://www.ctgreenbank.com/wp-content/uploads/2018/10/Green-Bank-CAFR_2018.pdf, table 147, report p. 233.

England wholesale power costs during a heat wave from July 1 to July 7, 2018[11], and ISO New England reported that the Thanksgiving midday peak "typically seen from ovens and family gatherings was curtailed this year because of the installation of rooftop solar in Connecticut and New England states."[12]

The following chart provides historical perspective on Connecticut's residential solar PV market from 2004 through 2018, based on projects incentivized through RSIP from 2012-2018 and before that through the Connecticut Clean Energy Fund (CCEF), the Green Bank's predecessor organization. The average RSIP incentive has been dramatically reduced as shown by the upper/green portion of the bars in the chart, while the average installed cost minus the RSIP incentive shown in the lower/blue portion of the bars have stayed roughly stable. Comparing 2004 to 2018, the average installed cost decreased 58% from $8.61/W to $3.57/W and the average RSIP incentive decreased 93% from $4.33/W to $0.29/W, while deployment increased over 470,000% from 12.7 kW in 2004 to 60.2 MW in 2018. Incentives were reduced most steeply with the inception of the Green Bank in 2011, 83% from $1.68/W in 2011 to $0.29/W in 2018 (as compared to 61% from 2004 to 2011). At the same time, installed costs decreased 33% from $5.35/W to $3.57/W and deployment grew over 3700% from 1.6 MW in 2011 to 60.2 MW in 2018.



Note that deployment had declined in 2016 and 2017 due to several factors including a decrease in electricity rates from July through December 2016 and nationwide flattening/slowdown in the residential solar PV market due to structural changes in the third-party ownership landscape, with major companies struggling with profitability and customer acquisition costs, resulting in business

[11] http://isonewswire.com/updates/2018/7/17/heat-wave-recap-reliable-operations-through-holiday-heat-hum.html, https://pv-magazine-usa.com/2018/07/25/heavy-lifting-by-behind-the-meter-solar-power-in-new-england-heatwave/, https://www.solarreviews.com/news/rooftop-solar-saves-new-englanders-30m-1-week-083118/

[12] https://www.theday.com/local-news/20181224/greenhouse-gas-emissions-continue-to-decline-in-new-england

model changes, market exits, and bankruptcies. In Connecticut, SolarCity reduced annual deployment significantly starting in 2016 when they stopped offering power purchase agreements and focused exclusively on selling homeowner-owned projects, NRG withdrew from doing residential solar PV projects in the state, and several companies went into bankruptcy including Sungevity, One Roof, and Sun Edison. The Connecticut market rebounded strongly by 2018 with several large, national companies (i.e., Sunnova, Sunrun, Vivint, PosiGen, and SunPower) filling the gap left by those who exited the market, along with strong participation by regional and local companies including Trinity Solar, Ross Solar (a ConEdison Solutions Company), Sunlight Solar, RGS Energy, C-TEC Solar, Aegis Solar Energy, Earthlight Technologies, EcoSmart Home Services, and other companies.

At the current pace of submissions and approvals, the Green Bank estimates that RSIP will reach 300 MW sometime in Q4 2019 depending on end-of-program volume.

Table 2 provides RSIP cost and incentive data by calendar year and incentive type, for projects with cost data in PowerClerk[13]. The incentive for an RSIP project has decreased from an average of 35% of project cost in 2012 to an average of 8% in 2018 (10% for an EPBB project and 7% for a PBI). Associated with the incentive reduction, Table 2 shows that the ratio of the installed cost minus RSIP incentive to the RSIP incentive increased from a ratio of nearly 2-1 in 2012 to over 11-1 in 2018, reflecting increasingly efficient leveraging of RSIP funds to deploy higher levels of solar PV.

Table 2. RSIP Cost and Incentive Data for Projects Approved CY 2012-2018[14]

CY Approved	Incentive Type	# Projects	Capacity (kW STC)	Average Installed Cost minus RSIP Incentive ($/W)	Average RSIP Incentive ($/W)	Average of Installed Cost ($/W)	Incentive as % of Installed Cost	Installed Cost minus RSIP Incentive/ RSIP Incentive Leverage Ratio
2012 Total		**603**	**4,209**	**$3.07**	**$1.67**	**$4.75**	**35%**	**1.8**
2013 Total		**1,021**	**7,460**	**$2.96**	**$1.31**	**$4.27**	**31%**	**2.3**
2014 Total		**2,936**	**22,402**	**$3.07**	**$0.99**	**$4.06**	**24%**	**3.1**
2015 Total		**4,034**	**31,929**	**$3.25**	**$0.46**	**$3.71**	**12%**	**7.0**
2016	EPBB	1,101	9,549	$3.34	$0.43	$3.77	11%	7.8
	PBI	3,572	27,783	$3.06	$0.32	$3.39	10%	9.4
2016 Total		**4,673**	**37,332**	**$3.13**	**$0.35**	**$3.48**	**10%**	**9.0**
2017	EPBB	1,253	10,833	$3.21	$0.40	$3.61	11%	8.0
	PBI	3,147	24,201	$3.20	$0.30	$3.51	9%	10.5
2017 Total		**4,400**	**35,033**	**$3.21**	**$0.33**	**$3.54**	**9%**	**9.6**
2018	EPBB	1,366	12,320	$3.38	$0.38	$3.76	10%	8.9
	PBI	2,352	18,833	$3.22	$0.24	$3.46	7%	13.2
2018 Total		**3,718**	**31,153**	**$3.28**	**$0.29**	**$3.57**	**8%**	**11.2**
Grand Total		**21,385**	**169,518**	**$3.18**	**$0.53**	**$3.71**	**14%**	**6.0**

Table 2 also provides insight into installed costs which decreased from 2012 to 2016 but which increased slightly in recent years, from 2016 to 2018. In 2018 in particular, key cost drivers that have contributed to this increase are:

[13] PowerClerk is the Green Bank's incentive application and document management system for RSIP. For information about PowerClerk, see https://www.cleanpower.com/products/powerclerk/. PBI projects approved after August 15, 2017, when RSIP launched the updated PowerClerk II system, do not report cost data until project completion, hence a lag in cost reporting for PBI projects as compared to EPBB projects (which report cost data at incentive application). The number of projects with cost data reported thus far for CY 2017 and 2018 is therefore a smaller number than those approved for incentives in 2017 and 2018.

[14] Average system cost per Watt figures include all reported installed costs without including those projects where financing costs for some third-party ownership installers are included as part of the system cost.

- Import tariffs on modules/cells, inverters, and steel/racking – these tariffs are scheduled to increase for inverters and steel in January 2019 (from 10% to 25%) unless trade negotiations with China result in changes to the current import tariff schedule. Related to the import tariffs are challenges around uncertainty in availability of equipment.
- Increased customer acquisition and other soft costs such as infrastructure upgrades (note however that the cost of infrastructure upgrades is not captured in installed cost numbers and are borne by either contractors and/or customers outside of the RSIP installed cost data being captured).
- Increased financing, labor and insurance costs.
- RSIP installers explained to the Green Bank that solar PV companies were absorbing cost increases for some time and had to start passing some of these costs onto customers in order to stay in business. That said, contractors still absorb to various degrees (depending on the company) unexpected costs of installation (e.g., infrastructure upgrades, electrical upgrades) to help projects move forward.

Other factors that can affect costs or the economics of solar PV projects in the near future, include but are not limited to:

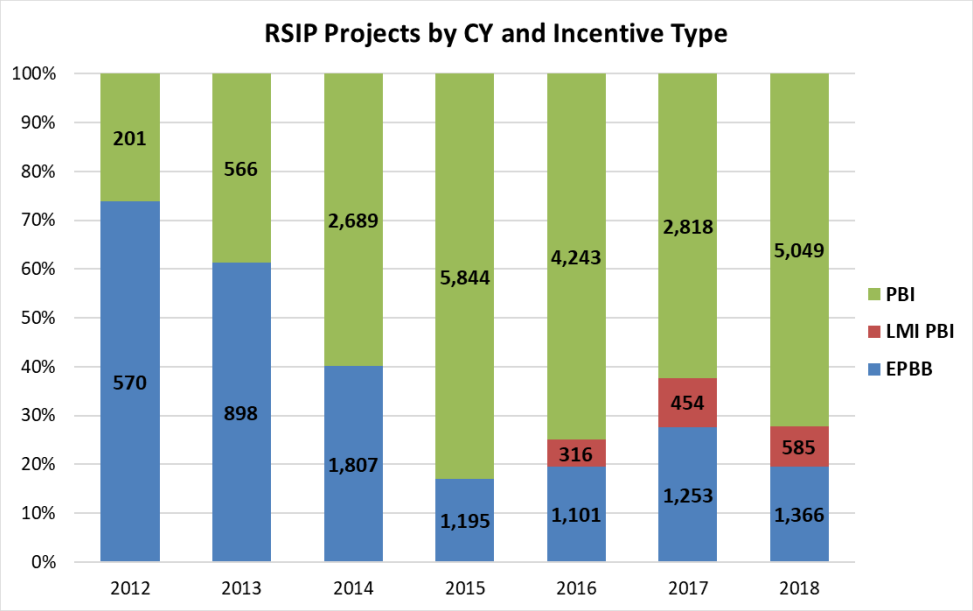
- The federal Investment Tax Credit is scheduled to ramp down from the current tax credit of 30% to 26% in 2020, then 22% in 2021, to 0% in 2022 for residential, homeowner-owned projects and 10% from 2022 onward for third party owned projects.
- Property tax exemptions are being fought by a handful of CT municipalities looking for new revenue streams, in particular for solar PV projects that are third party owned.

Expanding Adoption in Low-to-Moderate Income Households

While solar PV adoption was strong among residential households generally through 2015, to ensure that the benefits of solar were being shared equally among all income classes and to correct for natural market failures, the Green Bank devised and successfully implemented a strategy to increase adoption specifically among low-to-moderate income (LMI) households from 2016 onward. LMI households have higher energy burdens (percentage of income spent on household energy costs) than upper-income households, so solar PV and energy efficiency projects can help significantly alleviate this burden and provide greater energy security for these families.

Through a public-private partnership with PosiGen Solar, the Green Bank established a “Solar for All” initiative to expand deployment of residential solar PV among LMI households. The Green Bank supported the partnership through an investment in PosiGen’s Connecticut solar lease fund, along with a higher RSIP incentive[15] for projects serving low and moderate income-verified customers, and collaboration on Solarize-style marketing campaigns. The following chart shows the number of RSIP projects that received the higher LMI PBI, as well as PBI (non-LMI) and EPBB incentives, with the stacked bars representing the percentage of projects in each year. From 2012 to 2018, third party owned projects, including PBI and LMI PBI, have grown in market share from 26.1% in 2012 to 72.3% of projects in 2017, 80.5% of projects in 2018, and 73.5% of all RSIP projects since 2012. LMI PBI projects made up 5.6%, 10.0%, and 8.4% of all projects in 2016, 2017 and 2018 respectively, or 4.4% for RSIP overall.

[15] The LMI incentive is only offered as a PBI incentive based on research indicating that LMI customers are less able to fully utilize the ITC based on lower tax liability. The base LMI PBI in the current Step 14 is 2.57 times higher than the PBI.



While only a small percentage of RSIP projects utilized the higher LMI PBI incentive, adoption of residential solar PV in LMI communities has increased significantly since the Solar for All initiative launched. From 2016-2018, nearly half of all RSIP customers lived in census tracts with average median income (AMI) of 100% or less.

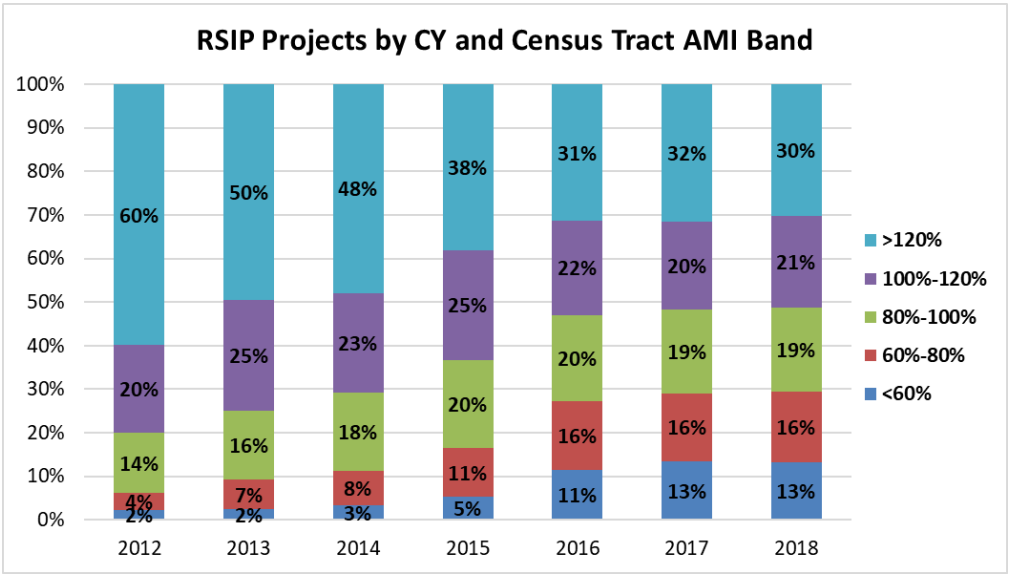


Table 3 below provides a comparison of approved RSIP projects by census tract income bands as a percentage of the number of owner-occupied households in the respective income bands. The data indicate that the highest market penetration is 4.5% in the <60% (lowest income band) and the lowest market penetration is 3.3% in the >120% (highest income band). The 60-80% income band has the next highest market penetration at 4.0%. Table 4 provides another, similar perspective on LMI market penetration based on the distribution of all RSIP projects among income bands as compared to the distribution of owner-occupied housing units among income bands. While only 7.1% of owner-occupied housing units belong to homeowners in the <60% income band, a higher percentage, namely 8.9% of all RSIP projects were deployed by homeowners in this lowest income band (i.e., the lowest income band group was responsible for more than their share of solar PV

deployments). By comparison, 40.2% of all owner-occupied housing units belonged to homeowners in the >120% income band, but these homeowners accounted for only 36.6% of all RSIP projects. These numbers show that LMI market penetration is beyond parity with respect to income bands, that LMI customers will go solar if they have the means, and that the LMI market is a key growth market for the long-term sustainability of the residential solar industry.

Table 3. RSIP Projects by Income Band as % of Owner-Occupied Households

Census Tract Income Level (AMI)	# Projects	Total Owner Occupied 1- 4 Unit Households	% of Households
<60%	2,759	60,769	4.5%
60%-80%	4,007	99,220	4.0%
80%-100%	5,931	165,331	3.6%
100%-120%	6,934	187,463	3.7%
>120%	11,347	345,311	3.3%
Total	30,978	858,094	3.6%

Table 4. Distribution of RSIP Projects by Income Band versus Distribution of Owner-Occupied Households by Income Band

Census Tract Income Band (AMI)	# Projects (cumulative)	% Project Distribution (cumulative)	Total Owner Occupied 1- 4 Unit Households	% Distribution Owner Occupied 1- 4 Unit Households
<60%	2,759	8.9%	60,769	7.1%
60%-80%	4,007	12.9%	99,220	11.6%
80%-100%	5,931	19.1%	165,331	19.3%
100%-120%	6,934	22.4%	187,463	21.8%
>120%	11,347	36.6%	345,311	40.2%
Total	30,978	100.0%	858,094	100.0%

Lastly, to complement the Green Bank's internal efforts to expand deployment to the LMI market, the Green Bank has received federal funding and is part of a U.S. Department of Energy (DOE) SunShot Initiative grant award, led by the Clean Energy States Alliance, to further develop and disseminate throughout the country successful strategies and informative research to help other states in serving the LMI market.

Sustained Orderly Development in a post-RSIP Market

CT General Statutes section 16-245ff (4)(d)(3) provides that incentives are to decline over time and **will foster the sustained, orderly development of a state-based solar industry.** The goal of sustained orderly development supports the state's goal of reducing greenhouse gas emissions to 80% below 2001 levels by 2050 and supports the state's economic development goals. Public Act 15-194 - An Act Concerning the Local Encouragement of Local Economic Development and Access to Residential Renewable Energy, which expanded RSIP from 30 to 300 MW - is written as a local economic development and clean energy policy, leveraging the Class I Renewable Portfolio

Standard to support local job creation and state revenues through corporate, individual, and sales taxes.

The Green Bank interprets achieving sustained orderly development to mean that adoption of residential solar PV will continue at a rate of approximately 50 MW per year, the average over the last few years. The Green Bank comments here on several key factors (among many) that will be important for the long-term sustainability of the solar PV industry, including: (1) future market support in terms of compensation (i.e., from net metering to tariff-based public policy) as well as other support mechanisms (e.g., reducing the cost of capital for financing), (2) continued effort to reduce costs, in particular soft costs, (3) clean energy deployment viewed holistically as part of grid modernization, electrification of heating, cooling and transportation, and commercialization and deployment of complementary technologies such as energy storage and energy efficiency.

Future Market Support

"An Act Concerning Connecticut's Energy Future," PA 18-50 passed in the 2018 legislative session, prescribing sweeping changes to the state's clean energy programs. Section 7 of the Act specifies that the current net metering policy of compensating solar PV at the avoided retail electricity rate will end when RSIP ends. Through Docket No. 18-08-33, the Green Bank has been a participant in the subsequent dialogues at the Public Utilities Regulatory Authority (PURA) on the design and implementation of the residential tariff compensation structure and rates that are intended to replace both current net metering and RSIP. The impact on the residential solar PV market will depend on whether the future tariff structure and compensation level (i.e., tariff rates assuring a reasonable rate of return) will provide sufficient support to continue a similar rate of deployment as in recent years, as well as provide for a smooth transition to a post-RSIP compensation structure. The transition will be important to get right from the perspectives of contractors, third party system owners (and their investors), and customers to ensure that the economics of investing in solar PV still make sense for all parties. It also requires that enough time is provided to adjust sales and marketing approaches and financing constructs, particularly in the case of third party owned projects which have historically been 74% of RSIP projects.

Despite PA 18-50 specifying that PURA should begin proceedings on Section 7 tariff development in September 2019, PURA recognized the need to begin as soon as possible (possibly in recognition that RSIP could end in late 2019 and because of the complexity of the policy). PURA began work in June 2018 on implementation of the new tariff structure with Docket 18-06-15, PURA Review of the Implementation Requirements of Section 7 of Public Act 18-50, followed in August 2018 by Docket 18-08-33, PURA Implementation of Section 7. The Green Bank has participated actively in both dockets along with many other stakeholders[16] to weigh in on the structure, compensation levels, and timing of both the final tariff as well as the possibility of an interim tariff. The final tariff for residential solar PV is specified by PA 18-50 to allow for two options: (1) a buy-all, sell-all/credit-all (BASA or BACA)[17] tariff rate fixed over 20 years, or (2) a netting option based on daily, sub-daily or real-time netting, sometimes called use-buy-sell since this option can allow for some self-consumption by a homeowner. The interim tariff is specified as an option that does not have any structural limitations.

[16] Stakeholders that have participated in docket 18-08-33 include the CT Green Bank, DEEP, Eversource Energy, United Illuminating, the Office of Consumer Counsel, Solar Connecticut and member contractors, Sunrun, Vivint, the CT Fund for the Environment, Acadia Center and others.

[17] Whether the tariff is designed as sell-all or credit-all would likely affect whether tariff compensation is taxable by the IRS, so the Green Bank has encouraged the seeking of an IRS ruling to clarify this before a compensation rate is set; however, requesting such a ruling comes at a high cost and it can take close to a year to get an answer. In the meantime, it is thought that a BACA structure is likely not taxable as credits would be included on utility bills; however, a credit structure would not allow compensation tariffs to be assignable to third parties.

A few highlights of the tariff development process are provided here - legislators are encouraged to view PURA docket materials directly for more information[18]:

- There is disagreement among stakeholders on what the structure, compensation levels and timing should be for both the final as well as a potential interim tariff.
- Clarity is needed on the legal and legislative intent of the interim tariff and whether it can bridge the gap between the end of RSIP and implementation of the new tariff or whether it can only be offered in parallel to RSIP.
- The utility companies do not yet have the metering nor the billing capabilities to allow for all netting options specified by the legislation, and it would likely take more than 6 months (or in some cases, for Eversource Energy, multiple years) to be able to implement the daily or sub-daily netting options.
- DEEP developed a spreadsheet model to enable calculation of tariff rates based on cost recovery plus a reasonable rate of return – using 10 percent as the default rate of return in the model, based on the best publicly available data at the time.[19]
- Stakeholders submitted proposals on the interim tariff to PURA in December 2018 and are hoping for a decision or next steps in January 2019.

In addition to supporting adequate and sustainable compensation policy for solar energy, the Green Bank has continued to support and help transform the residential solar PV market through program administration, financing, marketing and educational initiatives, and strategic partnerships, for example by:

- Continuing to support over 50 eligible installers and third-party system owners, ranging from large, national companies to regional players and small, local businesses that provide for a strong, diverse state industry.
- Continuing to offer the Smart-E loan[20] through local community banks and credit unions that can be used to finance installation of residential solar PV, renewable thermal technologies, energy efficiency, alternative fuel vehicles, energy storage and other measures, including health and safety (e.g., asbestos, lead, mold).
- Continuing to collaborate with stakeholders such as Solar Connecticut (the state's solar PV industry association), the Renewable Energy and Efficiency Business Association (REEBA), the Connecticut Technical High School System, and SmartPower - a nonprofit leading Solarize campaigns in communities throughout the state.
- Addressing consumer protection by collaborating with the Connecticut Department of Consumer Protection, the Office of Consumer Counsel, and the Office of the Attorney General to address consumer complaints and contractor issues. For examples, state officials issued a joint press release on Earth Day in 2015 offering consumer protection advice to homeowners considering the purchase or lease of solar PV[21], and the Green

[18] https://www.ct.gov/pura/

[19] DEEP's tariff model calculates the internal rate of return using a similar methodology to Solar Power Rocks which looks at "the cost of paying for a 5-kW system with cash, reduced within the first year by tax credits and other incentives, then estimate[s] annual electricity savings, SREC sales, and other ongoing incentives", https://solarpowerrocks.com/2017-state-solar-power-rankings/. DEEP also referenced Vivint, which includes states with a 10+ percent IRR among those with the "Highest Investment Return", https://www.vivintsolar.com/blog/top-states-for-solar. It should be noted that the Connecticut Green Bank asked a Yale University economist (Kenneth Gillingham) to calculate the rate of return for the RSIP over the last several years and it was determined that 10.1 - 11.3 % was the average rate of return from 2017-2018.

[20] https://ctgreenbank.com/programs/smart-e-loans/

[21] https://www.ftc.gov/system/files/documents/public_comments/2016/06/00190-128452.pdf, or https://portal.ct.gov/DCP/News-Releases-from-the-Department-of-Consumer-Protection/2015-News-Releases/On-Earth-Day-State-Officials-Offer-Advice-on-Solar-Energy-Promotions-and-Installation

Bank meets with the Department of Consumer Protection on a quarterly basis to address current issues and complaints.

- The Green Bank collaborates with the Clean Energy States Alliance (CESA)[22] to develop resources on solar PV consumer protection and related topics, in addition to participating as an active member in CESA's clean energy market transformation programs and projects.
- Participating in the ISO New England Distributed Generation Forecast Working Group[23].
- Updating the GoSolarCT.com web site to better support consumers of solar PV with a trusted source of information.
- Continuing improvement of RSIP customer and contractor experience and program efficiency by upgrading to an enhanced PowerClerk system for incentive application processing and increasing analytic capabilities in the Locus data monitoring platform.

Solar PV Cost Reduction Efforts

A second area of ongoing importance for the long-term sustainability of the solar PV industry is reduction of costs, in particular non-hardware or soft costs. Recognizing that hardware costs were steadily decreasing but soft costs were remaining high, the Green Bank participated in multiple U.S. Department of Energy (DOE) funding opportunities over the past 7 years, as the lead organization as well as in collaboration with other organizations on projects led by the Clean Energy States Alliance (CESA). Earlier efforts including two rounds of the DOE Rooftop Solar Challenge which focused on improvement of municipal solar PV permitting as well as barriers to solar PV adoption resulting from zoning regulations or interconnection rules and processes. Resources developed through these efforts can be found at www.energizect.com/sunrisene. As required by PA 15-194 Sec. 3(f) and in partnership with the Office of Education and Data Management, the Green Bank held 7 (2 more than required) residential solar PV system training seminars for municipal code officials around the state between October and December 2015. These seminars covered best practices and resources on solar PV permitting, as well as technical content on solar PV system equipment, design and National Electric Code requirements. In addition to the trainings, municipalities were supported in adopting best practices for solar PV permitting. The Green Bank continues to collaborate with municipalities and the Office of the State Building Inspector as opportunities arise.

Recent efforts have included participation in the DOE SunShot Prize Competition and the DOE-funded SolSmart grant. When the SunShot Prize: Race to 7-day Solar, a national competition intended to reduce the time it takes to "go solar" across the country, ended in FY18, the Connecticut Permit to Plug-in Challenge team was among the last two teams standing. The team, comprised of the Green Bank, the investor-owned utilities, solar installers, and municipalities, earned an award of distinction for their multi-pronged strategic approach to reducing solar installation times, which relied on detailed project tracking and evaluation. The competition enabled the team to create resources that walked residents through the permit to plug-in process[24], further standardized aspects of municipal solar permitting processes, and supported utility interconnection improvements for solar PV. The Connecticut Permit to Plug-in Challenge team reported the installation of 1,501 systems in 49 participating municipalities covering 141 different zip codes. The median total time from permit to plug-in was 89 days, with 78.6% of total installed capacity in the competition completing in 56 days or less. The Green Bank was a DOE-funded SolSmart technical advisor contract winner – funding from this award provided resources for further consulting support to municipalities on solar PV permitting and zoning improvements to earn SolSmart certifications for solar-friendliness. These resources have also enabled greater safety for firefighters through training

[22] https://www.cesa.org/
[23] https://www.iso-ne.com/committees/planning/distributed-generation/
[24] http://www.gosolarct.com/1-Get-Into-Solar/Whats-Involved-From-Paperwork-to-Panels

sessions coordinated by the Green Bank team on fire safety considerations where solar PV is present.

Finally, the Green Bank continues to work with municipalities on solar PV permitting and other municipal clean energy efforts through Sustainable CT[25], "a voluntary certification program to recognize thriving and resilient Connecticut municipalities. An independently funded, grassroots, municipal effort, Sustainable CT provides a wide-ranging menu of best practices. Municipalities choose Sustainable CT actions, implement them, and earn points toward certification." Sustainable CT provides a platform for achieving sustainability across a broad range of needs and connects municipalities to resources to help them achieve sustainability goals. The Green Bank provides technical and financial assistance for Sustainable CT[26] actions or action areas related to the following clean energy actions: (1) C-PACE, (2) municipal permitting, (3) supporting electric vehicle deployment, (4) increasing use of clean energy in municipal buildings, (5) implementing a community energy campaign targeting single-family households, and (6) benchmarking and providing financing for projects in multifamily buildings. Of the 22 municipalities certified, Green Bank programs and technical assistance helped 21 municipalities earn over 250 points in this year's first round of certifications.

Deployment of Solar PV in Combination with other Technologies

As more solar PV is deployed throughout Connecticut, the Green Bank and others including our utility partners are viewing clean energy deployment more holistically, in the context of grid modernization, electrification of heating, cooling and transportation, and commercialization and deployment of complementary technologies such as energy storage and energy efficiency.

Since the beginning of RSIP in 2012, it is a requirement to have an energy assessment performed in a home in order to access the solar PV incentive, preferably using the utility-administered Home Energy Solutions (HES)[27] assessment but with other options if needed. These energy assessments encourage customers to adopt energy efficiency measures along with solar PV – these measures might include insulation, upgrading to higher efficiency HVAC systems, adoption of heat pump hot water heaters, and electrification of space heating and cooling using air and ground source heat pumps.

An emerging market is residential solar plus energy storage. Over 100 RSIP projects approved in 2018 included battery storage systems. Battery storage provides backup power benefits for customers who are concerned about resiliency and increased energy independence, particularly during storms. Battery storage can also increase peak load reduction benefits to the grid by storing and making available solar energy when it is most needed. Commercially available battery storage systems based on lithium ion chemistry can be set up to cycle regularly to provide this load shifting functionality. Given that solar PV production generally peaks around midday to early afternoon, energy storage can save solar energy not needed to meet on-site load and use it later in the day during a household's greatest time of need, usually in the late afternoon or early evening. This alleviates demand put on the grid and potentially expensive and dirtier peaking plants that would otherwise be needed. Customer time of use rates can help incentivize cycling of battery systems to provide these peak load reduction benefits.

The Green Bank is collaborating with United Illuminating (UI) on a pilot project that aims to deploy solar PV as well as battery storage to reduce peak demand on two specific circuits in southwest

[25] https://sustainablect.org/
[26] https://ctgreenbank.com/SUSTAINABLECT/
[27] The HES assessment includes an energy audit with a blower door test as well as several on-site improvements like air and duct sealing, weather-stripping and water saving measures.

Connecticut. If enough peak load reduction is provided by the solar PV (and battery storage), UI may be able to avoid an upgrade to a specific substation. This pilot project helps illustrate another potential benefit of solar PV – the ability to provide location-specific benefits on a distribution system to help avoid traditional infrastructure capacity upgrades. This example also underscores the importance of looking at adoption of distributed energy resources such as solar PV and battery storage from a broader perspective, based on where and when these technologies can provide the greatest benefits. Section 7 of Public Act 18-50 directs PURA to evaluate these electric system benefits and to determine if and how locational benefits should be incentivized.

Similarly, approaching deployment of clean energy technologies in the residential market more holistically, the National Renewable Energy Laboratory (NREL) produced a report called "Solar Plus: A Holistic Approach to Distributed Solar PV"[28]. NREL's analysis illustrates that solar PV can provide more benefits when installed in combination with complementary technologies such as energy storage, controllable hot water heaters and air conditioning units, and home energy management systems. As RSIP reaches its statutory goal of 300 MW, the Green Bank encourages the state to support opportunities to deploy battery storage and other technologies in combination with existing and new solar PV installations to help meet the energy needs of customers more comprehensively while also providing greater benefits to the larger system and making energy cleaner, cheaper and more reliable for all customers. Technologies such as battery storage will also become more and more important for integration of solar energy into the grid as market penetration of solar energy increases to higher levels.

Recommendations

The Green Bank offers the following three recommendations to help ensure sustained orderly development of the Connecticut residential solar PV market in light of the transition to a post-RSIP market, as well as the state's broader economic and environmental context.

1. **Clarification of the Legal and Legislative Intent of PA 18-50, Section 7** - to provide guidance on whether an interim tariff structure can stay in place after RSIP ends. Implementation of an interim tariff structure is needed because the utility companies do not yet have the metering nor the billing capabilities to allow for all options specified by the legislation, and it would likely take 6 months or longer to implement the most expedient options (and for some options, for Eversource Energy, multiple years). It is critical to provide continuity between RSIP and the new, final tariff structure. A poor transition would result in the loss of economic development by companies leaving the state or at minimum shedding jobs thereby violating the public policy objective of fostering the sustained orderly development of a local state-based solar PV industry.

2. **Grid Modernization through Residential Solar PV and Complementary Technologies** – the Green Bank encourages the state to support opportunities to deploy clean energy technologies holistically and "cost effectively," in the context of grid modernization, electrification of heating, cooling and transportation, and commercialization and deployment of complementary technologies such as energy storage and energy efficiency in order to ensure that costs are minimized and benefits are maximized for all Connecticut ratepayers.

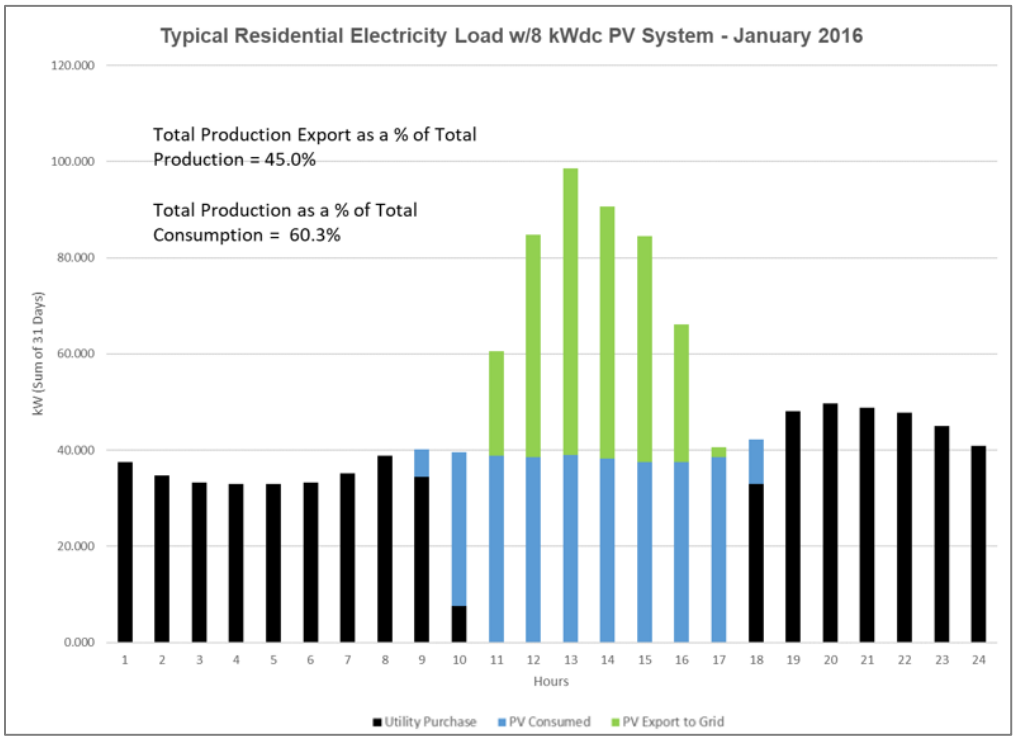
   For example, residential solar PV production and consumption graphs (produced by the Green Bank)[29] for January and July 2016 are provided below. In January 2016, 45% of PV

[28] https://www.nrel.gov/solar/solar-plus-holistic-approach.html

[29] Interval data for a typical residential customer in Connecticut came from Eversource Energy. Solar data is derived from NREL's PV Watts (https://pvwatts.nrel.gov) for a typical residential solar PV system in Connecticut that is 8 kW with a capacity factor of 12.53%.

production is exported to the grid (implying that 55% is used for on-site, household consumption) and about 60% of consumption is met by solar PV production. In July 2016, 37% of PV production is exported to the grid (63% is used for on-site consumption) and about 75% of consumption is met by solar PV production. On average throughout the year, about 50% of PV production is used on site and 50% is exported to the grid. These numbers demonstrate that solar PV provides significant benefit to the grid in reducing electricity demand throughout the year, as well as peak demand in months such as July. As previously noted, behind-the-meter distributed solar PV reduced New England wholesale power costs during a heat wave from July 1 to July 7, 2018[30], and ISO New England reported that the Thanksgiving midday peak "typically seen from ovens and family gatherings was curtailed this year because of the installation of rooftop solar in Connecticut and New England states."[31]

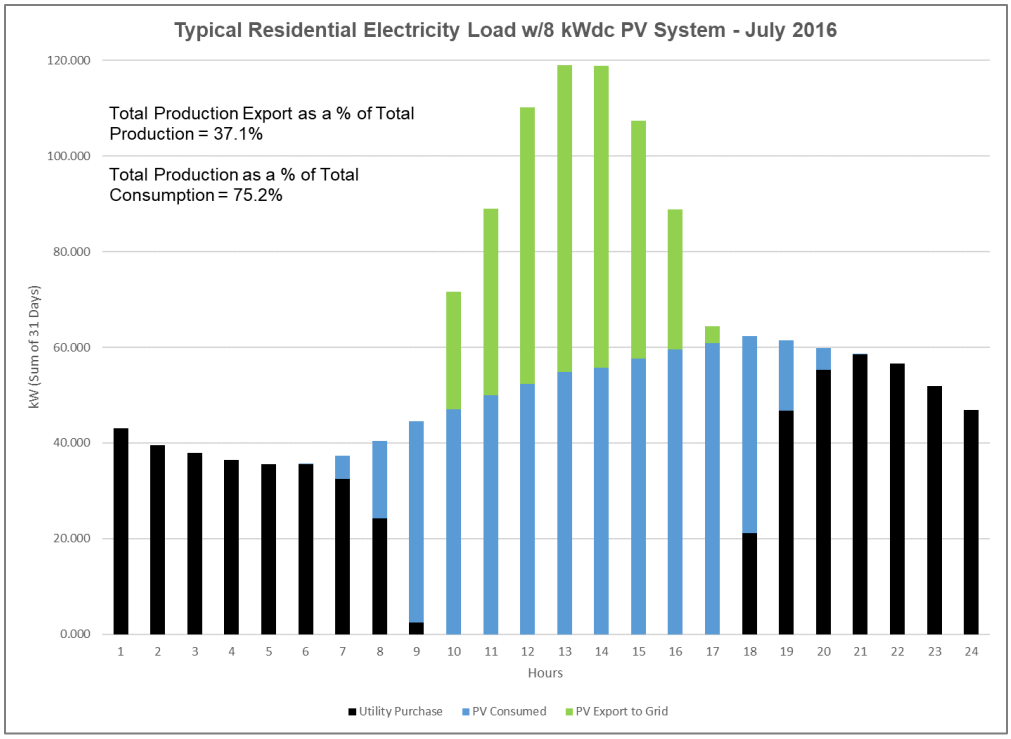
If a complementary technology such as battery storage is installed to store solar energy and dispatch it when the grid needs it the most (i.e., during summer and winter peak demand periods), grid and customer benefits will be further maximized. The Green Bank strongly recommends deployment of complementary technologies such as solar PV plus battery storage,[32] solar PV plus energy efficiency, solar PV plus heat pumps, and other combinations that maximize economic, energy and environmental benefits to all stakeholders.



[30] http://isonewswire.com/updates/2018/7/17/heat-wave-recap-reliable-operations-through-holiday-heat-hum.html, https://pv-magazine-usa.com/2018/07/25/heavy-lifting-by-behind-the-meter-solar-power-in-new-england-heatwave/, https://www.solarreviews.com/news/rooftop-solar-saves-new-englanders-30m-1-week-083118/

[31] https://www.theday.com/local-news/20181224/greenhouse-gas-emissions-continue-to-decline-in-new-england

[32] The Green Bank has submitted Partner and Technology Applications under the Electric Efficiency Partners Program to support enhanced demand-side management technologies that reduce demand, specifically peak demand.



3. **<u>Resource Value Framework</u>** – the Green Bank supports the use of methods and tools for bringing consistency and synergy to State of Connecticut policies in terms of valuing various energy resources. One key method being implemented by DEEP, which has the legislative authority to administer cost-effectiveness assessments for energy efficiency, is the use of the Resource Value Framework provided in the latest edition of the National Standard Practice Manual.[33] The Green Bank supports DEEP's reforms of energy efficiency "cost-effectiveness" screening using the Resource Value Framework, which seeks to value both energy and non-energy costs and benefits with respect to public policy in Connecticut. Consideration should be given to applying this same framework to cost-effectiveness evaluation of all distributed energy resources (e.g., solar PV, battery storage, demand response, etc.) so as to ensure that their individual and collective value toward grid modernization are appropriately and equitably valued.

[33] The National Standard Practice Manual has historically provided guidance on cost-effectiveness testing for energy efficiency technologies, https://nationalefficiencyscreening.org/national-standard-practice-manual/.

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CONNECTICUT GREEN BANK

Memo

To: Bryan Garcia (President and CEO of Green Bank), Kerry O'Neill (CEO of Inclusive Prosperity Capital), and Selya Price (Director of Infrastructure Programs at Green Bank)

From: Isabelle Hazlewood (Associate Manager at Green Bank)

CC: Madeline Priest (Manager at Inclusive Prosperity Capital), Emily Basham (Senior Associate at Green Bank)

Date: February 20, 2019

Re: Residential Solar Investment Program Performance Reaching Minority Households

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Executive Summary

The Connecticut Green Bank's (Green Bank's) low-to-moderate income (LMI) focused solar PV programs have had a significant impact on solar penetration in Connecticut's disadvantaged communities. Solar PV adoption in LMI census tracts is now higher than solar penetration in upper income census tracts based on the distribution of owner-occupied homes. However, recent national studies have shown that there is widespread inequality in the deployment of residential rooftop solar in the U.S. when considering race and ethnicity, and not income alone.[1] In February 2019 the Green Bank conducted an analysis of the distribution of the Residential Solar Investment Program (RSIP) fleet to determine whether or not the program had been successful in reaching minority populations in addition to low-income households.

The analysis shows that the RSIP program has been effective at reaching minority communities, and in some instances penetration in minority communities outperforms penetration in white neighborhoods.

Background

The Connecticut Green Bank was established through Public Act 11-80 in 2011. In 2012, it launched the Residential Solar Investment Program (RSIP) which provides up-front rebates and performance-based incentives to owner-occupied residential solar PV installations through a declining incentive block model. Two years after launching the RSIP, Connecticut experienced huge growth in its residential solar market, expanding from 16 MW approved in 2012-2013, to 33 MW in 2014 alone. Despite this success, only 11% of projects approved in 2014 were located in census tracts with a median income <80% of the area median income. To rectify this

[1] Sunter, D. A., Castellanos, S., & Kammen, D. M. (2019). Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity. *Nature Sustainability,2*(1), 71-76. doi:10.1038/s41893-018-0204-z https://www.nature.com/articles/s41893-018-0204-z

disparity, the Green Bank designed two opportunities to support contractors focused on low-to-moderate income solar deployment and achieve socioeconomic parity within the RSIP.

In 2015, the Green Bank established a unique low-to-moderate income performance-based incentive (LMI PBI) within the RSIP. The LMI PBI incentive is greater than the market rate PBI and is only available to third-party owned solar PV installations serving LMI households. In 2015, the Green Bank also opened an RFP inviting solar financing proposals that would drive deployment in low-to-moderate income communities. As a result of this RFP, the Green Bank also established the Solar for All partnership with PosiGen – a solar provider focused on the LMI market, to help expand solar and energy efficiency deployment in underserved communities. Since launching these programs in 2015, solar adoption in low-to-moderate income communities increased by 187%.[2]

Table 1 RSIP Projects by AMI Band and Calendar Year Approved[3]

AMI Band	2012	2013	2014	2015	2016	2017	2018	Grand Total
<60%	17	36	135	355	658	598	867	2,666
60%-80%	30	100	339	778	869	697	1,069	3,882
80%-100%	107	232	810	1,422	1,137	891	1,380	5,979
100%-120%	155	370	1,028	1,763	1,219	906	1,470	6,911
>120%	462	726	2,152	2,674	1,775	1,421	2,135	11,345
Grand Total	**771**	**1,464**	**4,464**	**6,992**	**5,658**	**4,513**	**6,921**	**30,783**

Table 2 RSIP Distribution as a Percent of Owner-Occupied Homes by Income Band[4]

Census Tract Income Level (AMI)	# Projects	Total Owner-Occupied 1-4 Unit Homes[5]	Percent of Homes with Solar
<60%	2,285	61,818	3.7%
60%-80%	3,635	93,965	3.9%
80%-100%	6,313	172,275	3.7%
100%-120%	8,363	220,022	3.8%
>120%	10,187	332,800	3.1%
Grand Total	**30,783**	**880,880**	**3.5%**

[2] Total RSIP deployment in census tracts <100% AMI was 4,361 at the end of calendar year 2015, and rose to 12,527 at the end of calendar year 2018 representing 187% growth. Total RSIP deployment in census tracts <80% AMI was 1,790 at the end of calendar year 2015 and rose to 6,548 by the end of calendar year 2018 representing 266% growth.

[3] RSIP data through 12/31/2018

[4] RSIP data through 12/31/2018

[5] 2010 American Community Survey. 2010 ACS housing data was used to match the 2010 ACS race and ethnicity data used for the analysis.

Analysis One – RSIP Penetration in Minority Communities

To analyze RSIP penetration in minority communities, data from the 2010 U.S. Census was used to categorize each census tract in Connecticut as "Majority Hispanic", "Majority Black," "Majority White," or "No Majority Race" based on how the population identified in that year. Census tracts were categorized as having a majority race if more than 50% of the population in that census tract identified as Hispanic, black or white.[6] A no majority census tract indicates that there was no single dominant race or ethnic group in that census tract. 79% Of Connecticut's population lives in a predominantly white census tract, 5% live in a majority Hispanic census tract and 3% live in a majority black census tract. 13% of the population lives in a census tract with no dominant race.

Table 3 Connecticut Census Tracts and Population by Race/Ethnicity[7]

	Number of Census Tracts	Total Population	Percent of Population
Majority Hispanic	55	178,863	5.0%
Majority Black	26	97,565	2.7%
Majority White	633	2,816,730	78.8%
No Majority Race	114	480,939	13.5%
Grand Total	**828**	**3,574,097**	**100%**

Because the RSIP program is limited to owner-occupied households the analysis also looked at the distribution of owner-occupied households in each census tract category. 89% of owner-occupied households in Connecticut are located in majority white census tracts, while less than 2% of owner-occupied households are located in majority Hispanic or black census tracts.

Table 4 Owner-Occupied 1-4 Unit Homes by Race/Ethnicity of Census Tract[8]

	Number of Owner-Occupied 1-4 Unit Homes	Percent of all Owner-Occupied 1-4 Unit Homes
Majority Hispanic	14,568	1.7%
Majority Black	13,953	1.6%
Majority White	787,514	89.4%
No Majority Race	64,845	7.4%
Grand Total	**880,880**	**100%**

Comparing the distribution in the RSIP to the distribution of owner-occupied homes by race/ethnicity reveals that the distributions roughly mirror each other, and in some instances the RSIP is overrepresented in minority tracts. 1.6% of RSIP projects and 1.7% owner-occupied households are located in majority Hispanic neighborhoods while 2.2% of RSIP projects are in census tracts that identified as majority black compared to just 1.6% of owner-occupied

[6] No census tract in Connecticut had a majority population other than white, Hispanic or black.
[7] 2010 American Community Survey
[8] 2010 American Community Survey

households. The RSIP is overrepresented in no majority tracts, which contain 10.6% of projects vs 7.4% of owner-occupied homes respectively.

Table 5 Distribution of RSIP Projects Compared to Owner-Occupied Households by Race/Ethnicity[9]

	Percent of 1-4 Unit Owner-Occupied Homes	**Percent of RSIP Projects**
Majority Hispanic	1.7%	1.6%
Majority Black	1.6%	2.2%
Majority White	89.4%	85.6%
No Majority Race	7.4%	10.6%
Grand Total	**100%**	**100%**

In addition to owner-occupancy, the analysis also considered income. The majority owner-occupied homes in predominantly minority census tracts in the state are located in census tracts with a median income <80% of the area median. The majority of owner-occupied homes in upper income census tracts are majority white census tracts, although a small portion (3.3%) of the homes are in no majority race census tracts.

Table 6 Distribution of Owner-Occupied Homes by Race/Ethnicity and Income[10][11]

Income Band (% of AMI)	**Majority Hispanic**		**Majority Black**		**Majority White**		**No Majority Race**	
	Number of OO Homes	**Percent of OO Homes**	**Number of OO Homes**	**Percent of OO Homes**	**Number of OO Homes**	**Percent of OO Homes**	**Number of OO Homes**	**Percent of OO Homes**
<60%	12,158	19.67%	4,702	7.61%	14,248	23.05%	30,710	49.68%
60%-80%	1,198	1.27%	5,650	6.01%	65,093	69.27%	22,024	23.44%
80%-100%	1,212	0.70%	2,383	1.38%	164,278	95.36%	4,402	2.56%
100%-120%	--	--	1,218	0.55%	212,470	96.57%	6,334	2.88%
>120%	--	--	--	--	331,425	99.59%	1,375	0.41%
Grand Total	**14,568**	**1.65%**	**13,953**	**1.58%**	**787,514**	**89.40%**	**64,845**	**7.36%**

When comparing the distribution of the RSIP portfolio to the distribution of owner-occupied homes in minority tracts by income band, we see that the RSIP again mirrors or is overrepresented in minority tracts compared to white majority tracts. In the <60% AMI band the percent of RSIP projects in that income band is slightly below par with the number of owner-occupied homes in majority-Hispanic neighborhoods (19.7% vs 16.9%), and beyond parity with respect to the number of owner-occupied homes in majority black and no majority tracts (7.6% homes vs 8.9% of solar projects, and 49.7% of homes vs 58.6% of solar projects respectively). The same trend is observed in the 60-80% AMI band. In the upper-income bands the RSIP is

[9] 2010 American Community Survey and RSIP data through 12/31/2018

[10] "Percent of homes" indicates the percent of homes in that income band.

[11] 2010 American Community Survey and RSIP data through 12/31/2018

overrepresented in no majority census tracts compared to owner-occupied housing, and slightly below parity compared to owner-occupied homes in majority white census tracts.

Table 7 Owner-Occupied Housing and RSIP Distribution by Race/Ethnicity and Income[12][13]

Income Band (% of AMI)	Majority Hispanic		Majority Black		Majority White		No Majority Race	
	% of OO Homes	% of RSIP	% of OO Homes	% of RSIP	% of OO Homes	% of RSIP	% of OO Homes	% of RSIP
<60%	19.67%	16.89 %	7.61%	8.93%	23.05%	15.54 %	49.68%	58.64%
60%-80%	1.27%	1.51%	6.01%	7.32%	69.27%	57.91 %	23.44%	33.26%
80%-100%	0.70%	0.81%	1.38%	2.22%	95.36%	93.76 %	2.56%	3.22%
100%-120%	--	--	0.55%	0.85%	96.57%	93.84 %	2.88%	5.31%
>120%	--	--	--	--	99.59%	99.37 %	0.41%	0.63%
Grand Total	**1.65%**	**1.60%**	**1.58%**	**2.21%**	**89.40%**	**85.60 %**	**7.36%**	**10.59%**

Lastly, when comparing installation rates per owner-occupied home by race/ethnicity we see that the RSIP has been successful in reaching minority communities. On an installation per owner-occupied home basis, there are 46% more installations in majority black census tracts than majority white census tracts and 50% more installations in no majority race census tracts than white majority census tracts.

Table 8 RSIP Installations Per Capita Comparison[14]

	Number of Owner-Occupied 1-4 Unit Homes	Number of RSIP Installations	Number of Installations per Owner-Occupied Household	Percent Increase/Decrease Compared to the Number of RSIP Installations per OOH in white-majority tracts
Majority Hispanic	14,568	492	0.0338	1%
Majority Black	13,953	681	0.0488	46%
Majority White	787,514	26,350	0.0335	0%
No Majority Race	64,845	3,260	0.0503	50%
Grand Total	**880,880**	**30,783**	**0.0349**	**4%**

[12] These figures represent total owner-occupied homes in the state, however the following municipalities are served by municipal or cooperative utilities and are ineligible for the RSIP: Bozrah, Groton, Norwich, Wallingford.

[13] 2010 American Community Survey and RSIP data through 12/31/2018

[14] 2010 American Community Survey and RSIP data through 12/31/2018

Analysis Two – Solar for All Penetration in Minority Communities

The above analysis was conducted again using only data on the Solar for All program's (PosiGen's) solar installations. As the primary Green Bank-supported driver of solar adoption in LMI communities, the goal of this analysis was to determine whether the Solar for All program and its implementer, PosiGen, had been more successful at reaching minority populations than the RSIP overall. The results show that PosiGen has been more successful in reaching minority communities than the RSIP portfolio – 6-8% of PosiGen's projects are in majority Hispanic or black census tracts and over 35% of their projects are in no majority census tracts. On a per owner-occupied home basis, PosiGen has 910% more projects per home in majority black census tracts than majority white census tracts, 911% more projects in no majority tracts than majority white census tracts and 666% more projects in majority Hispanic tracts.

Table 9 Distribution of Solar for All Projects Compared to Owner-Occupied Households by Race/Ethnicity[15]

	Percent of 1-4 Unit Owner-Occupied Homes in Connecticut	**Percent of Solar for All PosiGen Projects**
Majority Hispanic	1.7%	6.6%
Majority Black	1.6%	8.3%
Majority White	89.4%	46.4%
No Majority Race	7.4%	38.7%
Grand Total	**100.0%**	**100.0%**

Table 10 Owner-Occupied Housing and Solar for All Project Distribution by Race/Ethnicity and Income[16]

Income Band (% of AMI)	**Majority Hispanic**		**Majority Black**		**Majority White**		**No Majority Race**	
	% of OO Homes	% of Projects	% of OO Homes	% of Projects	% of OO Homes	% of Projects	% of OO Homes	% of Projects
<60%	19.7%	17.26%	7.6%	12.65%	23.0%	3.57%	49.7%	66.52%
60%-80%	1.3%	2.41%	6.0%	13.08%	69.3%	35.61%	23.4%	44.89%
80%-100%	0.7%	1.44%	1.4%	3.16%	95.4%	91.67%	2.6%	3.74%
100%-120%	0.0%	0.00%	0.6%	2.36%	96.6%	74.75%	2.9%	22.90%
>120%	0.0%	0.00%	0.0%	0.00%	99.6%	94.71%	0.4%	5.29%
Grand Total	**1.7%**	**6.58%**	**1.6%**	**8.31%**	**89.4%**	**46.44%**	**7.4%**	**1.7%**

[15] 2010 American Community Survey and RSIP data through 12/31/2018

[16] 2010 American Community Survey and RSIP data through 12/31/2018

Table 11 Solar for All Installations Per Capita Comparison[17]

	Number of Owner-Occupied 1-4 Unit Homes	Number of Solar for All Installations	Number of Installations per Owner-Occupied Household	Percent Increase/Decrease Compared to the Number of Solar for All Installations per OOH in white-majority tracts
Majority Hispanic	14,568	133	0.0091	666%
Majority Black	13,953	168	0.0120	910%
Majority White	787,514	939	0.0012	0%
No Majority Race	64,845	782	0.0121	911%
Grand Total	**880,880**	**2,022**	**0.0023**	**93%**

Table 12 Distribution of RSIP Portfolio Compared to Solar for All Portfolio by Race/Ethnicity[18]

	Number of RSIP Installations	Percent of RSIP Installations	Number of Solar for All Installations	Percent of Solar for All Installations
Majority Hispanic	492	1.60%	133	6.58%
Majority Black	681	2.21%	168	8.31%
Majority White	26,350	85.60%	939	46.44%
No Majority Race	3,260	10.59%	782	38.67%
Grand Total	**30,783**	**100.00%**	**2,022**	**100.00%**

Conclusion

This analysis shows that there is a clear correlation between income, race and ethnicity and homeownership in Connecticut. Over 89% of owner-occupied homes in Connecticut are located in majority white census tracts, and 61% of these homes are located in census tracts with median income greater than 100% of the area median income. Despite these institutional barriers to homeownership, and as a by-product, solar access, data from the Connecticut Green Bank's Residential Solar Investment Program (RSIP) demonstrates that states can achieve "solar parity" across various race, ethnic and income groups. LMI and minority communities that were previously underrepresented in solar PV adoption responded favorably to measured incentives and market focus. The experience in Connecticut bucks the trend of recent national studies that have shown a widespread inequality in the deployment of rooftop solar in the U.S. when considering race and ethnicity. Despite this success, there is still much work to be done to ensure equitable access to clean energy in the state. Less than 5% of owner-occupied households across all racial, ethnic and income groups have been able to participate in the state's primary residential solar program thus far, and many more renters could be reached through shared clean energy programs. Continued and improved opportunities for participation across all racial, ethnic and income groups could play a major role in widespread support for a

[17] 2010 American Community Survey and RSIP data through 12/31/2018

[18] RSIP data through 12/31/2018

transition to more renewable energy to not only improve our environment but ensure inclusive prosperity in the growing green economy.

1305 Post Road: A C-PACE Project in Fairfield, CT

Address	1305 Post Road, Fairfield CT 06824			
Owner	1305 Post Road, LLC			
Proposed Assessment	$645,286			
Term (*years*)	20			
Term Remaining (*months*)	Pending construction completion			
Annual Interest Rate[1]	6.25%			
Annual C-PACE Assessment	$57,363			
Savings-to-Investment Ratio	1.08			
Average DSCR	[redacted]			
Lien-to-Value	[redacted]			
Loan-to-Value	[redacted]			
Projected Energy Savings (mmBTU)		EE	RE	Total
	Per year		650	650
	Over EUL		16,239	16,239
Estimated Cost Savings (incl. ZRECs and tax benefits)	Per year		$58,884	$58,884
	Over EUL		$1,472,092	$1,472,092
Objective Function	25.2 kBTU / ratepayer dollar at risk			
Location	Fairfield			
Type of Building	Commercial			
Year of Build	1966			
Building Size (*sf*)	42,098			
Year Acquired by Owner	2014			
As-Complete Appraised Value[2]	[redacted]			
Mortgage Lender Consent	[redacted]			
Proposed Project Description	181.4 kW Solar PV			
Est. Date of Construction Completion	Pending closing			
Current Status	Awaiting Board of Directors Approval			
Energy Contractor	[redacted]			
Notes				

[redacted]

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