845 Brook Street
Rocky Hill, Connecticut 06067

300 Main Street, 4th Floor
Stamford, Connecticut 06901

T: 860.563.0015
F: 860.563.4877
www.ctcleanenergy.com

CLEAN ENERGY
FINANCE AND INVESTMENT AUTHORITY

January 16, 2015

Dear Norma and John:

On behalf of Commissioner Smith, thank you again for your willingness to participate on the Joint Committee of the Connecticut Energy Efficiency Board and the Connecticut Green Bank Board of Directors.

We have a regular meeting of the Joint Committee scheduled for Wednesday, January 21, 2015 from 1:30 to 3:30 p.m. in the Commissioners Conference Room of the Department of Energy and Environmental Protection at 10 Franklin Square, New Britain, CT.

On the agenda we have the following items:

- **Governance** – we will quickly update you all on the status of the Bylaws and then begin the process to nominate and elect the Chair and Vice Chair. Craig Diamond and myself are willing to serve in the role of Co-Secretary to continue to coordinate the Joint Committee if nominated.

- **Strategic Objectives** – to continue to better understand how each organization measures results, we will provide highlights on progress to date with regards to each of our respective plans. We will also discuss a residential financing alignment document as an example of how our teams are coordinating activities.

- **Areas of Joint Priorities for Financing** – as we continue to focus on the five areas of priority for financing, we will have our staffs provide an update on the residential, commercial & industrial, and multifamily programs. Given the priority of low income and multifamily consumers for the Connecticut Green Bank, our staff will be presenting the research findings that you already received at the December 19th Board of Directors meeting of the Green Bank.

- **Measuring Success** – we will discuss some highlights on how residential financing programs might be evaluated and measured for success.

- **New developments in Efficiency and Financing** – and lastly, we will engage Bert Hunter and Chris Kramer (i.e., Finance Consultant to the EEB) to offer up new developments and insights in efficiency and financing.

I have established a New Year's resolution to do a much better job helping coordinate this Joint Committee. So please do let me know what I can do in order to do a better job.

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. Until then, enjoy the long weekend in honor of Martin Luther King Jr., Day.

Sincerely,

Bryan Garcia
President and CEO

AGENDA

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board of Directors
10 Franklin Square, New Britain, CT

Wednesday, January 21, 2015
1:30-3:30 p.m.

1. Call to Order

2. Public Comments

3. Approval of Meeting Minutes for October 22, 2014 meeting

4. Governance (15 min)

5. Strategic Objectives (30 min)

    a. 2015 Update to the 2013-15 C&LM Plan - highlights
    b. FY 2015-2016 Connecticut Green Bank Comprehensive Plan - highlights
    c. Residential Financing Alignment document

6. Areas of Joint Priorities for Financing (45 min)

    a. Residential (HES Loan/CHIF Re-Capitalization, Smart-E Bundle, OBR, Residential PACE)
    b. C&I (C-PACE, SBEA, LBE)
    c. Multi-Family - Green Bank Low Income Housing Market Analysis and Financing Strategy

7. Measuring Success - update/continuation of July 2014 agenda item (20 min)

    a. Highlights from Residential Financing "performance" discussion
    b. Residential Financing Market study, and next steps
    c. Approaches in other states (LBNL research) - Chris Kramer

8. New Developments in Efficiency and Financing (10 min)

    a. Secondary Markets (SEEAction paper) – Chris Kramer
    b. Innovations in Clean Energy Finance – Bert Hunter

9. Adjourn

Join the meeting online at: https://www4.gotomeeting.com/join/637583663
Dial-in: (571) 317-3122 / Access Code: 637-583-663

Next Quarterly Meeting: Wednesday, April 22, 2015
In the Commissioners Conference Room
DEEP, 10 Franklin Square, New Britain, CT

RESOLUTIONS

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board of Directors
10 Franklin Square, New Britain, CT

Wednesday, January 21, 2015
1:30-3:30 p.m.

1. Call to Order

2. Public Comments

3. Approval of Meeting Minutes for October 22, 2014 meeting

   Resolution #1

   Motion to approve the minutes of the Joint Committee for October 22, 2014. Second. Discussion. Vote.

4. Governance (15 min)

   Resolution #2 – Chair

   Bryan Garcia asks for nominations for the election of Chair. A Voting Member nominates someone to serve as Chairperson. Another Board Member seconds the nomination. Bryan asks for any additional nominations. Hearing none, Bryan calls for a vote on the nominee, and declares the nominee elected as Chair.

   Chair takes over the meeting agenda.

   Resolution #3 – Vice Chair

   Chair asks for nominations for the election of Vice Chair. A Voting Member nominates someone to serve as Vice Chairperson. Another Board Member seconds the nomination. Chair asks for any additional nominations. Hearing none, Chair calls for a vote on the nominee, and declares the nominee elected as Vice Chair.

   Resolution #4 – Secretary

   Chair asks for nominations for the election of Secretary. A Voting Member nominates someone to serve as Secretary. Another Board Member seconds the nomination. Chair

asks for any additional nominations. Hearing none, Chair calls for a vote on the nominee, and declares the nominee elected as Secretary.

5. Strategic Objectives (30 min)

    a. 2015 Update to the 2013-15 C&LM Plan - highlights
    b. FY 2015-2016 Connecticut Green Bank Comprehensive Plan - highlights
    c. Residential Financing Alignment document

6. Areas of Joint Priorities for Financing (45 min)

    a. Residential (HES Loan/CHIF Re-Capitalization, Smart-E Bundle, OBR, Residential PACE)
    b. C&I (C-PACE, SBEA, LBE)
    c. Multi-Family - Green Bank Low Income Housing Market Analysis and Financing Strategy

7. Measuring Success - update/continuation of July 2014 agenda item (20 min)

    a. Highlights from Residential Financing "performance" discussion
    b. Residential Financing Market study, and next steps
    c. Approaches in other states (LBNL research) - Chris Kramer

8. New Developments in Efficiency and Financing (10 min)

    a. Secondary Markets (SEEAction paper) – Chris Kramer
    b. Innovations in Clean Energy Finance – Bert Hunter

9. Adjourn

Join the meeting online at: https://www4.gotomeeting.com/join/637583663
Dial-in: (571) 317-3122 / Access Code: 637-583-663

Next Quarterly Meeting: Wednesday, April 22, 2015
In the Commissioners Conference Room
DEEP, 10 Franklin Square, New Britain, CT

energize CONNECTICUT

Empowering you to make smart energy choices

Joint Committee

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

Department of Energy and Environmental Protection
January 21, 2015

energize CONNECTICUT

Empowering you to make smart energy choices

Agenda Item #1

Call to Order

energize CONNECTICUT

Empowering you to make smart energy choices

Agenda Item #2

Public Comments

energize CONNECTICUT

Empowering you to make smart energy choices

Agenda Item #3

Approval of Meeting Minutes of October 22, 2014

energize CONNECTICUT

Empowering you to make smart energy choices

Agenda Item #4

Governance

Update and Next Steps

- **Composition** – Joint Committee Bylaws approved by CEEF and CGB; appointments to the Joint Committee confirmed

	DEEP	CEEF	CGB
Voting	[TBD]	Eric Brown Amanda Fargo-Johnson	Norma Glover John Harrity
Non-Voting Members		Matt Gibbs Pat McDonnell	Bryan Garcia Bert Hunter

- **Elections** – per the Joint Committee Bylaws, nominate and select Chair, Vice Chair, and Secretary

Chair	
Vice Chair	
Secretary	

energize CONNECTICUT

energize CONNECTICUT

Empowering you to make smart energy choices

Agenda Item #5

Strategic Objectives

2015 Update to 2013-15 C&LM Plan
Connecticut Energy Efficiency Fund

- Customer Services
  - Financial Incentives (66% of budget)
  - Technical and Installation Services
  - Financing
  - Education & Community Development
- Impacts
  - 2.8 million high efficiency retail products
  - 1,277 efficient new homes constructed
  - 32,000 homes served
  - 357,000 home energy reports delivered
  - 5,700 businesses served
  - 8,000 job years, $700M secondary economic benefit*

energize CONNECTICUT

*** Macroeconomic Impacts of Rhode Island Energy Efficiency Investments, National Grid, November 2014**

2015 Update to 2013-15 C&LM Plan
Connecticut Energy Efficiency Fund

Statewide Annual Savings (MMBtu)	Value of Benefits ("Modified Utility")*	Costs (2015 Budget)	Net Benefits (Benefits - Costs)	Benefit/Cost Ratio
2,024,553	$532,618,000	$225,323,000	**$307,295,000**	**2.36**

*Modified utility benefits include oil and propane.

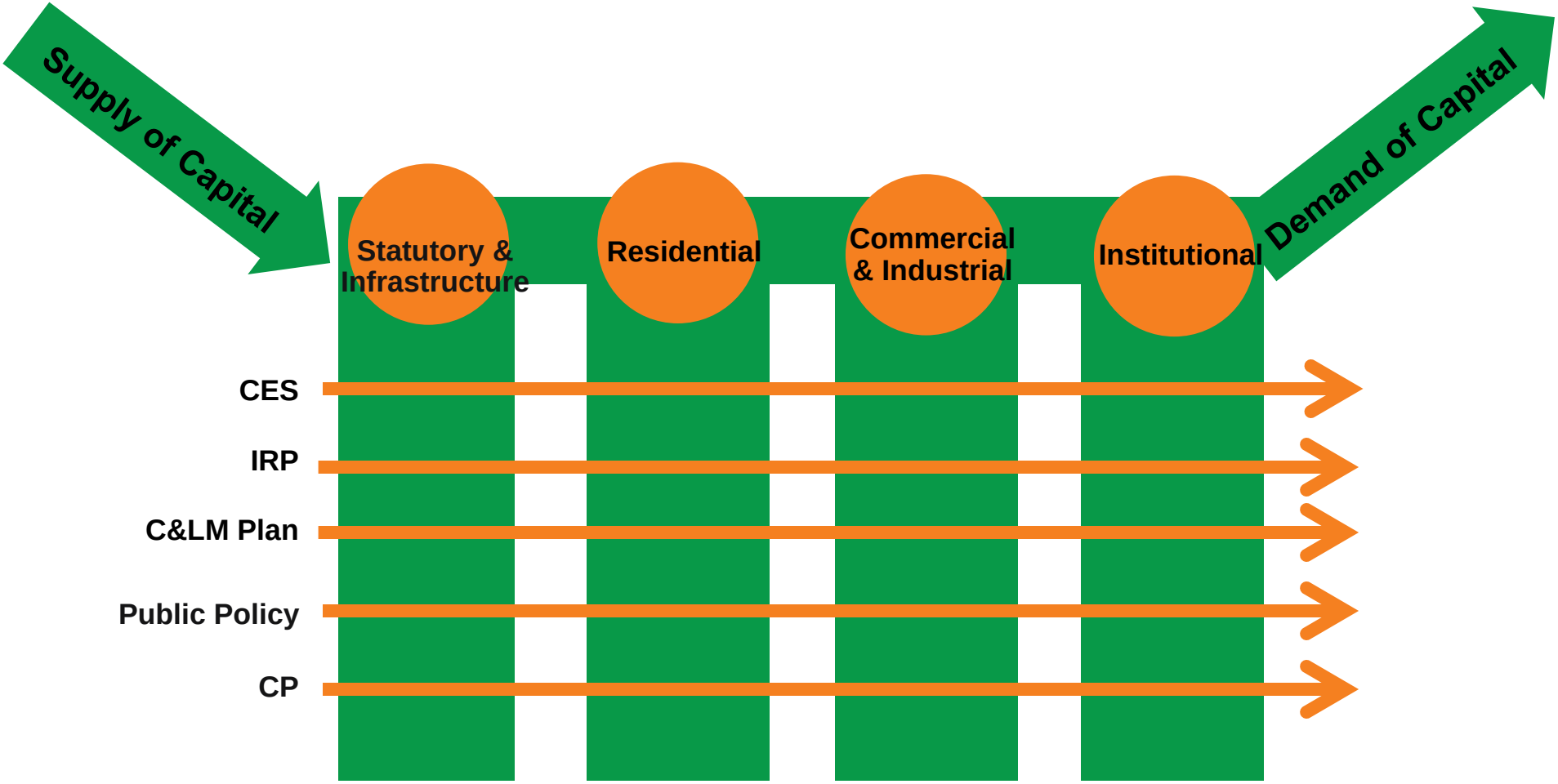
Key Takeaways:

- Every dollar spent on efficiency (including incentives, admin, etc.) avoids $2.36 in supply-side costs. If not for the programs, those costs would be passed onto customers.
- I.e., while there is a cost to ratepayers to support the program budgets, the overall cost to them of not having the programs would be significantly higher.
- Realizing benefits depends on successfully achieving program participation. Goal is to strike a balance that encourages greatest participation at lowest customer acquisition cost.

energize CONNECTICUT

FY 2015-16 Comprehensive Plan

Connecticut Green Bank – Progress to Targets



energize CONNECTICUT

FY 2015-16 Comprehensive Plan
Statutory and Infrastructure

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

Program	Q2 Closed	Q2 Targets	Approved (but not yet Closed)	+ Q1 & Q2 Closed	= Total Approved & Closed	FY 2015 Targets
CHP and AD	0.0 / 0	7.7 / 356,054	5.8 / 118,575	0.0 / 0	5.8 / 118,575	14.8 / 684,364
Grid and Infrastructure	5.0 / 26,900	0.0 / 0	0.0 / 0	5.0 / 26,900	5.0 / 26,900	0.0 / 0
RSIP	14.0 / 45,644	5.8 / 22,889	N/A	26.0 / 82,880	26.0 / 82,880	23.1 / 91,556
Total	19.0 / 72,544	13.5 / 378,943	5.8 / 118,575	31.0 / 109,780	36.8 / 228,355	37.9 / 775,920

Projects and Funding

Program	Q2 Closed	Q2 Targets	Approved (but not yet Closed)	+ Q1 & Q2 Closed	= Total Approved & Closed	FY 2015 Targets
Projects	1,828	805	5	3,383	3,388	3,217
Capital Deployed	$82,910,500	$73,700,000	$75,826,825	$134,503,319	$210,330,144	$207,100,000

energize CONNECTICUT

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

FY 2015-16 Comprehensive Plan
Residential

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

Program	Q2 Closed	Q2 Targets	Approved (but not yet Closed) +	Q1 & Q2 Closed =	Total Approved & Closed	FY 2015 Targets
Cozy Home	0.0 / 0	0.0 / 136	0.0 / 0	0.0 / 10	0.0 / 10	0.0 / 680
Smart-E	0.2 / 1,316	0.1 / 1,471	0.4 / 1,891	0.4 / 2,777	0.8 / 4,668	0.7 / 5,518
Solar Lease	1.0 / 3,278	0.7 / 2,521	3.6 / 11,796	1.5 / 4,744	5.1 / 16,540	2.8 / 10,920
Solar Loan	0.5 / 1,612	0.8 / 3,220	0.2 / 803	1.0 / 3,302	1.2 / 4,105	3.3 / 12,744
Total	1.7 / 6,206	1.6 / 7,348	4.2 / 14,490	2.9 / 10,833	7.1 / 25,323	6.8 / 29,862

Projects and Funding

Program	Q2 Closed	Q2 Targets	Approved (but not yet Closed) +	Q1 & Q2 Closed =	Total Approved & Closed	FY 2015 Targets
Projects	251	295	601	440	1,041	1,195
Capital Deployed	$7,841,562	$7,337,500	$20,171,221	$13,368,248	$33,539,469	$28,502,500

energize CONNECTICUT

REFERENCES
Smart-E lender data is as of 11/30/2014.
Closed includes closed and completed.
Total Approved & Closed Projects = 10% EE, 82% RE, 4% Both and 4% unknown.

FY 2015-16 Comprehensive Plan
Commercial and Industrial

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

Program	Q2 Closed	Q2 Targets	Approved (but not yet Closed)	+	Q1 & Q2 Closed	=	Total Approved & Closed	FY 2015 Targets
CT Solar Lease	0.9 / 2,778	-	0.0 / 0		0.9 / 2,778		0.9 / 2,778	-
C-PACE	0.9 / 4,956	2.7 / 34,355	6.0 / 63,795		2.0 / 16,461		4.7 / 80,256	8.8 / 114,517
Total	1.8 / 7,734	2.7 / 34,355	6.0 / 63,795		2.9 / 19,239		5.6 / 83,034	8.8 / 114,517

Projects and Funding

Program	Q2 Closed	Q2 Targets	Approved (but not yet Closed)	+	Q1 & Q2 Closed	=	Total Approved & Closed	FY 2015 Targets
Projects	13	19	37		23		60	63
Capital Deployed	$6,835,160	$15,000,000	$28,092,658		$14,107,717		$42,200,375	$50,000,000

energize CONNECTICUT

REFERENCES

Closed includes closed and completed.
Total Approved & Closed Projects = 28% EE, 57% RE and 15% Both.

FY 2015-16 Comprehensive Plan
Institutional

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

Program	Q2 Closed	Q2 Targets	Approved (but not yet Closed)	+ Q1 & Q2 Closed	= Total Approved & Closed	FY 2015 Targets
Institutional Off-Credit ESA	0.0 / 0	0.0 / 33,334	0.0 / 0	0.00 / 0	0.0 / 0	0.0 / 66,668
LBE – Municipal	0.0 / 0	0.0 / 0	0.0 / 0	0.00 / 0	0.0 / 0	0.0 / 166,667
LBE- State	0.0 / 0	0.0 / 38,095	0.0 / 0	0.00 / 0	0.0 / 0	0.0 / 266,668
CT Solar Lease	0.6 / 2,011	0.8 / 3,348	0.0 / 0	0.00 / 0	0.6 / 2,011	2.0 / 8,370
Total	0.6 / 2,011	0.8 / 74,777	0.0 / 0	0.00 / 0	0.6 / 2,011	2.0 / 508,373

Projects and Funding

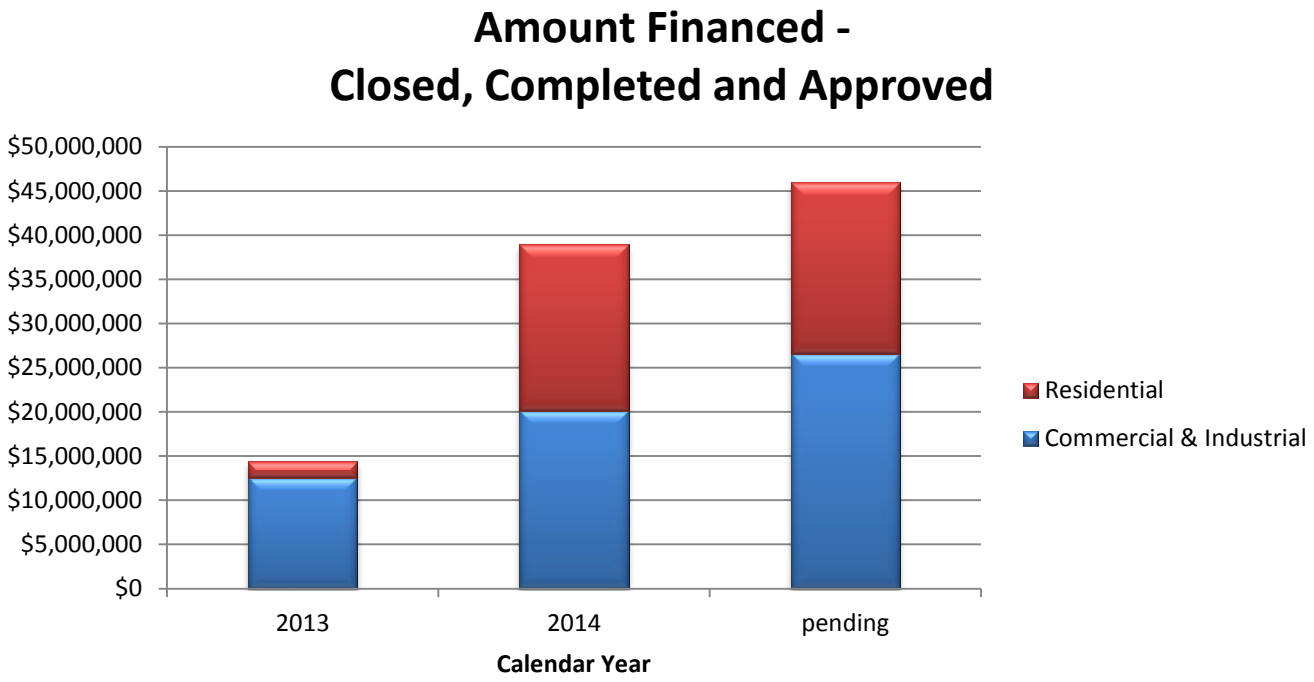
Program	Q2 Closed	Q2 Targets	Approved (but not yet Closed)	+ Q1 & Q2 Closed	= Total Approved & Closed	FY 2015 Targets
Projects	4	6	0	10	10	25
Capital Deployed	$1,922,337	$32,400,000	$0	$3,667,906	$5,590,243	$166,000,000

energize CONNECTICUT

REFERENCES

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

Connecticut Green Bank
Financing Progress



- Of the Residential financing, 89% is RE, 2% is EE, 3% is combined, and 3% is conversion
- Of the C&I financing, 56% is RE, 23% is EE and 21% is combined.

Residential Financing Alignment Document

Energize CT EE Financing*		
EE Payment Plan Delivered through HES and Home Performance (up to $3,000)[1]	**Comprehensive, Multi-Measure Bundle Qualified EE Project Loan ($3,000-$25,000)**	**All Other Projects ($3,000 - $25,000)[3]**
0% up to 36 months	2.99% up to 10 years[2]	4.49% for 5 years 4.99% for 7 years 5.99% for 10 years 6.99% for 12 years
Note: CHIF is repositioned to fill gap between $2,500 and $3,000 Smart-E.	The 2.99% is currently offered by both CHIF and participating Green Bank lenders. CHIF requires participation in the HES program (including an energy audit) and the installation of at least two eligible measures, with at least one from a specific subset of incentivized measures. Green Bank 2.99% Smart-E Bundle rate is based on installing two or more eligible measures.	Note: CHIF is repositioned to have the same loan terms as CEFIA's interest rate caps.

energize CONNECTICUT

energize CONNECTICUT

Empowering you to make smart energy choices

Agenda Item #6

Areas of Joint Priorities for Financing

Residential

HES Loan/CHIF Recap/Smart-E Bundle, OBR, R-PACE

HES Loan Re-Capitalization – Working to secure ~$10 million for CHIF

- Products include:
  1. Energy Efficiency Payment Plan Loan – 0%/3 years/up to $3K
  2. Comprehensive Loan (2.99%) for credit-challenged customers – like Smart-E Bundle offer
  3. Smart-E loan terms for credit challenged customers
- "Prime" customers for Comprehensive Loan will move to Smart-E Bundle
- Green Bank will provide loan loss reserve for CHIF, Green Bank will also support interest rate buy-downs for Smart-E Bundle and CHIF's Comprehensive Loan through end of 2015 using ARRA $'s
- Going out to capital providers in next few weeks – primarily local and regional banks
  - CHIF's current loan portfolio will be used to collateralize a note for the new capital

Cozy Home Loan Relaunch – Met with utilities; social service agency outreach underway

Smart-E On-Bill Repayment – Targeting June 2015 launch

- Draft cost recovery agreement between Green Bank and Companies with Companies for review
- Working on model for eligibility screening and consumer disclosures – Working Group review in Mar
- Outreach starting to lenders in February

R-PACE – Study complete and going to Legislature; recommends pursuing residential PACE policy

energize CONNECTICUT

Optimize C-PACE Financing and Incentives

- Pressure to leverage or reduce EEB funds. EEB Board Priority: Given positive cash flow and other attractive C-PACE features, “Optimize the mix of financing and incentives for the C-PACE product to make the best use of limited CEEF program funds.” (January 29, 2014)
- Understanding by Joint Committee that no end-use customer who receives C-PACE financing will receive a different incentive from CEEF than customer who doesn’t use C-PACE financing regardless of SIR (July 16, 2014)
- Going forward: explore opportunities to use positive-cash-flow financing (SIR > 1) to “leverage up” program resources.

energize CONNECTICUT

CGB

C-PACE Analysis

- Purpose: Explore how financing, incentives, and other program offerings can work together to produce deeper savings and more comprehensive projects.
- CEEF Consultants provided access to C-PACE CDMP data from SRS through NDA
- CGB working with SRS to develop an SIR calculator w/ and w/o CEEF incentives
- CGB “Data Smash” with SRS

energize CONNECTICUT

Commercial & Industrial

C-PACE – Project Types

Property Type	Project Type				
	EE Multi Measure	EE Single Measure	Solar PV Only	Mixed EE & RE	Total
Office	13		6	2	21
Retail	1		11	1	13
Manufacturing/Industrial Plant	1		5	1	7
Non-Refrigerated Warehouse			6	1	7
Multifamily Housing		2	2		4
Worship Facility		2			2
Hotel	1		1		2
K-12 School	1				1
Senior Care Community		1			1
Other	2	1	1		4
Project Count Totals	**19**	**6**	**32**	**5**	**62**
Percent of Total	**31%**	**10%**	**52%**	**8%**	**100%**

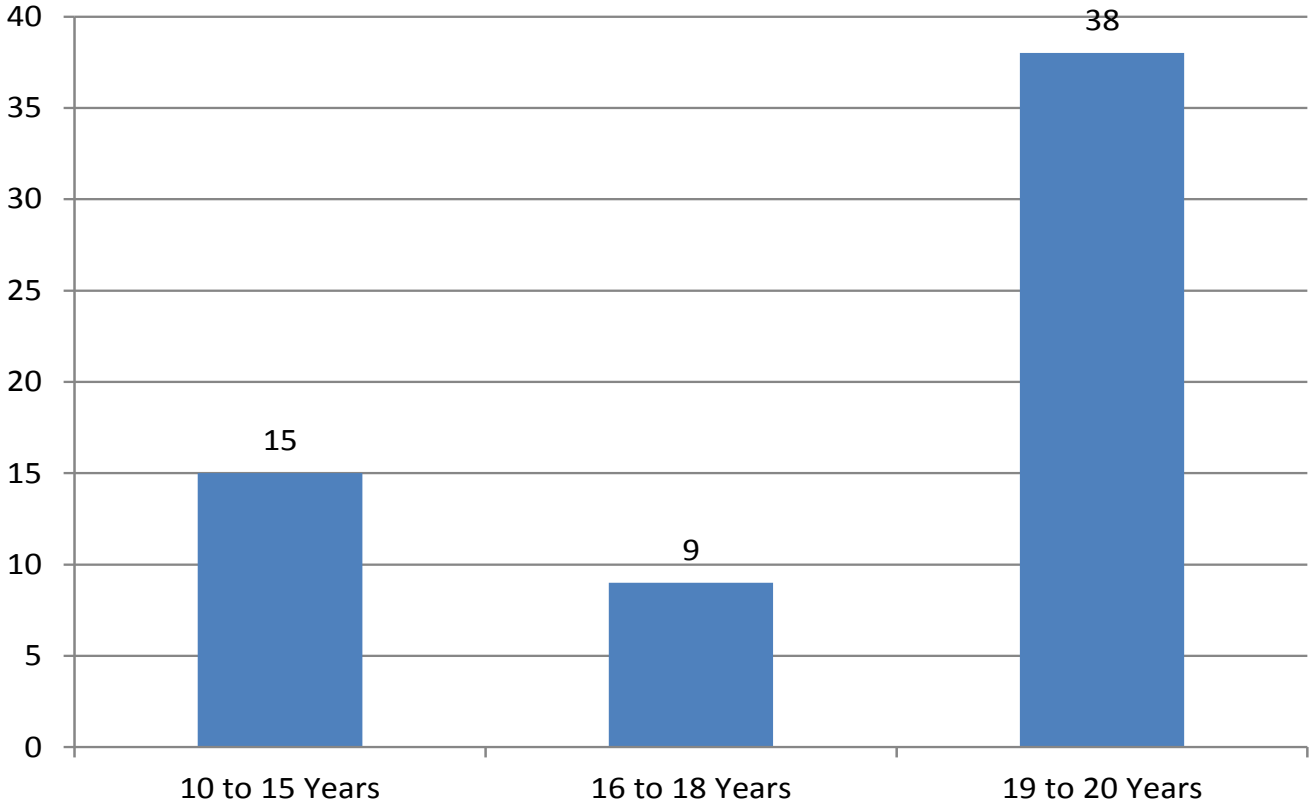
energize CONNECTICUT

REFERENCES

Data Smash meeting with SRS (approved and closed projects as of November 5, 2014)

Commercial & Industrial

C-PACE – Financing Terms

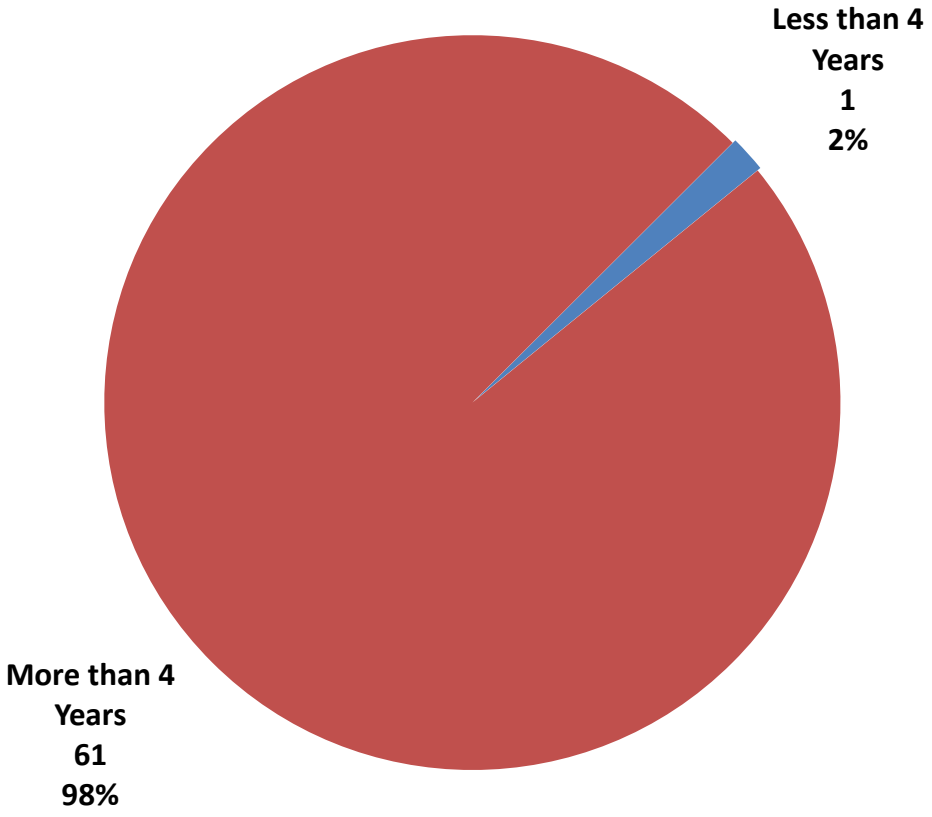


REFERENCES

Data Smash meeting with SRS (approved and closed projects as of November 5, 2014)

Commercial & Industrial

C-PACE – Payback

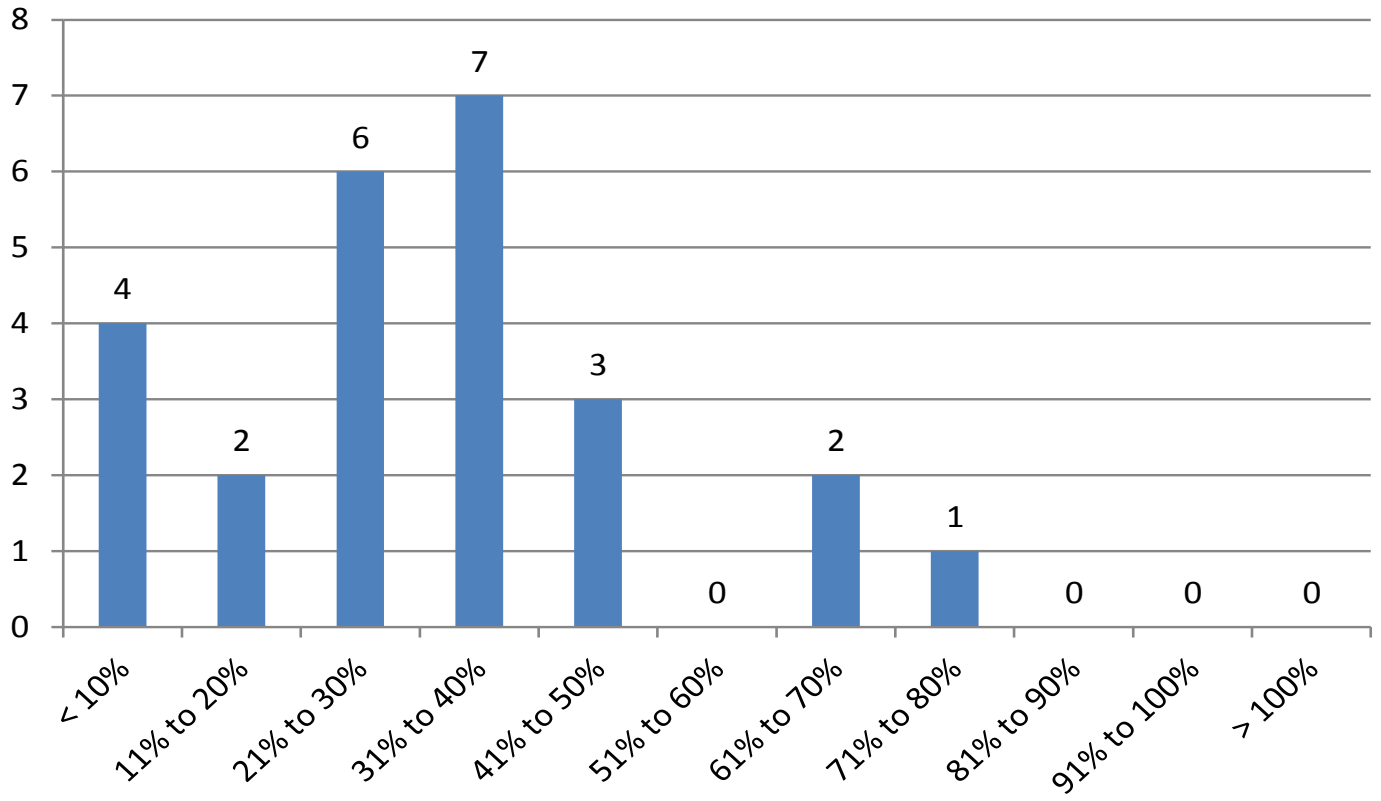


REFERENCES

Data Smash meeting with SRS (approved and closed projects as of November 5, 2014)

Commercial & Industrial

C-PACE – How Deep are EE Projects?



REFERENCES

Data Smash meeting with SRS (approved and closed projects as of November 5, 2014)

Commercial & Industrial

C-PACE – Value of Financing Deeper ECMs

Measure Payback (Years)	# of Measures Undertaken	Total Annual Energy Saved (MMBtu)	Total Cost of the Measures	CEEF Incentives for the Measures	% of Cost CEEF Incentives	C-PACE Financing	% of Total Cost of the Measures Supported by C-PACE Financing
Below 2	35	5,438,722,465	$1,455,918	$287,320	20%	$1,168,597	80%
2-4	10	2,135,292,553	$661,335	$162,034	25%	$499,301	75%
4-6	14	3,087,769,966	$1,378,181	$322,816	23%	$1,051,337	76%
6-8	12	5,142,894,283	$2,525,057	$607,142	24%	$1,917,915	76%
8-10	10	1,282,321,789	$1,569,545	$369,693	24%	$1,199,852	76%
10-12	10	631,077,712	$575,883	$75,724	13%	$500,159	87%
12-14	1	27,956,835	$23,275	$3,761	16%	$19,514	84%
14-16	11	1,321,314,323	$980,587	$23,160	2%	$957,427	98%
16-18	7	1,984,976,457	$3,375,527	$270,581	8%	$3,104,947	92%
18-20	4	1,783,752,532	$1,654,683	$81,536	5%	$1,573,147	95%
20+	35	1,820,924,373	$5,447,911	$503,185	9%	$4,471,721	82%
Total	**149**	**24,657,003,288**	**$19,647,901**	**$2,706,952**	**14%**	**$16,463,918**	**84%**

energize CONNECTICUT

REFERENCES

Data Smash meeting with SRS (approved and closed projects as of November 5, 2014)

C-PACE Project Analysis & Reporting

1. Program & Project Summaries
   - Project characteristics
   - Project flow, pipeline, and longer-term projections
   - Project costs and savings levels
   - Financing amount and terms
   - Incentive levels
2. Financing/Incentive Interaction
   - Savings-to-investment ratio (SIR) analysis
   - Impact of incentives on project financials
3. Measure Comprehensives & Performance
   - Types of measures supported
   - Comprehensiveness: breadth and depth of EE measures per project
   - Sensitivity analysis: role of financing & incentives in supporting comprehensiveness

CEEF Incentives in C-PACE Projects

Percent of C-PACE EE & Combo Projects Using CEEF Incentives	**94%**
Highest Individual Project Cost Covered by CEEF Incentives	41%
Average Percent of Total Project Cost Covered by Incentives	12%

Key Takeaways:

- CEEF incentives used in 58/62 EE and combo projects reviewed.
- Percent of EE portion covered by CEEF incentives is higher. Requires separating out non-EE project costs (still working on this). E.g., see Middletown case study.
- Incentives not intended to cover full project costs.
  - For lost-opportunity measures, only covers % of *incremental* costs.
  - For retrofit measures, designed to encourage participation.
- C-PACE financing can cover the remaining project cost for those who need it.
- Worth exploring whether ability to finance projects on a cash-flow-positive basis (SIR > 1) may provide opportunities to "leverage up" program resources.
- Requires instilling confidence in energy savings projections.

energize CONNECTICUT

Incentive Impact on SIR

Previous review by Green Bank/SRS:

- Of the 106 projects reviewed, 48 projects met the screening criteria above meaning they had CEEF incentives and data was ‘complete’
- Then ran a Scenario Report “without CEEF incentives” on the 48 projects to assess the impact to SIR (among other metrics)
- Of the 48 project Scenario Reports “without CEEF incentives”:
  - 22 of the 48 project’s SIR dropped below 1.0
  - **So high-level ‘story’ is without CEEF incentives 46% of the C-PACE projects would not have made SIR > 1 requirement as originally scoped**

Property	Project #	SIR With CEEF Incentives	SIR Without CEEF Incentives	% Varience in SIR Without CEEF Incentives
Project 1	PT-1xxxxxx	1.14	1.08	-5.26%
Project 2	PT-1xxxxxx	1.21	0.89	-26.45%
Project 3	PT-1xxxxxx	1.55	1.25	-19.35%
Project 4	PT-1xxxxxx	1.05	1.01	-3.81%
Project 5	PT-1xxxxxx	1.03	0.83	-19.42%
Project 6	PT-1xxxxxx	1.39	1.14	-17.99%
Project 7	PT-1xxxxxx	1.01	0.98	-2.97%
Project 8	PT-1xxxxxx	1.92	1.13	-41.15%
Project 9	PT-1xxxxxx	0.89	0.73	-17.98%
Project 10	PT-1xxxxxx	1.03	0.77	-25.24%
Project 11	PT-1xxxxxx	1.01	0.96	-4.95%
Project 12	PT-1xxxxxx	1.04	0.90	-13.46%
Project 13	PT-1xxxxxx	1.04	0.95	-8.65%
Project 14	PT-1xxxxxx	1.83	1.31	-28.42%
Project 15	PT-1xxxxxx	1.27	1.11	-12.60%
Project 16	PT-1xxxxxx	1.19	1.10	-7.56%
Project 17	PT-1xxxxxx	1.81	1.13	-37.57%
Project 18	PT-1xxxxxx	1.02	0.73	-28.43%
Project 19	PT-1xxxxxx	1.12	1.11	-0.89%
Project 20	PT-1xxxxxx	1.86	1.38	-25.81%
Project 21	PT-1xxxxxx	1.03	0.98	-4.85%
Project 22	PT-1xxxxxx	1.01	0.97	-3.96%
Project 23	PT-1xxxxxx	1.01	0.88	-12.87%
Project 24	PT-1xxxxxx	1.04	0.84	-19.23%
Project 25	PT-1xxxxxx	1.04	0.96	-7.69%
Project 26	PT-1xxxxxx	2.10	1.96	-6.67%
Project 27	PT-1xxxxxx	2.33	1.46	-37.34%
Project 28	PT-1xxxxxx	1.74	1.43	-17.82%
Project 29	PT-1xxxxxx	1.01	0.89	-11.88%
Project 30	PT-1xxxxxx	1.00	0.78	-22.00%
Project 31	PT-1xxxxxx	1.04	0.92	-11.54%
Project 32	PT-1xxxxxx	1.42	1.01	-28.87%
Project 33	PT-1xxxxxx	1.49	1.46	-2.01%
Project 34	PT-1xxxxxx	1.13	0.69	-38.94%
Project 35	PT-1xxxxxx	1.05	0.90	-14.29%
Project 36	PT-1xxxxxx	1.10	1.05	-4.55%
Project 37	PT-1xxxxxx	1.13	1.03	-8.85%
Project 38	PT-1xxxxxx	1.01	0.94	-6.93%
Project 39	PT-1xxxxxx	1.54	1.30	-15.58%
Project 40	PT-1xxxxxx	1.18	1.07	-9.32%
Project 41	PT-1xxxxxx	1.07	0.92	-14.02%
Project 42	PT-1xxxxxx	3.92	3.67	-6.38%
Project 43	PT-1xxxxxx	1.16	1.00	-13.79%
Project 44	PT-1xxxxxx	1.54	1.12	-27.27%
Project 45	PT-1xxxxxx	1.03	1.02	-0.97%
Project 46	PT-1xxxxxx	1.02	0.98	-3.92%
Project 47	PT-1xxxxxx	1.91	1.40	-26.70%
Project 48	PT-1xxxxxx	1.27	1.18	-7.09%
Summary:	**48 total projects**			
	22 projects (46%) dropped below SIR>1 when CEEF incentives removed			

Case Study: Energy Efficiency Upgrade in Simsbury

Project

- **$840,416 (**$675,000 financed) energy efficiency upgrade, including
  - Installation of Air Leakage Improvements
  - High Efficiency lights
  - Occupancy Sensors and Upgraded Energy Management System
  - New Rooftop Units

Utility Incentives

- **$165,850, 20% of project cost**

Impact

- Annual savings $61,000, 35%
- 269 MWh savings
- Immediate positive cash flow
- **Without CEEF incentives: SIR < 1.0**

energize CONNECTICUT

Case Study: Solar and Energy Efficiency Upgrade in Middletown

Project

- **$2.9M total project** ($2.5M financed):
  - the installation of air units, variable frequency drives, HVAC upgrades, high efficiency lights, occupancy sensors, air leakage improvements, an upgraded energy management system, (~$1.9M, ~$1.5M financed)
  - 336 kW ground-mounted PV system. (~$1M)

Utility Incentives

- **$387,885, 21% of EE project cost**

Impact

- Energy savings of $198,283 annually
- 1.1M kWh clean energy produced/saved
- **Without CEEF incentives: SIR < 1.0**

energize CONNECTICUT

C-PACE Analysis and Optimizing: Proposed Next Steps

- Continue to dig into detailed data
  - Summarize role of incentives and financing in existing projects
  - Explore potential to optimize mix of financing and incentives to drive deeper projects going forward
- Continued collaboration
  - Continued Green Bank participation in EE meetings
  - EEB/Company participation in Green Bank meetings?
- Reporting
  - Standardize EEB/Green Bank information sharing
  - Collaborate on external reporting of role of incentives & financing in C-PACE projects

Commercial & Industrial

SBEA and LBE

- **SBEA:**
  - **Update from NU**
  - **Comments from UI**
- **LBE:**
  - **Update from Andy Brydges**
  - **Comments from EEB Consultants and Companies**

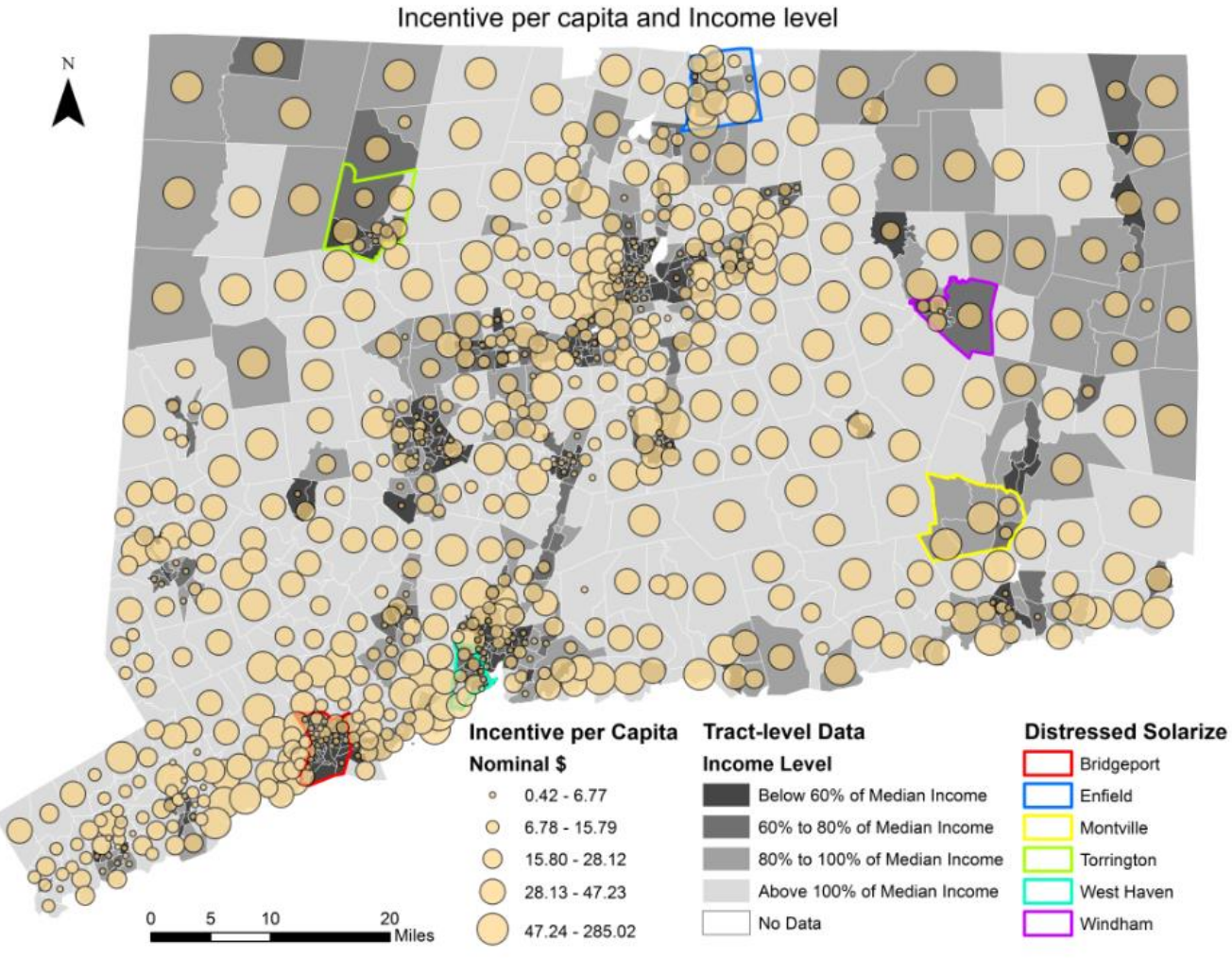
Green Bank Multifamily Housing Update

- MacArthur PRI approved - $5MM – with first disbursement in next few months
- Continued focus on building and moving pipeline
- Low Income Analysis and Strategy presented to CGB BOD on Dec 19 – with directive to move forward aggressively on agenda
  - Holistic approach that integrates energy with other capital improvements as well as addressing health and safety
  - 3 market segments:
    - Will focus on State funded portfolio first – in strategic partnerships with DOH and CHFA
    - Will test single family strategies using Cozy Home Loan
    - Will begin exploring solution approaches for small investor owned residential properties, understanding this is the most difficult market
  - Setting up meetings with key stakeholders discuss and get input on Low Income strategy recommendations

Low Income Solar Strategy – Research

Our penetration and investment in low income communities is low:

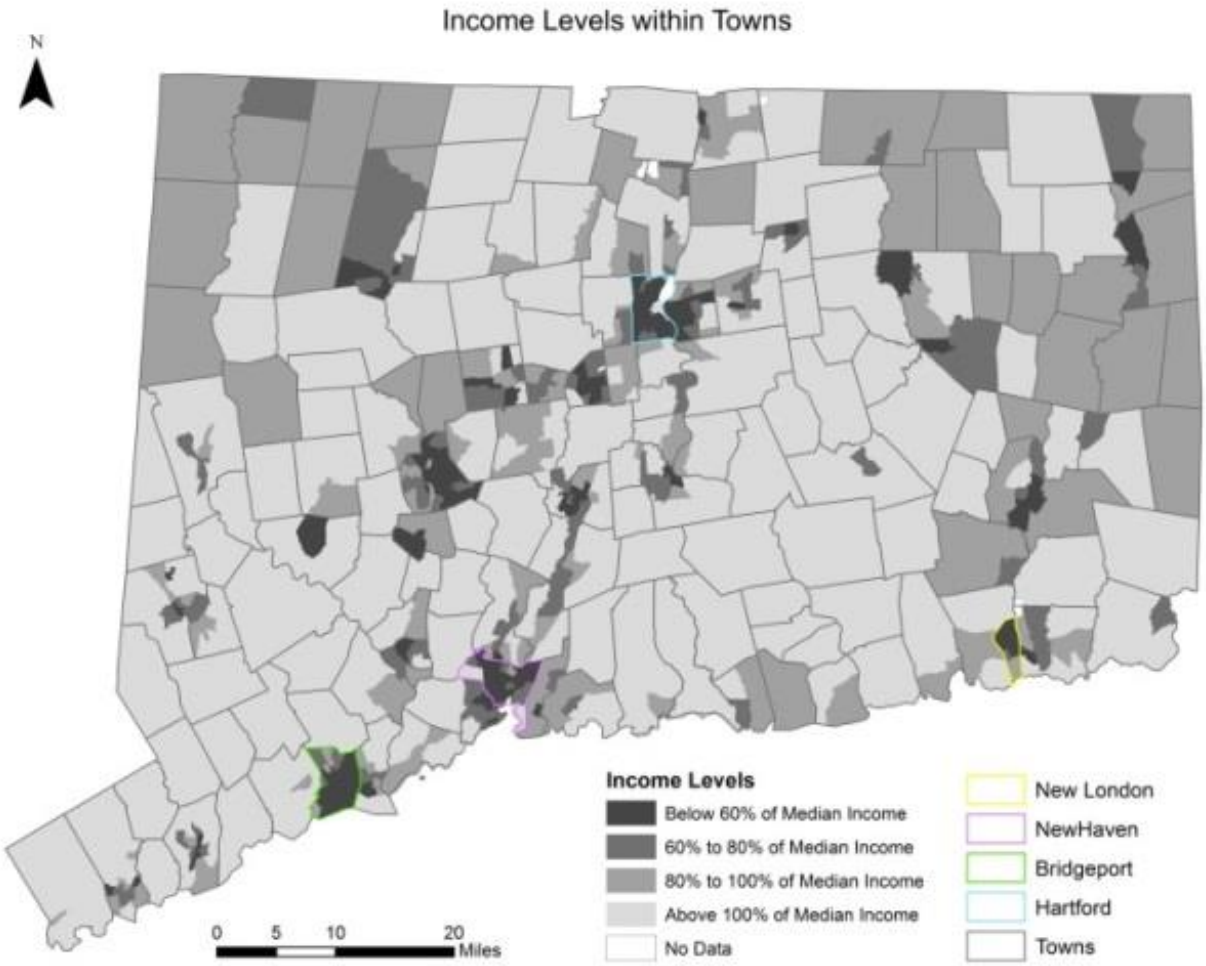
- **1/10th the penetration in <60% AMI, 1/4th the penetration in 60%-80% AMI tracts**



energiz
CONNECTIC

Low Income Solar Strategy – Research

34% of CT's households are low-income (507,000) – they are really struggling, making hard choices

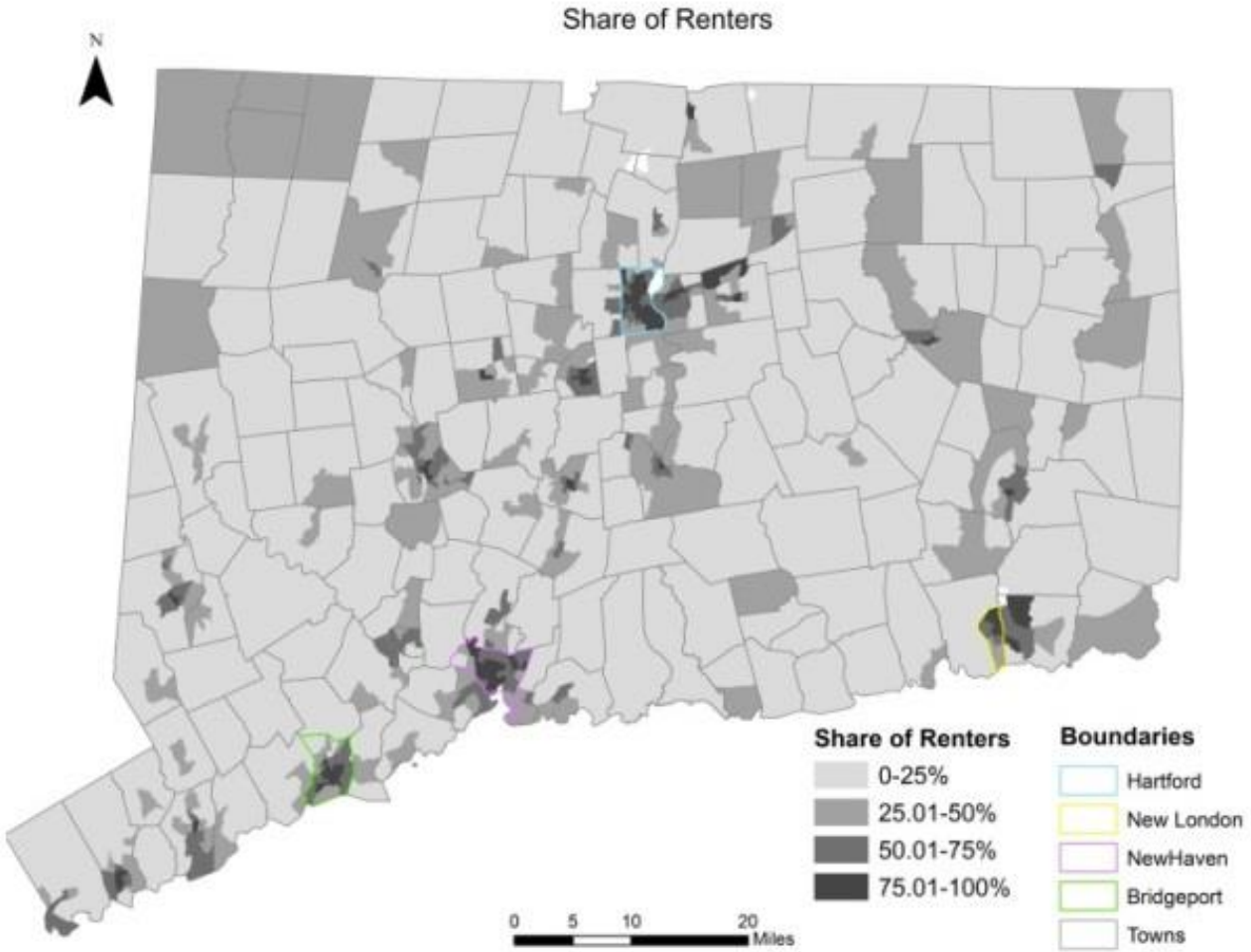


Breakdown of low-income units:

- **30% owner occupied single family homes**
- **40% small multifamily rentals (2-19 units)**
- 15% med-large multifamily
- 7% in owner occupied 2-4s and 7% in single family rentals

Low Income Solar Strategy – Research

Small rental properties/owners face a myriad of challenges and outreach challenges



Breakdown of low-income units:

- 30% owner occupied single family homes
- **40% small multifamily rentals (2-19 units)**
- 15% med-large multifamily
- 7% in owner occupied 2-4s and 7% in single family rentals

Low Income Solar Strategy – Research

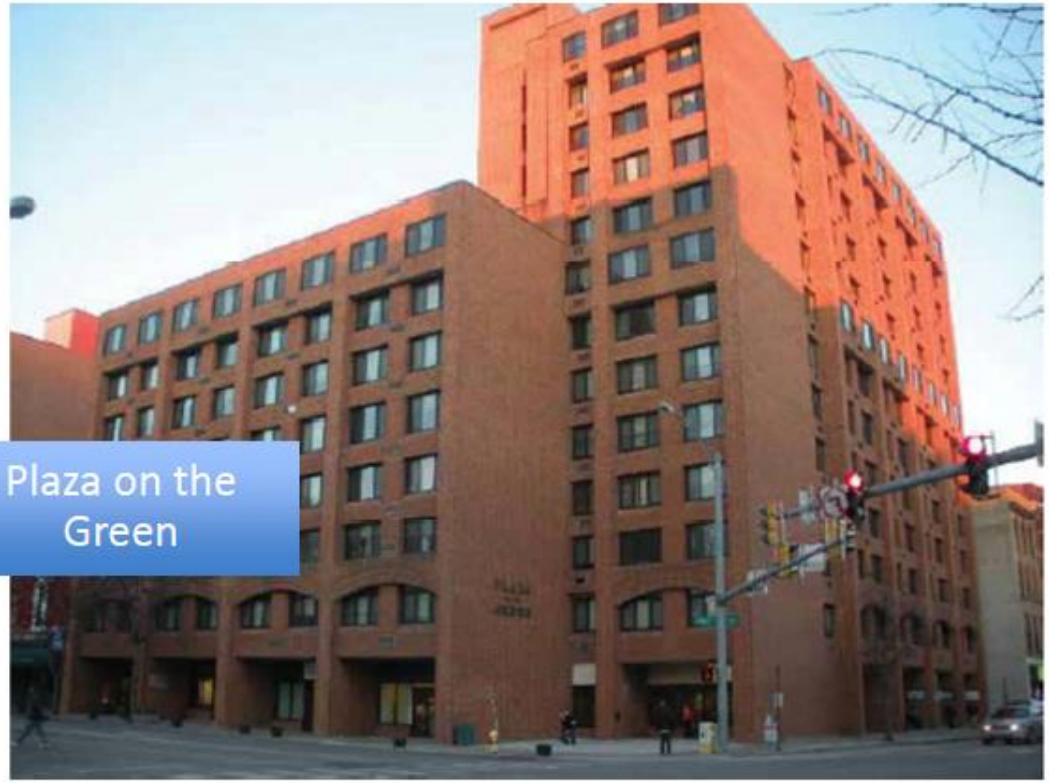
A "solar plus" approach will be most beneficial:

- **Comprehensive financing solutions that address deferred maintenance, health & safety, and energy improvements (efficiency, solar, conversions) *all at once***

energize CONNECTICUT

Low Income Solar – Current Initiatives

Several initiatives under way, but most promising are focused on the easiest markets (medium to large master-metered multifamily) – current efforts are not sufficient to meet the challenge



CONNECTICUT

CONNECTICUT HOUSING FINANCE AUTHORITY
The Key To Affordable Housing

CONNECTICUT Department of Housing

MacArthur Foundation

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

NEI NEW ECOLOGY INC.

cpace

CL&P

UI

URBAN ATLANTIC

Solarize CONNECTICUT

hdf

Low Income Solar Strategy – Future Needs

- **Multipronged approach needed:**
  - Legislative/ regulatory
  - Green Bank policies
  - Capacity building
  - Financing

energize CONNECTICUT

Low Income Solar Strategy
Board Discussion

- Supportive of a more holistic, comprehensive “solar plus efficiency” strategy, combined with other capital improvements
- OK with credit enhancing this segment of the market at higher levels than we have typically done in the past
- Supportive of significant resources over an extended period of time in this sector, including pilot/learn-as-we-go approaches and resources for infrastructure development & marketing/outreach
  - *But want us to pursue aggressively and move faster*
  - *Staff needs to come back with a draft budget*
- Comfortable setting a target
  - *Staff needs to come back with a suggestion*

energize CONNECTICUT

Empowering you to make smart energy choices

Agenda Item #7

Measuring Success

Measuring Success

Highlights from Residential Financing Performance

- Performance
  1. Overall: HES example (recommended add-ons, completed, financed)
  2. Comparison with and without financing
  3. Deal flow: applied, approved, completed, etc.
  4. Measure-level data (recommended, completed, financed)

- Costs
  1. Customer costs
     - Down payment
     - Principal
     - Interest
     - Fees
  2. Program costs
     - Incentives
     - Financing (IRBs, LLRs, other credit enhancement)
     - Program admin/third-party fees

energize CONNECTICUT

Measuring Success

Highlights from Residential Financing Performance

Residential Financing	Applied	Approved	% of Applied	Completed	% of Approved
Totals	**4,651**	**2,382**	**51%**	**1,340**	**56%**
HES/CHIF (not mapped to HES Projects)	**1,947**	**1375**	**71%**	**827**	**60%**
Payment Plan- 0%	788	610	77%	414	68%
Comprehensive- 2.99%	686	460	67%	234	51%
HES Loan/CHIF (4.49 to 6.99%)	473	305	64%	179	59%
Smart E (not mapped to HES Projects)*	**112**	**75**	**67%**	**47**	**63%**
Comprehensive- 2.99%	**4**	**4**	100%	**4**	100%
4.49% to 6.99%	108	71	66%	43	61%
ECLP (not mapped to HES Projects)	**564**	**182**	**32%**	**85**	**47%**
0%	451	105	23%	52	50%
1.00%	3	2	67%	1	50%
3.00% to 6.00%	110	75	68%	32	43%
EnergizeCT Heating Loan (not mapped to HES Projects)	**2,028**	**750**	**37%**	**381**	**51%**
0%	**812**	**285**	35%	**22**	8%
2.99%	1,216	465	38%	359	77%

energize CONNECTICUT

Measuring Success

Highlights from Residential Financing Performance

	Total Financing Costs*		New**	Interest Rate Buydown		Credit Enhancements & Losses (i.e., Loan Loss Reserves & Loan Defaults)		Program Management Costs*			
Residential Financing	**Total Financing Costs***	**Cost Per Loan**	**Cost Per Loan Amount - %**	**Interest Rate Buydown**	**Cost Per Loan**	**LLR/ Other**	**Cost Per Loan**	**Program Admin. / Labor & Mkt.**	**Cost Per Loan**	**Origination / Servicing**	**Cost Per Loan**
Totals	**$1,649,432**	**$1,231**	**17%**	**$ 319,951**	**$239**	**$ 1,734**	**$1**	**$ 119,500**	**$89**	**$1,208,247**	**$902**
HES/CHIF (not mapped to HES Projects)	**$1,035,026**	**$1,252**	**16%**	**$0**	**$0**	**$1,734**	**$2.1**	**$62,500.0**	**$75.6**	**$970,792.0**	**$1,173.9**
Payment Plan- 0%	$289,827	$700	28%	$0	$0	$1,734	$4.19	$31,288	$76	$256,806	$620
Comprehensive- 2.99%	$439,064	$1,876	12%	$0	$0	$0	$0	$17,684	$76	$421,380	$1,801
HES Loan/CHIF (4.49 to 6.99%)	$306,134	$1,710	18%	$0	$0	$0	$0	$13,528	$76	$292,606	$1,635
Smart E (not mapped to HES Projects)*	**$26,483**	**$563**	**4%**	**$26,483**	**$563**	**$0**	**$0.0**	**$0**	**$0.0**	**$0**	**$0.0**
Comprehensive- 2.99%	$12,508	$3,127	13%	$12,508	$3,127		$0		$0		$0
4.49% to 6.99%	$13,975	$325	2%	$13,975	$325		$0		$0		$0
ECLP (not mapped to HES Projects)	**$293,468**	**$3,453**	**39%**	**$293,468**	**$3,453**	**$0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**
0%	$216,121	$4,156	51%	$216,121	$4,156	$0	$0	$0	$0	$0	$0
1.00%	$2,630	$2,630	45%	$2,630	$2,630	$0	$0	$0	$0	$0	$0
3.00% to 6.00%	$74,718	$2,335	23%	$74,718	$2,335	$0	$0	$0	$0	$0	$0
EnergizeCT Heating Loan (not mapped to HES Projects)	**$275,076**	**$722**	**14%**	**$0**	**$0**	**$0**	**$0.0**	**$57,000**	**$149.6**	**$237,454.9**	**$623.2**
0%	$19,379	$881	14%	**$0**	$0	**$0**	$0	**$3,291**	$150	**$16,087.9**	$731
2.99%	$275,076	$766	14%	$0	$0	$0	$0	$53,709	$150	$221,367	$617

energize CONNECTICUT

Measuring Success

Highlights from Residential Financing Performance

- Key question going forward:
  - What are the right metrics to use for financing?
  - Need to balance ease of comparison with recognition of different policy/program objectives for different products
  - Important to look at both sides: costs and performance
- Could be an area of focus for this committee to provide input and high-level recommendations

Measuring Success

Residential Financing Market Study

- Numerous residential financing products in the market
  - Each one serves a different policy/program objective
  - Question is whether these products are being used effectively to achieve those objectives
  - Or whether there is market confusion
- Market Study: Current Status
  - EEB, Green Bank and others are collaborating to address this question through a market study
  - Working group held in December to gather feedback
  - Scope being revised and budget issues being addressed
  - Target is to procure contractor and begin executing in Q1

energize CONNECTICUT

Measuring Success

Approaches in Other States

- Many states are linking financing metrics with EM&V.
- Number of states focused on financing evaluation is growing rapidly, includes at least the following:
  1. NY: Green Bank “Metrics, Reporting, & Evaluation Plan”
  2. CA: Evaluation of Financing Pilots and Other Financing Programs
  3. MA: HEAT Loan Evaluation
  4. IL: On-Bill Repayment Evaluation
  5. ME: PACE Evaluation
  6. MD: Maryland Home Energy Loan (MHELP) Evaluation
  7. MI: Better Buildings for Michigan/Michigan Saves
- Some states are also doing “prospective” analyses (e.g., CA potential study; MD cost-effectiveness screening)
- LBNL paper will document some of these efforts; should be able to provide a summary by next meeting

energize CONNECTICUT

Measuring Success
Approaches in Other States

1. **Key Theme: "Growing the Pie" ("Additionality")**
   - Certain key questions distinguish financing programs that "grow the pie" from those that do not:
     i. Would the customer have gone forward with other non-program financing (or without financing)? ("free ridership")
     ii. Did the program encourage greater efficiency than what the customer would have otherwise installed? ("incremental savings above baseline")
   - Answers may not be obvious. Hard to get at without EM&V.
   - Same questions that are required of traditional programs.
   - Given imperative to increase EE above existing levels ("grow the pie"), these questions are non-trivial.

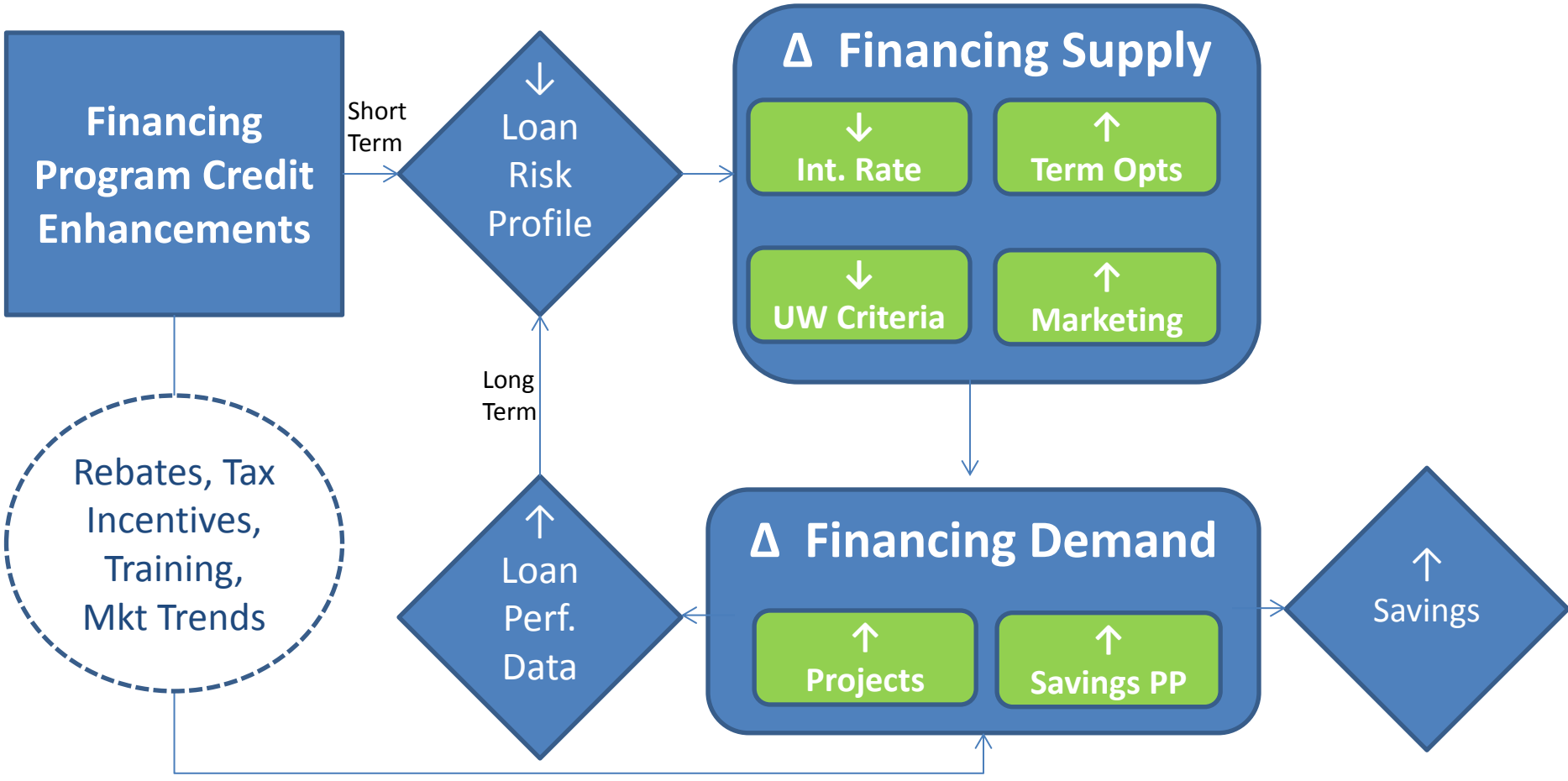
energize CONNECTICUT

Measuring Success

Approaches in Other States

2. **Key Theme: Cost-Effectiveness Ratios as Financing Metrics**
   - Financing may improve cost-effectiveness ratios, if (and only if) other program costs are reduced.
   - However, if ratio improves, but total participation goes down, then total net savings will also be reduced.
   - Loss of savings must be made up for on the supply side (always a "two-sided equation").
   - Viewed as a whole, ultimate impact may be an overall increase in cost of energy supply.
   - Same reason not to cream-skim or go after only the low-hanging fruit: leaves savings on the table that would be cheaper to acquire than additional supply.
   - Bottom line: don't just look at ratios; look at change in total net benefits.

Measuring Success
Approaches in Other States



energize CONNECTICUT

Adopted from Dunsky Energy Consulting, 2014

energize CONNECTICUT

Empowering you to make smart energy choices

Agenda Item #8

New Developments in Efficiency and Financing

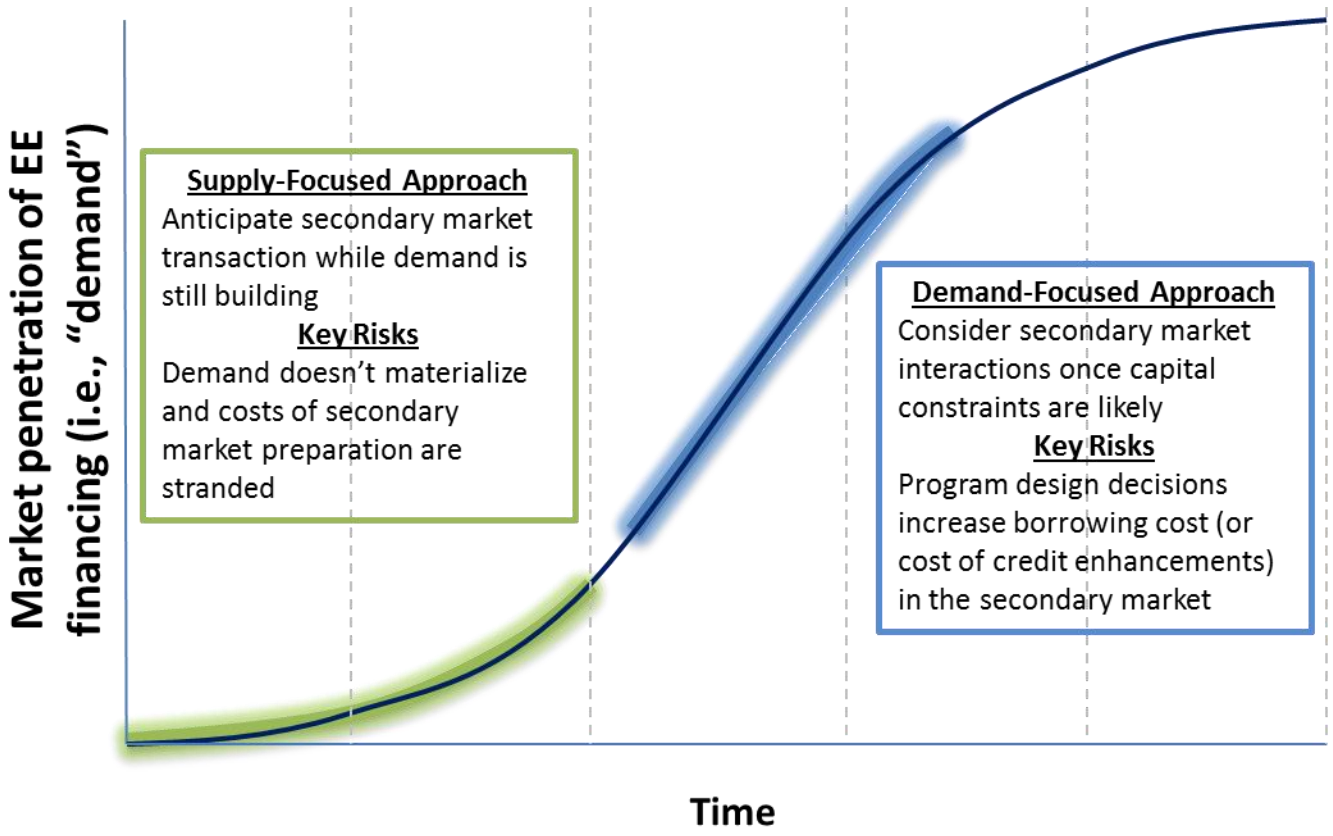
New Developments

Secondary Markets

Transaction Short Name	Transaction Type	Issuer (Type)	Jurisdiction	Date of Transaction	Market Sector	Size
Craft 3-Self-Help	Portfolio Sale	Craft 3 (Private)	OR	December 2013	Residential	$15.7M
Keystone HELP	Portfolio Sale	AFC First (Private)	PA	July 2013	Residential	$24M
NYSERDA	Revenue Bond	NYSERDA (Public)	NY	August 2013	Residential	$24M
Toledo PACE	Revenue Bond	Toledo Lucas-County Port Authority (Public)	OH	2012-2013	Commercial	$16.5M
Connecticut C-PACE	Revenue Bond	Public Finance Authority (Public)	CT	May 2014	Commercial	$30M
Delaware SEU	Revenue Bond	Delaware SEU (Quasi-public)	DE	July 2011	Public/ Institutional	$73M
HERO PACE I	Asset-Backed Security	WRCOG (Quasi-public)	CA	February 2014	Residential	$104M
HERO PACE II	Asset-Backed Security	WRCOG and SANBAG (Quasi-Public)	CA	October 2014	Residential	$129M
WHEEL	Asset-Backed Security	WHEEL SPV (Private)	Multiple (TBD)	TBD	Residential	TBD, targeting $100M
Kilowatt	Asset-Backed Security	Kilowatt (Private)	Multiple (TBD)	TBD	Residential	TBD, targeting $100M+

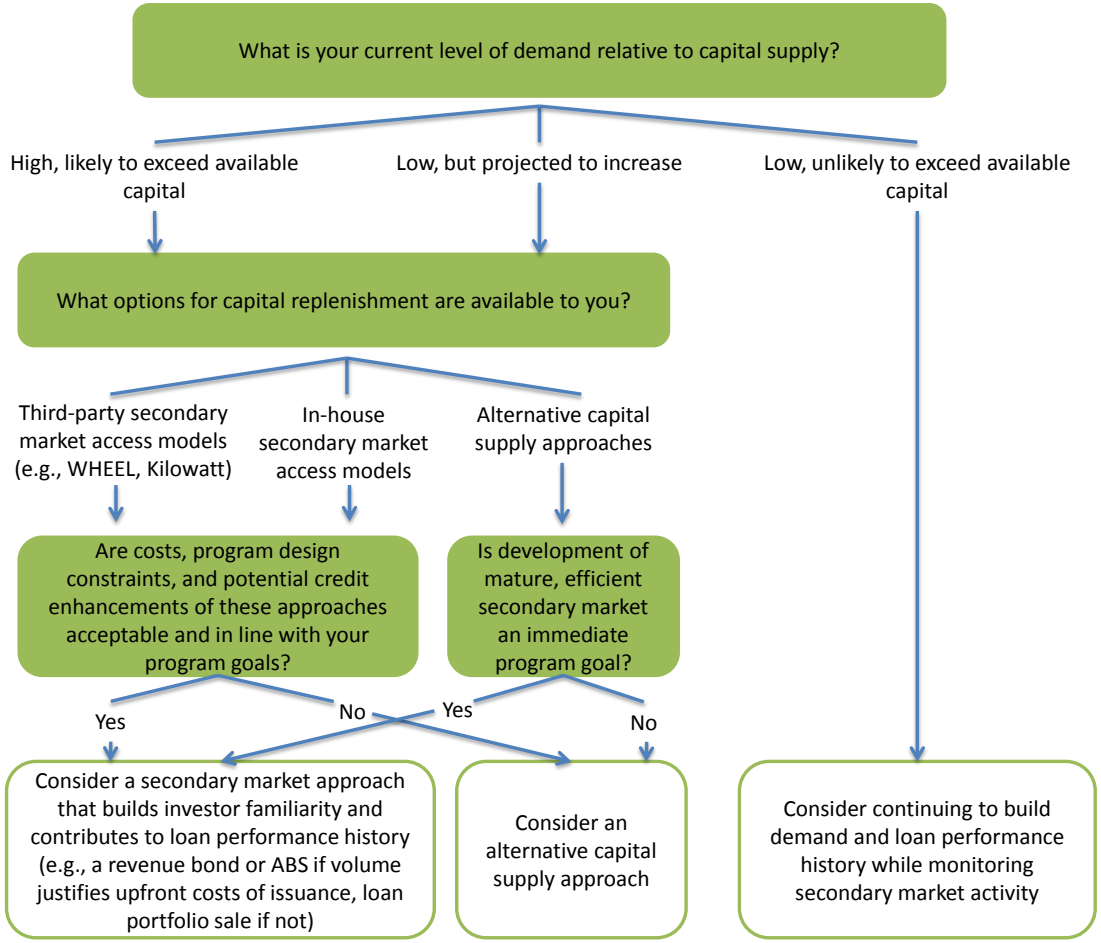
New Developments

Secondary Markets



energize CONNECTICUT

New Developments
Secondary Markets



New Developments
Innovations in Clean Energy

- **NYSERDA Green Jobs-Green NY Transition**
  - Since 2010 – GJGNY has supported 000's of energy saving projects
  - Targets were particularly LMI (≤80% AMI) households & MFH projects
  - With dramatic increase in private sector option increasingly available, GJGNY financing supports only a fraction of projects coming through NYSERDA programs

    [EE (35%) and PV (3%) programs]
  - Transition GJGNY financing programs to
    - Focus state resources on underserved areas (LMI households/ distressed communities)
    - avoid directly competing with newly emerging and growing private sector solutions
  - Effective July 1, 2015, assuming at least two third-party loan products are available for market rate customers, GJGNY residential energy efficiency loans (including On-Bill Recovery (OBR)) will be limited to LMI customers
  - Phase out of GJGNY loans for MFH (1/2015) and loans for small businesses and nonprofits (4/2015)
  - Effective 4/1/2015 - GJGNY residential solar loan will be limited to LMI customers

New Developments
Innovations in Clean Energy (2)

- **Discussions w/ Consumer Protection Financing Bureau (CPFB)**
  - Exploring consumer protection issues related to innovations in clean energy finance (including solar leasing, PACE financing, and OBR)
- **Discussions with Fannie Mae**
  - Exploring ways to work with Fannie lenders on MFH financing
- **Discussions with HUD**
  - Discussions with HUD on efforts to allow the agency to allow for PACE financing of FHA-insured (or direct HUD mortgaged) multifamily properties
  - End Goal: definitive process to allow for HUD to consent to PACE financing of qualifying MFH properties

energize CONNECTICUT

energize CONNECTICUT

Empowering you to make smart energy choices

Agenda Item #9

Adjourn

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board
10 Franklin Square, New Britain, CT

Wednesday, October 22, 2014
1:30-3:30 p.m.

MINUTES[1]

In Attendance

Voting Board Members: Norma Glover, John Harrity, Eric Brown, Amanda Fargo-Johnson, Diane Duva
Non-Voting Board Members: Bryan Garcia, Matt Gibbs, Pat McDonnell
Others: Brian Farnen, Ron Araujo Kerry O'Neill, Bert Hunter Andy Brydges, Macky Dykes, Chris Kramer, Ravi Gorthala, Bill Dornbos, Jessica Bailey, Les Tumidaj, Jeff Schlegel, Craig Diamond

1. **Call to Order.** The meeting was called to order at 1:30 pm.

2. **Public Comments.** None.

3. **Approval of Minutes for July 16, 2014 Meeting**. Ms. Glover moved, Mr. Harrity 2nd. Ms. Duva, Ms. Glover and Mr. Harrity voted to approve, Mr. Brown and Ms. Fargo-Johnson abstained. Minutes approved.

4. **Governance – Review and Approve Joint Committee Bylaws** - Mr. Farnen provided an overview of the draft bylaws and the process to date in preparing the document. He noted that the Green Bank needed to appoint its non-voting board members. He said that those would be Mr. Garcia and either Mr. Hunter or himself. **A vote was taken to approve the bylaws. All voting members voted in favor, except for Mr. Brown who abstained. Bylaws approved.** Mr. Farnen recommended that the committee discuss appointments of additional non-voting members and officers at the next meeting. Mr. Brown said he would like to discuss at next EEB meeting the issue that the EEB Board could be an impediment to progress in the joint committee. He said he would like the EEB to potentially consider delegating certain authorities to EEB voting members of the joint committee.

5. **Financing Issues**

    a. **Green Bank Response to EEB Request for Assistance – Update on Progress.** Mr. Schlegel commented on the discussion at the last joint committee meeting on the role of incentives in C-PACE. He said that the Green Bank and the EEB need to work together to find the optimal mix of incentives and private sector financing.

[1] Materials for this meeting can be accessed at Box.net: https://app.box.com/s/ng6sxn4cnxrnhxjkj4tu

b. **Residential Financing Update.** Ms. O'Neill discussed the HES Loan Capitalization and the Cozy Loan. Mr. Brydges and Mr. Kramer noted that they had put together a joint working group to discuss a residential financing market assessment. They said that they would report back progress at the next joint committee meeting.

c. Commercial and Industrial Financing Update. Ms. Bailey reported that the initial findings were that about 1/2 of all C-PACE projects so far would not have gone forward without incentives. Mr. Garcia suggested that the EEB and Green Bank staffs meet to discuss the data and findings. Mr. Kramer suggested that we should understand what types of ECMs the incentives encourage. He said he would also like to discuss how the financing and incentives gets reported, and make sure the contributions are made clear. Mr. Schlegel said that the C&I Committee had some questions about how the projects are reported. Mr. Kramer then provided an overview of the C11 market assessment (Barriers to Energy Efficiency, including Financing). He said there were still questions that will require further research to answer. Mr. Brown mentioned the discussions that have been on-going at the EEB and the EEB committees regarding the possibility of doing market research through the EEB committees. Mr. Garcia suggested that the draft C11 report be shared with the joint committee. Mr. Gibbs then gave update on the SBEA loan sale agreements. He said that for older loans, they will not be able to do a "true sale," so they will need to treat those as long-term debt; therefore, they might need to file with PURA. For new loans, he said that defaults are covered by CEEF, but with private sector capital. Mr. Garcia mentioned potentially tapping into the Green Loan Guarantee Fund. Ms. O'Neill noted that the Green Bank is also thinking about this fund for the CHIF loan re-capitalization. Mr. Brydges then provided an overview of bank RFQ in regard to financing for ESPC projects. He mentioned that the incentives for the ESPC program need to be re-thought. Mr. McDonnell noted that CT Executive Branch agencies would be treated as a large C&I customers under new Customized Solutions Partnership offered by the C&I Program. He said that DEEP is encouraging the Green Bank to continue looking for bond financing, but private financing is necessary for the existing pipeline.

d. **New Developments in Financing** - Mr. Hunter provided some insights on financing trends. In regard to the CT Solar Loan, Sungage received $100M in financing, so they no longer need support from the Green Bank. That is an important development because it is an example of the market becoming self-sustaining. Another trend is Solar Mosaic (crowd funding, or peer to peer) becoming more popular for residential and small business. Some people are starting to think about a small business application for the crowd funding model. Mr. Hunter then mentioned that, in regard to C-PACE, there was currently $40M in the Green Bank's warehouse, and they will need to bring in more capital starting in 2015 (they hope to issue an RFP for capital providers soon). He then mentioned that in California, residential PACE is floating asset-backed securities. He said that is a low-cost option with a lot of capital available. The Green Bank is exploring residential PACE.

6. Updates

a. **On Bill Repayment** - Mr. O'Neill provide a brief update.

b. **Green Bank Comprehensive Plan (FY 2015-FY 2016)** - Mr. Dykes provided a brief update.

7. **Other Business.** 2015 schedule of meetings. Mr. Garcia suggested we continue the quarterly meetings. We will propose dates, probably 3rd or 4th Wednesday every 3rd month.

8. **Adjourn** - the meeting adjourned at 3:00 pm.

JOINT COMMITTEE OF THE ENERGY CONSERVATION MANAGEMENT BOARD AND THE BOARD OF DIRECTORS OF THE CONNECTICUT GREEN BANK

BYLAWS

PURSUANT TO

Section 16-245m(d)(2) of the
Connecticut General Statutes

Adopted October 22, 2014

ARTICLE I
NAME, PLACE OF MEETINGS

1.1. **Name of the Committee**. The name of the Committee shall be, in accordance with the Statute, the "Joint Committee of the Energy Conservation Management Board and the Connecticut Green Bank".

1.2. **Meetings of the Committee**. The meetings of the Committee shall be held at such place or places within the State of Connecticut as the Committee may designate.

ARTICLE II
COMMITTEE MEMBERSHIP

2.1. **Membership**. The Committee shall consist of no more than nine (9) members. Both the Board of Directors of the Connecticut Green Bank and the Energy Conservation Management Board shall appoint no more than (2) voting Directors from their respective boards and (2) nonvoting members to serve on the Committee. Additionally, the Commissioner of the Department of Energy and Environmental Protection, or her or his designee, shall be a voting ex officio member of the Committee.

2.2. **Term**. Each member of the Committee shall serve a term of two (2) years or until a successor is appointed, whichever is longer.

2.3. **Chairperson**. The Committee shall elect from its members a Chairperson who shall serve a term of one (1) year or until a successor is chosen by the Committee, whichever is longer. The Chairperson shall preside at all meetings of the Committee which he or she attends.

2.4. **Vice Chairperson**. The Committee shall elect from its members a Vice Chairperson who shall serve a term of one (1) year or until a successor is chosen by the Committee, whichever is longer. In the absence or incapacity of the Chairperson, the Vice

Chairperson shall perform all the duties and responsibilities of the Chairperson. In the absence or incapacity of the Vice Chairperson, or in case of his or her resignation or death, the Committee shall elect from amongst its members an acting Vice Chairperson during the time of such absence or incapacity or until such time as the Committee shall elect a new Vice Chairperson.

2.5. **Secretary**. A Secretary may be elected by the Committee. The Secretary shall perform the duties imposed by resolution of the Committee. In the absence or incapacity of the Secretary, or in case of his or her resignation or death, the Committee shall elect from amongst its members an acting Secretary who shall perform the duties of the Secretary during the time of such absence or incapacity or until such time as the Committee shall elect a new Secretary. The Secretary shall serve until a successor is elected by the Committee.

ARTICLE III
POWERS AND DUTIES OF THE COMMITTEE

3.1. **Powers and Duties**. The Committee shall examine opportunities to coordinate the programs and activities contained in the plan developed under section 16-245n(c) of the General Statutes with the programs and activities contained in the plan developed under section 16-245m(d)(1) of the General Statutes and to provide financing to increase the benefits of programs funded by the plan developed under section 16-245m(d)(1) of the General Statutes so as to reduce the long-term cost, environmental impacts and security risks of energy in the state.

ARTICLE IV
COMMITTEE MEETINGS

4.1. **Regular Meetings**. Regular meetings of the Committee for the transaction of any lawful business of the Committee shall be held in accordance with a schedule of meetings established by the Committee, provided that the Committee shall meet at least four (4) times per calendar year.

4.2. **Special Meetings**. The Chairperson may, when the Chairperson deems it expedient, call a special meeting of the Committee for the purpose of transacting any business designated in the notice of such meeting.

4.3. **Legal Requirements**. All meetings of the Committee shall be noticed and conducted in accordance with the applicable requirements of the Connecticut Freedom of Information Act, including without limitation applicable requirements relating to the filing with the Secretary of the State of any schedule of regular meetings and notices of special meetings, meeting notices to Committee members, public meeting requirements, the filing and public availability of meeting agenda, the recording of votes and the posting or filing of minutes, the addition of agenda items at any regular meeting, and the holding of any executive session.

4.4. **Order of Business.** The order of business of any meeting of the Committee shall be as set forth in the agenda for such meeting, provided that the Committee may vary the order of business in its discretion.

4.5. **Organization**. At each meeting of the Committee, the Committee Chairperson, or in the absence of the Committee Chair, the Vice Chairperson, shall act as Presiding Officer. The Presiding Officer shall prepare or direct the preparation of a record of the business transacted at such meeting. Such record when adopted by a majority of the Committee

members in attendance at the next meeting and signed by the Committee Chairperson shall be the official minutes of the Committee meeting.

4.6. **Attendance**. Any member of a Committee may participate in a meeting of the Committee by means of teleconference, videoconference, or similar communications equipment enabling all Committee members participating in the meeting to hear one another, and participation in a meeting pursuant to this Section shall constitute presence in person at such a meeting.

4.7. **Quorum**. A quorum of the Committee shall consist of a minimum of at least three (3) voting members.

4.8. **Enactment**. When a quorum is present, an affirmative vote of a majority of voting members attending the Committee meeting shall be sufficient for action, including the passage of any resolution, except as may otherwise be required by these Bylaws or applicable law.

4.9. **Parliamentary Authority**. Robert's Rules of Order, current revised edition, shall govern the proceedings of the Committee when not in conflict with these Bylaws.

ARTICLE V
COMMITTEE STAFF

5.1. **Committee Staff**. The Committee may from time to time and upon a majority vote of the voting members request that employees and contractors from either the Connecticut Green Bank or the Energy Conservation Management Board assist the Committee with its work. Said assistance may include but not be limited to taking minutes of Committee meetings, conducting research or analyzing information.

ARTICLE VI
AMENDMENT

6.1. **Amendment or Repeal**. These Bylaws may be amended or repealed or new Bylaws may be adopted by the affirmative vote of not less than four (4) voting members of the Committee.

ARTICLE VII
DEFINITIONS

Definitions. Unless the context shall otherwise require, the following words and terms shall have the following meanings:

7.1.1. "Chairperson" means the Chairperson of the Committee appointed pursuant to these Bylaws.

7.1.2. "Committee" means the Joint Committee of the Energy Conservation Management Board and the Board of Directors of the Connecticut Green Bank.

7.1.3. "Connecticut Freedom of Information Act" means the Connecticut Freedom of Information Act, Connecticut General Statutes § 1-200 *et seq.*, as amended.

7.1.4. "General Statutes" means the Connecticut General Statutes, as amended.

7.1.5. "Majority", whether capitalized or lowercase, means one more than half.

7.1.6. "Presiding Officer" has the meaning attributed to that term in Article IV, Section 4.5 of these Bylaws.

7.1.7. "Secretary" means the Secretary of the Committee elected pursuant to these Bylaws.

7.1.8. "Statute" means Connecticut General Statutes § 16-245m(d)(2), as amended.

7.1.9. "Vice Chairperson" means the Vice Chairperson of the Committee elected pursuant to these Bylaws.

CEFIA and EEB Joint Meeting

REGULAR QUARTERLY MEETING SCHEDULE FOR 2015

The following is a list of dates and times for **regular meetings** of the Clean Energy Finance and Investment Authority and the Connecticut Energy Efficiency Board through 2015.

- Wednesday Jan 21,2015 Regular Meeting from 1:30pm 3:30pm
- Wednesday April 22, 2015 Regular Meeting from 1:30pm 3:30pm
- Wednesday July 22, 2015 Regular Meeting from 1:30pm 3:30pm
- Wednesday Oct 28, 2015 Regular Meeting from 1:30pm 3:30pm

Should a **special meeting** be needed to address other issues that arise, a meeting will be scheduled accordingly.

All regular and special meetings will take place at the:

Department of Energy and Environmental Protection
Commissioners Conference room
10 Franklin Square New Britain, CT 06051

Energize CT EE Financing*		
EE Payment Plan Delivered through HES and Home Performance (up to $3,000)[1]	**Comprehensive, Multi-Measure Bundle Qualified EE Project Loan ($3,000-$25,000)**	**All Other Projects**[3] **($3,000 - $25,000)**
0% up to 36 months	2.99% up to 10 years[2]	4.49% for 5 years 4.99% for 7 years 5.99% for 10 years 6.99% for 12 years
Note: CHIF is repositioned to fill gap between $2,500 and $3,000 Smart-E.	The 2.99% is currently offered by both CHIF and participating Green Bank lenders. CHIF requires participation in the HES program (including an energy audit) and the installation of at least two eligible measures, with at least one from a specific subset of incentivized measures. The Green Bank 2.99% Smart-E Bundle rate is based on installing two or more eligible measures.	Note: CHIF is repositioned to have the same loan terms as Green Bank's interest rate caps.

* **Primary co-branding and co-marketing with lending partners as Energize Connecticut financing. Loans will be presented to contractors and marketed as Energize CT financing with the loan products such as HES Financing (EE Payment Plan and Comprehensive EE Project Loan) and Smart-E Loan identified as products. Individual loan product brochures will clearly display the Energize CT brand and logo consistent with the brand guidelines. Co-branding with financial institutions will be done in conformance with Energize CT marketing guidelines.**

CEEF and the Green Bank are committed to work together to train all contractors on all of the loan products. Access to Energize CT financing will occur through a convenient and streamlined process, which will include an interactive comparison of all Energize CT financing options.
This rate alignment is based on our expectation that the following process items are in place or agreed upon:

- **No mandatory requirement for utility bill usage data to receive financing for the EE Payment Plan and Comprehensive EE Project Loan. Contractor training and Smart-E loan intake forms/applications will clearly state that utility bill usage history is requested only for Smart-E loan applications. Green Bank agrees that no customer will be denied a loan due to their unwillingness to provide utility use data. NU has made the Green Button available to its customers and Green Bank will utilize this mechanism to receive utility bill usage data from NU customers.**

- **Requirements for HES participation as outlined in this document**
- **QA/QC issues identified are satisfactorily resolved**
- **No customer loan application fee is required to access Energize CT (HES & Smart-E) financing**
- **The HES (EE Payment Plan and Comprehensive EE Project Loan) and Smart-E loan products will be evaluated in January, 2014**
- **No additional charges to customers, CEEF or the utilities for administration of the Smart-E loan product. Other customer charges for large loans may apply (e.g. UCC-1 filing).**
- **All Energize CT financing options are presented in a clear and consistent manner to customers and contractors**

[1] EE Payment Plan requires HES participation (HES and Home Performance with Energy Star ("HPwES")). EE Payment Plan maximum is increased from current $2,500 to $3,000. The zero percent EE Payment Plan applies to eligible cost-effective measures (*i.e.,* insulation, ductless heat pumps, heat pump water heaters, natural gas water heating (tank less 0.82 EF or greater with electronic ignition, high efficiency indirect water heater attached to natural gas Energy Star qualified boiler (90% AFUE or greater)), high efficiency natural gas indirect/combo space heating and water heating (90% AFUE or greater)), and high efficiency natural gas condensing storage tanks (95% thermal efficiency or greater). CHIF administers loan funding.

[2] Comprehensive EE Project Loan offered by CHIF currently requires HES participation and implementation of HES-eligible comprehensive multi-measure EE projects. The CEEF program will continue to promote comprehensive EE projects through HES and HPwES vendors to achieve deeper energy savings. CEEF and CHIF are currently using ratepayer "self-funding" capital and have set the interest rate at 2.99% for 10 years, as an incentive to encourage comprehensive EE projects, and as a sales tool to close the deal. CHIF currently administers loan funding for all customers regardless of FICO score, who invest in HES-eligible comprehensive EE measure installations. HES financing previously offered 2.99% financing for specific single measures. These measures no longer qualify for the Comprehensive EE Project Loan unless they are bundled with another qualified measure. Single measures over $3,000 and multi-measure bundles that are not eligible for the 2.99% rate will be financed through the All Other Projects loan category. Qualified measures under $3,000 will be financed through the EE Payment Plan. CHIF and the Green Bank are currently working to recapitalize CHIF to support CEEF lending (for EE Payment Plan, comprehensive multi-measure bundle, and all other measures). As part of that recapitalization CHIF's lending for the comprehensive multi-measure bundle and for all other measures will be focused on credit challenged customers with FICOs of 580 to 679. Also as part of that alignment, "prime" customers will be directed to Green Bank Smart-E Bundle lenders. The Green Bank will continue to work with CEEF and the Companies on any needed adjustments to eligible Bundles as they come up, although none are identified at this time. CEEF, the Green Bank, and the Companies will work together to continue lower-rate, comprehensive, multi-measure lending beyond 2015. Note the Green Bank has eight of nine lenders offering the Bundle (including one statewide lender) and two Smart-E lenders who lend up to $40,000 for the bundle and all other measures (including one statewide lender).

[3] All Other Projects Loan is available to all participants. CHIF administers loan funding for customers with FICO scores between 640 and 680 for eligible EE measures (e.g., Renewable Energy Systems are not qualifying measures under EE eligible measures). With the pending recapitalization, CHIF will lend down to a 580 FICO. The Green Bank/Smart-E lenders administer loan funding for customers with FICO scores 680 and above, although five of nine lenders go down to 640 (including one statewide lender). Smart-E interest rate caps are currently at 4.49% for 5 years, 4.99% for 7 years, 5.99% for 10 years, and 6.99% for 12 years (four lenders currently offer rates lower than the cap). The CHIF loan product has increased its interest rate for the ten-year loan term to match Smart-E and set rates at 4.49% for 5 years, 4.99% for 7 years, 5.99% for 10 years, and 6.99% for 12 years.

845 Brook Street
Rocky Hill, Connecticut 06067

300 Main Street, 4th Floor
Stamford, Connecticut 06901

T: 860.563.0015
F: 860.563.4877
www.ctcleanenergy.com

CLEAN ENERGY
FINANCE AND INVESTMENT AUTHORITY

Memo

To: Connecticut Green Bank Board of Directors

From: Kerry O'Neil, Director of Residential Programs; Kim Stevenson, Associate Director of Multifamily Programs

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

Date: December 12, 2014

Re: Market Analysis of Residential Solar Deployment and Housing Characteristics of CT's Low Income Sector

Introduction

The purpose of this memo is to respond to the Connecticut Green Bank (Green Bank) Board of Director's August 2014 request for staff to detail solar deployment in Connecticut's low-income communities and discuss strategies to achieve greater adoption in this sector. This memo will address:

- The level of current residential solar deployment and market penetration in the low income segment
- Overview of customer segmentation market research for the solar customer
- Defining characteristics of Connecticut's low income housing market

Approach to Analysis

Green Bank staff worked with Connecticut Center for Economic Analysis at UCONN, http://ccea.uconn.edu, to perform analysis on current solar deployment and the low income housing market. For solar deployment, ***all*** residential solar deployment to date was included (e.g. projects from the Connecticut Clean Energy Fund (CCEF), going back to 2004, were included). Analysis was done across the state at the census tract level, where census tracts were grouped by Area Median Income (AMI):

- 60% of median income or below
    - Chosen since 60% of AMI or lower correlates quite closely to 150% of the federal poverty rate or lower, a cutoff used by many low income advocates
    - Annual average household median income of less than $45,826
- 60% - 80% of median income

    - Chosen since 80% of AMI or lower is used as the cutoff for eligibility of programs such as CEEF's Home Energy Solutions-Income Eligible program, the Cozy Home Loan, and others
    - Annual average household median income of $45,826 to $61,102
- 80% of median income or higher
    - Since the focus of the analysis is on low income residents, Green Bank and UCONN decided to group all others into this 3rd category
    - Annual average household median income of $61,102 or above

For the solar deployment analysis, the data was visualized in two ways at the census tract level: by number of projects and by kW installed. An additional visualization was done showing the concentration of residents at 150% poverty level for projects only.

Residential Solar Deployment in the Low Income Sector

Residential solar is predominantly deployed in moderate and higher income communities in Connecticut, as expected. Higher relative penetration rates are also seen in communities with strong Solarize campaigns. The Green Bank is making some inroads into lower income communities, but there is significant room for improvement. For example, as the Table 1 shows, current penetration of kW installed per capita in:

- Census tracts at < 60% of area median income (AMI) **is 1/10th** that of tracts at >80% AMI
- Census tracts at 60% to 80% of AMI **is 1/4th** that of tracts at >80% AMI

Table 1. Statewide Solar Deployment Summary by Income of Census Tract

Income Level	# of Census Tracts	Population	# of Projects	Projects per Capita	kW Installed	kW Installed per Capita
<60% AMI	179	651,267	257	.00039	1,422	.00218
60-80% AMI	113	518,459	473	.00091	2,950	.00569
>80% AMI	532	2,395,353	6,756	.00282	48,284	.02016
Total	824	3,565,079	7,486	.00210	52,656	.01477

However, the data also confirms that concentrated and targeted marketing and outreach campaigns can lead to higher than average solar penetration in low income communities. To date, six Solarize campaigns have been run in distressed communities: Bridgeport, Enfield,

Montville, Torrington, West Haven and Windham. When looking at the kW per capita in these communities compared to the statewide averages in Table 1 there is:

- 27% higher penetration in <60% AMI census tracts
- 21% higher penetration in 80%-60% AMI census tracts
- Across all census tracts in these 6 communities, the penetration was at 95% of the statewide penetration rate, *almost* at parity

The data clearly demonstrates that the challenge in front of us is significant – and we need to be strategic, patient, and diligent, and commit to investing the time and resources, if we hope to make a meaningful impact.

Despite the low overall penetration rates for low income, we were surprised and pleased to see such a broad dispersion of projects deployed geographically as Figure 1 shows, including in lower income census tracts, despite the fact that lower income households are very hard to reach and to date the Green Bank has not done a lot to target these households, except for a handful of Solarize campaigns in distressed communities. This speaks to the broad appeal of solar across income spectrums – especially as a tool to reduce/control energy costs.

Figure 2 shows the same project data but with census tracts coded at the % of the federal poverty level, again demonstrating some coverage of lower income communities and the potential appeal of solar for lower income populations. This map shows us in darker colors where low-income residents are concentrated – a better tool for us when thinking about targeting outreach.

Overall, 83% of census tracts have done at least 1 solar project and 70% have done at least 3 projects (see Table 2)

Table 2. Project Coverage in Census Tract Groupings

Percentage of Coverage, by Num of Projects, of CT's Census Tracts

	Entire State			
	Total^	>80%	80%-60%	60% (and below)*
Total num of census tracts in CT:	824	532	113	179
Num of census tracts with at least one project:	693	508	95	90
Percent of total:	84%	95%	84%	50%
Num of census tracts with at least three projects:	587	488	65	34
Percent of total:	71%	92%	58%	19%

*60% of median income is roughly equivalent to 150% of poverty level.

^In the maps there are 824 census tracts, which excludes 9 'special tracts' such as Yale campus, UConn, etc.

To date the Green Bank and its predecessor organization has invested $103.5 million in residential solar incentives. Solar installed in low income census tracts represents about 8% of the total installed to date, for an estimated investment of $8.6 million in solar incentives in low income tracts (see Table 3). Additionally, 2 C-PACE affordable multifamily solar projects have been financed for $400,000.

Table 3. Level of Solar Investment (2004-2014)

Income Level	% of kW Installed	Total Incentive Amount	Total System Cost
<80% AMI	8.3%	$ 8,589,306	$ 26,986,779
>80% AMI	91.7%	$ 94,859,571	$ 298,039,719
Total	108%	$ 103,448,877	$ 325,026,498

Estimate, based on incentives through 12/15/2014 and the pro rata share of total kW Installed in low income census tracts

See Appendix 1 for the UCONN team's memo on their insights on the solar deployment analysis, including a detailed table of data in Appendix C of their mem. Some additional maps for our three largest cities and their surrounding regions is also provided.

Figure 1

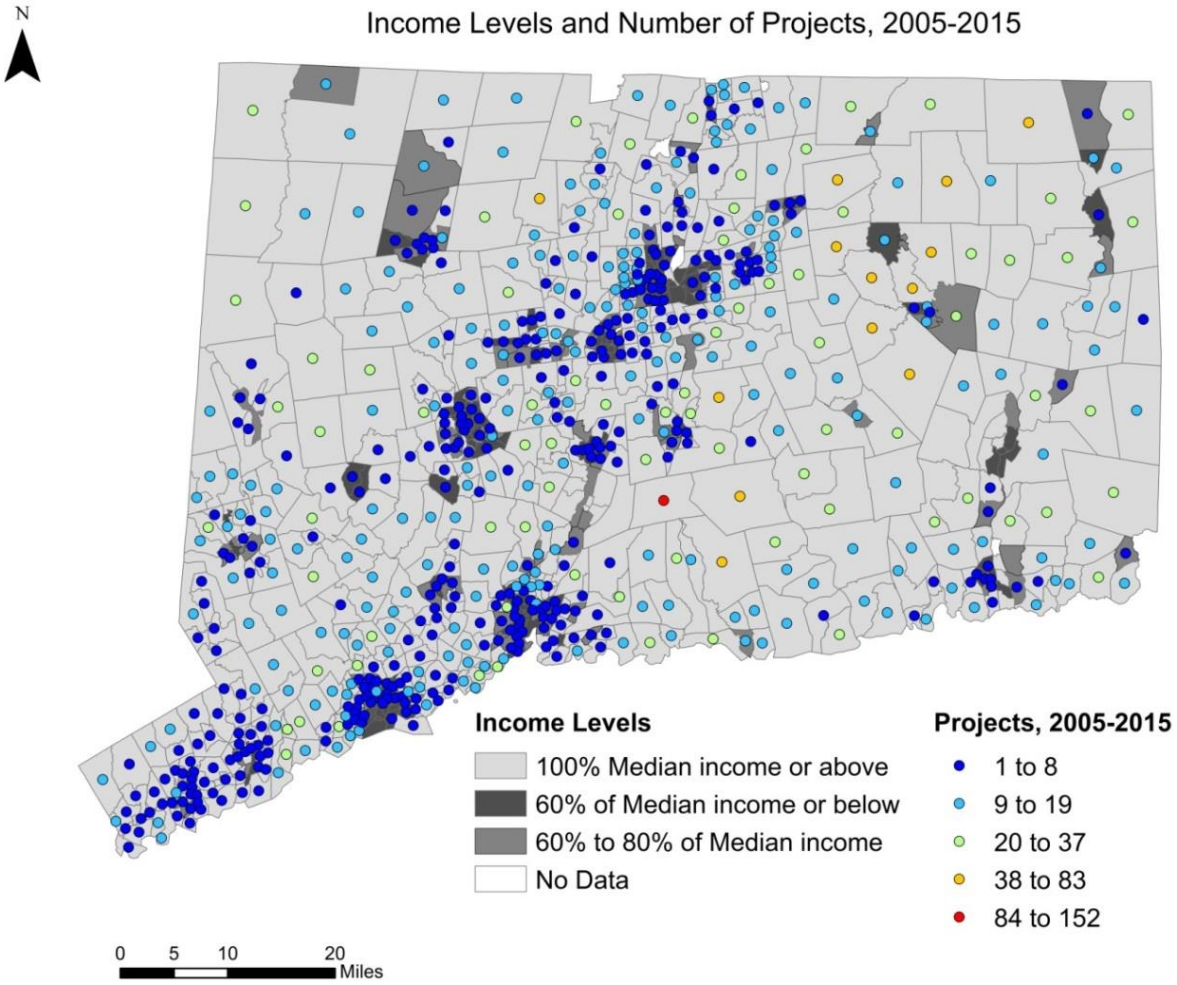
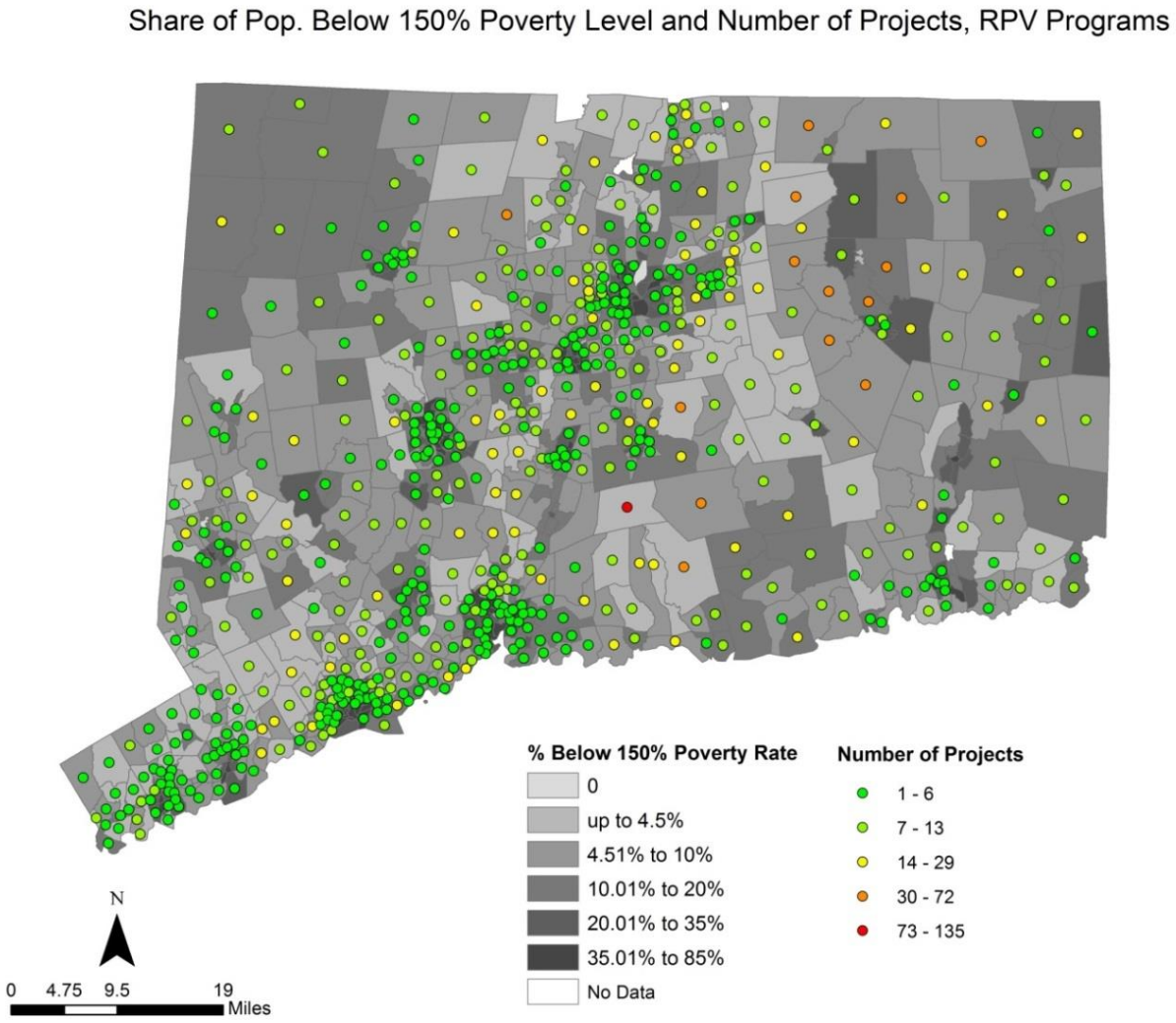

N
Income Levels and Number of Projects, 2005-2015
Income Levels
100% Median income or above
60% of Median income or below
60% to 80% of Median income
No Data
Projects, 2005-2015
1 to 8
9 to 19
20 to 37
38 to 83
84 to 152
0 5 10 20
Miles

Figure 2


Share of Pop. Below 150% Poverty Level and Number of Projects, RPV Programs
% Below 150% Poverty Rate
0
up to 4.5%
4.51% to 10%
10.01% to 20%
20.01% to 35%
35.01% to 85%
No Data
Number of Projects
1 - 6
7 - 13
14 - 29
30 - 72
73 - 135
N
0 4.75 9.5 19
Miles

Overview of Solar Customer Segmentation Research

Green Bank staff worked with our agency, Match Drive, to do a Nielsen customer market segmentation analysis of the current solar customer in CT. This segmentation analysis has revealed that going solar resonates with a wide range of income groups and customer profiles, including a customer segment unique to CT that skews older and lower in income. The identification of this specific customer segment is encouraging, as it will support targeted messaging and outreach to a subset of the low income market.

Our *current* customer base can be broken into 2 primary segments:

- **"Solar Homes"** – the mainstream solar customer in CT - affluent married couples, likely to have children in the home.
- **"Prudent Yankees"** – segment unique to CT, very different from Solar Homes – a smaller segment, likely not have a college degree, and older including retirees.

Nielsen identified an additional segment based on their national profile of solar customers. This profile represents customers that are going solar elsewhere, but don't seem to be going solar here in CT and is a new opportunity for state:

- **"Solar Prospects"** – represents an opportunity to test messaging & targeting. The "Solar Prospects" are middle-aged with an average income, likely to not have children in the home. They are also a higher percent Hispanic than the national average.

Table 4 summarizes the key characteristics of these three customer segments.

Table 4. Summary of Solar Customer Segments

Segment	% of Current Customers	Avg. Household Income	Avg. Age	College Education	% w/ Children in Home	% Employed Full Time	Potential CT Households
Solar Homes	70%	$148K	44	52% college+	54%	66%	483K
Prudent Yankees	10%	$48K	52	16% college+	48%	38%	83K
Solar Prospects	<10%	$79K	50	32% college+	27%	49%	250K

Visualizations of where customers in each segment live are provided in Appendix 2.

Defining Characteristics of CT's Low-Income Housing Market

Low income housing, defined as units with residents at 80% of area median income or below, represents about 507,000 units or 34% of CT's total housing units (see the Low Income Housing Stock Summary table in Appendix 3 for details). Properties with low income residents run the gamut from single family owner occupied homes, to small and large investor owned buildings. Our visualization analysis (Figure 3) shows a clear correlation between lower incomes and high concentrations of renters living in older buildings – predominantly in the core cities as well and scattered across the northeastern and northwestern quiet corners of the State.[1]

It is interesting to note the older housing is along the coast and river valleys, reflecting CT's industrial history. Older houses in the northwest likely relate to historic mansions for wealthy vacationers from Boston and New York City.

Connecticut's low income housing market generally falls into the following categories:

- Owner occupied housing (1 to 4 units)
- Naturally occurring affordable rental housing (investor owned small and large properties)
- State funded/subsidized affordable housing (public and privately owned)
- Federally funded/subsidized (HUD) properties

As Table 5 shows, the majority (nearly 70%) of CT's low income residents live in owner-occupied single family homes and small, investor owned multifamily rentals (2 to 19 units). Over half live in single family homes and 2-4 unit rentals. Most of these units fall within the "naturally occurring affordable" category, meaning they don't receive public subsidies. Collectively, this is the hardest of the hard to reach markets.

Table 5. Concentration of Housing Types for Low Income Households

Type of Housing	# of Low Income Households	% of Low Income Households
Single Family Owner-Occupied (SF OO) Homes	151,493	30%
2-4 Unit Rentals	130,684	26%
5-19 Unit Rentals	67,092	13%
Total SF 00 + 2-19 Unit Rentals	*349,269*	*69%*

[1] Partnership for Strong Communities also has some excellent state and community housing profiles: http://pschousing.org/news/2013-municipal-housing-data-profiles-now-available

Figure 3. Income Level, Share of Renters, Median Housing Age

Many of these small properties are concentrated in the urban core, but are also disbursed throughout suburban and rural communities (particularly elderly, owner occupied single family homes). They are characterized by significant **deferred maintenance needs** and **health and safety issues** (leaks, mold, lead, asbestos, etc.). Many investor-owned properties are operating on thin margins or at a loss; consequently owners have **limited capacity to take on additional debt** or other financial obligations. Further, many tenants in this sector pay their own utilities and have high utility cost burdens, often **making hard choices** between food, medicine and heat.[2] This utility payment structure also creates a disincentive for owners to invest in energy upgrades – the classic **split incentive issue**.

In general, larger properties (50 units and above) as well as State and HUD financed/subsidized properties are in better condition than the smaller, privately owned, non-subsidized properties[3]. This is due to stronger property management and maintenance budgets enabled by economies of scale, as well as building and other code requirements mandated by DOH, CHFA and HUD. This group typically has management and ownership structures better positioned to take advantage of CGB programs and are, therefore, a more immediate opportunity for solar and other energy upgrades. Further, many properties in this sector are master metered (meaning owners pay utilities), particularly for heat and hot water. For master metered properties, owners have a strong incentive to make energy upgrades that will result in utility and maintenance cost savings and solar can be a particularly attractive investment option.

However, across the board, housing in CT suffers from years of **deferred maintenance** as well as lack of public investment under prior administrations, now changing under Governor Malloy. Many owners in this market are **less sophisticated and much more stretched** (than the commercial and industrial market). Consequently, developing projects to a point where they are ready for financing is a huge challenge and requires significant technical support to owners. This sector will require substantial public investment and grant funding to build out the necessary supporting infrastructure.

Furthermore, given the brutal utility cost burden on low-income residents, it is also critical that Green Bank-funded programs lower total energy/operating costs and tenant utility costs with high levels of confidence (e.g. guarantees). While the opportunity to achieve deeper penetration of solar deployment in the low income sector is most certainly important, care must be taken to develop solutions that support the holistic improvement of the building stock. **Comprehensive financing solutions that address deferred maintenance, health and safety, and energy improvements, including solar, all at the same time will be most beneficial.**

[2] The average low income household in CT owes about $2360 more in annual energy bills than it can afford to pay – see http://www.operationfuel.org/wp-content/uploads/Connecticut-2012-HEAG-Final.pdf.

[3] Just over 50% of CT's low-income multifamily housing is naturally occurring affordable; just under 50% is subsidized affordable – CGB analysis.

See Appendix 3 for detailed maps highlighting the age of the housing stock, income levels within towns, and share of rentals.

Appendix 1

Memo from UCONN team to Green Bank staff and additional solar deployment maps.

SEMNIA LLC MEMORANDUM

TO: Mackey Dykes
FROM: Bill Waite & Marcello Graziano
SUBJECT: Mapping project thoughts and recommendations
DATE: October 31, 2014
CC: Lucy Charpentier, Kim Stevenson, Kerry E. O'Neill

The purpose of this memo is twofold: (1) summarize the work done to-date on the "CT Green Bank Mapping Project"; and (2) present additional information and recommendations regarding subsequent analysis.

Summary of Work Completed:

Thus far, Semnia has produced a series of maps illustrating various demographic characteristics of Connecticut and the adoption of solar power generation capabilities. Additionally, Semnia has provided analysis and commentary regarding the aforementioned maps. The following list is not comprehensive, but rather a summary of what we believe are the key take-aways from Semnia's analysis.

1) Adoption rates are quite high across the state – see Appendix A – but do drop off markedly as income levels decline (particularly below 60% of median income, which is approximately equivalent to 150% of the poverty level).
    a. The decrease in penetration rates is to be expected (due simply to economic and financial constraints; aka, financial barriers-to-adoption).
    b. The map in Appendix B provides another way in which data can be visualized/analyzed to identify areas that warrant special attention. They key to effectively utilizing identification strategies such as the one shown is determining where to set the different 'break-points' (such as 60% of median income, etc.). With even three variables in the mix, there are simply too many combinations and permutations to analyze each possible scenario.

2) The adoption of solar does tend to vary with the age of housing units across the state. As is the case in point 1, above, this is very much understandable. However, this finding does raise questions regarding causality; specifically: Why do individuals who live in older houses tend to not adopt as readily? There are several possible answers to this question, including structural concerns, the preferences of individuals who choose to live in older homes, etc. One potential explanation is that zoning/building regulations make installing solar systems difficult; that is, there is a regulatory barrier-to-entry. If this is the case, additional analysis seems warranted regarding how CT might mitigate this issue,

as well as the trade-offs between adoption of solar technologies and preservation of historical aesthetics.

3) While the issue was not analyzed in depth, it seems that CT Green Bank's outreach initiatives have been successful, with regard to higher adoption rates in areas where there was a targeted program as compared to those in which no such effort existed. The ability of CT Green Bank to effectively impact adoption is certainly positive, and suggests that the expansion of support for its programs would materially impact the adoption of solar across the state.

Additional Information:

Copies of the data tables not previously made available will accompany this memo in electronic form. The accompanying tables provide additional information regarding the breakdown of multifamily and owner- vs. renter-occupied residential properties. Select summary statistics regarding this data is presented in Appendix C.

Recommendations:

The following are recommendations for future action on the part of CT Green Bank (and, indirectly, municipalities and governing agencies across the state). As is the case with the key take-aways on Page 1 of this memo, the following is not an exhaustive list. Rather, these are the topics on which Semnia believes CT Green Bank should focus some of its efforts (above and beyond continuing to run the successful programs/initiatives it already has underway).

1) Regarding data: Support ongoing efforts to aggregate and integrate housing parcels data state-wide, and encourage Councils of Governments (COGs) that have not already begun such initiatives to do so. In CT, this data is kept at the town-level (within the Assessor's Office). There are some groups that are aggregating regional data – such as the South Central Regional Council of Governments, RiverCOG, etc. – but, in general, the data is still inconsistent, not available, etc. The issue with using Census data is that while it good/appropriate for studies/comparison at the aggregate level (comparisons between states, for instance), the information really isn't all that great for micro-analysis. Having integrated housing parcels data would allow for a much more rigorous, accurate analysis, and facilitate efforts to create targeted programs.

2) More in-depth study and analysis of:
   a. Split incentives (to target renters);[4]
   b. Regulatory barriers to adoption regarding multi-tenant properties, specifically metering/sub-metering;[5]
   c. Consumer behavior.[6]

[4] See: Gillingham, Kenneth; Harding, Matthew; Rapson, David. Split Incentives in Residential Energy Consumption, *The Energy Journal*; 2012; 33, 2.

[5] See: 2) Sara C. Bronin, Building-Related Renewable Energy and the Case of 360 State Street, *Vanderbilt Law Review*, Vol. 65, No. 6, 2012.

[6] See: http://www.washingtonpost.com/blogs/wonkblog/wp/2014/10/23/study-solar-energy-isnt-just-for-rich-liberals-any-more/

Appendix A

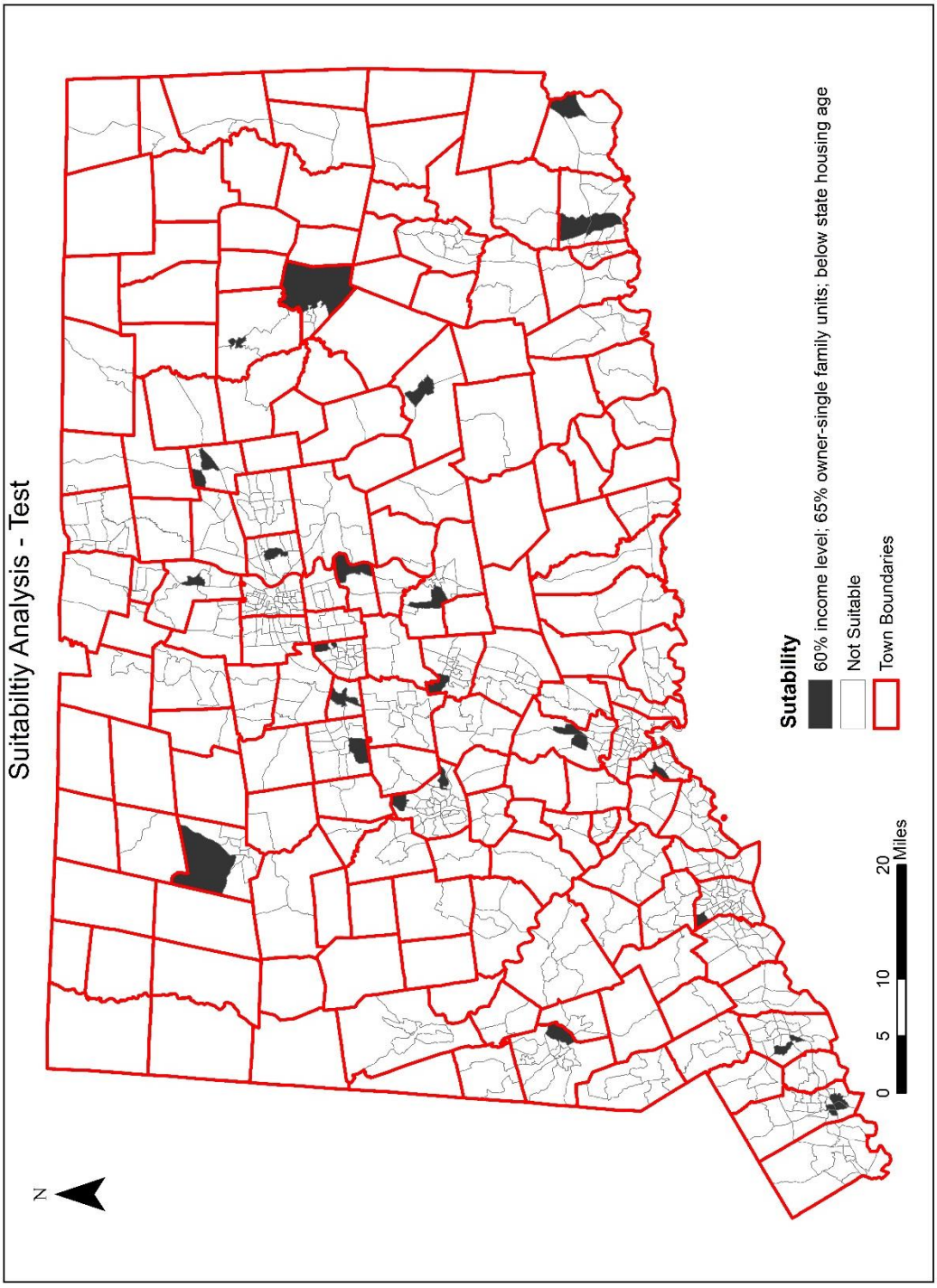
Percentage of Coverage, by Num of Projects, of CT's Census Tracts

	Entire State			
	Total^	>80%	80%-60%	60% (and below)*
Total num of census tracts in CT:	824	532	113	179
Num of census tracts with at least one project:	693	508	95	90
Percent of total:	84%	95%	84%	50%
Num of census tracts with at least three projects:	587	488	65	34
Percent of total:	71%	92%	58%	19%

*60% of median income is roughly equivalent to 150% of poverty level.

^In the maps there are 824 census tracts, which excludes 9 'special tracts' such as Yale campus, UConn, etc.

Appendix B


Suitabiltiy Analysis - Test
N
Sutability
60% income level; 65% owner-single family units; below state housing age
Not Suitable
Town Boundaries
0
5
10
20
Miles

Housing Characteristics Data, Segmented by Percent of Median Income

	Entire State				Solarize Cities/Towns (Bridgeport, Enfield, Montville, Torrington, West Haven, Windham)							
median household annual income** =	$76,377											
median household annual income	>$61,102	<$61,102 and >$45,826	<$45,826		>$61,102		<$61,102 and >$45,826		<$45,826			
					>80% Median		80%-60% Median		<60% Median		Totals	
	>80% Median	80%-60% Median	<60% Median	Totals	Number	Ratio or %	Number	Ratio or %	Number	Ratio or %	Number	Ratio or %
Number of Tracts	532	113	179	824	46	8.65%	21	18.58%	45	25.14%	112	13.59%
Number of Projects	6,756	473	257	7,486	780	11.55%	116	24.52%	79	30.74%	975	13.02%
Total Population	2,395,353	518,459	651,267	3,565,079	198,941	8.31%	106,140	20.47%	162,911	25.01%	467,992	13.13%
Total Housing Units	978,118	220,657	286,613	1,485,388	79,761	8.15%	44,678	20.25%	76,391	26.65%	200,830	13.52%
Total kW	48,284	2,950	1,422	52,656	5,354	11.09%	733	24.86%	451	31.72%	6,538	12.42%
Total kWh	53,572,123	3,251,784	1,570,765	58,394,672	6,007,161	11.21%	804,634	24.74%	508,210	32.35%	7,320,005	12.54%
Average Total % Owner Occupied^	81.9%	54.8%	30.6%		80.95%	0.99	63.82%	1.16	34.77%	1.14		
1 Unit	76.03%	43.43%	19.42%		76.24%	1.00	52.46%	1.21	20.97%	1.08		
2 Units	1.45%	4.24%	5.07%		1.55%	1.07	3.92%	0.92	6.44%	1.27		
3-4 Units	0.86%	1.75%	2.74%		0.76%	0.88	1.39%	0.79	2.89%	1.05		
5-9 Units	1.22%	1.77%	1.08%		0.62%	0.51	1.71%	0.97	1.72%	1.59		
10-19 Units	0.72%	1.33%	0.66%		0.41%	0.57	1.48%	1.12	0.90%	1.36		
20-49 Units	0.50%	0.82%	0.59%		0.47%	0.93	0.48%	0.58	0.75%	1.26		
50 of More Units	0.57%	0.75%	0.65%		0.21%	0.36	1.00%	1.33	0.97%	1.50		
Average Total % Renter Occupied^	18.1%	45.2%	69.4%		19.0%	1.05	36.2%	0.80	65.2%	0.94		
1 Unit	5.94%	7.32%	7.20%		6.46%	1.09	6.96%	0.95	8.64%	1.20		
2 Units	2.73%	8.95%	11.22%		2.92%	1.07	7.89%	0.88	12.65%	1.13		
3-4 Units	2.86%	10.74%	19.22%		3.60%	1.26	7.05%	0.66	17.98%	0.94		
5-9 Units	1.81%	5.24%	10.02%		1.91%	1.06	3.32%	0.63	7.21%	0.72		
10-19 Units	1.34%	3.66%	6.53%		1.45%	1.08	2.74%	0.75	6.08%	0.93		
20-49 Units	1.34%	4.07%	6.14%		1.23%	0.92	3.29%	0.81	5.78%	0.94		
50 of More Units	1.92%	5.04%	8.89%		1.20%	0.62	4.62%	0.92	6.80%	0.76		
kW per capita	0.02016	0.00569	0.00218	0.01477	0.02691	1.34	0.00691	1.21	0.00277	1.27	0.01397	0.95
kWh per capita	22.365	6.272	2.412	16.380	30.196	1.35	7.581	1.21	3.120	1.29	15.641	0.95
Projects per House	0.00691	0.00214	0.00090	0.00504	0.00978	1.42	0.00260	1.21	0.00103	1.15	0.00485	0.96
Projects per House Owned*	801,079	120,999	87,758		64,569		28,514		26,558			
Projects per House Rented*	177,039	99,658	198,855		15,192		16,164		49,833			

NOTES:

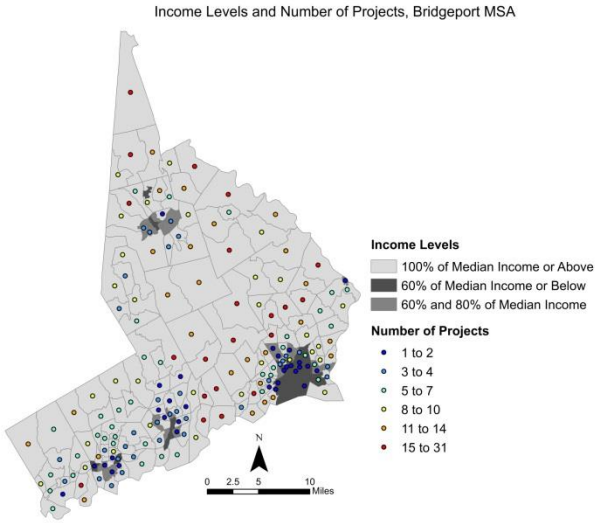
^Total averages calculated independently of break-outs; rounding error means that the sum of the broken-out numbers is slightly lower than the total averages.

*Estimate based on Average Percent of House Owned/Rented multiplied by Total Housing Units.

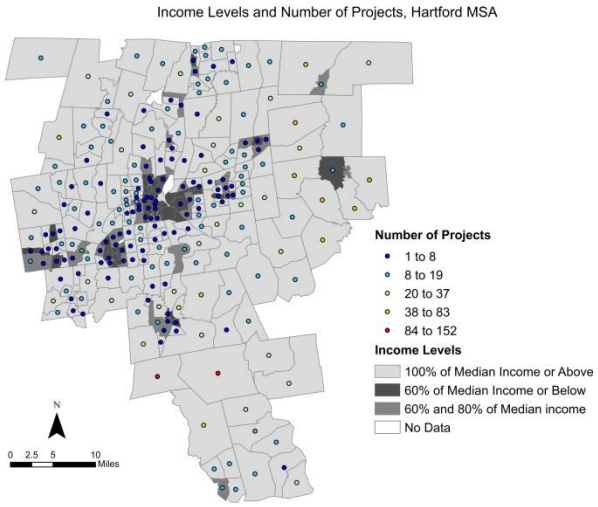
**Median annual household income for the state is $67,098, which is from the 2013 American Community Survey 1-Year Estimates; the median numbers used in this analysis are from the ACS 2008-2012 5-Year Average, with Data at Tract Level (the most recent figures available for every geography (tract and/or group level) in the state).

MSA Maps - Going down a level of detail in our 3 largest cities, this also shows that we have solar installs in many of our lower income census tracts

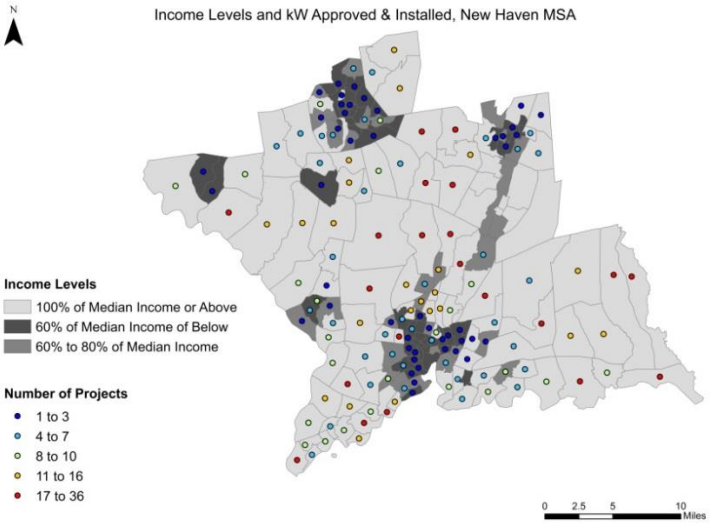
Bridgeport MSA



Hartford MSA



New Haven MSA (map mislabeled, it should read “Income Levels and Number of Projects, New Haven MSA”)


N
Income Levels and kW Approved & Installed, New Haven MSA
Income Levels
100% of Median Income or Above
60% of Median Income of Below
60% to 80% of Median Income
Number of Projects
1 to 3
4 to 7
8 to 10
11 to 16
17 to 36
0 2.5 5 10
Miles

Appendix 2 – Customer Segmentation Maps

Solar Homes - 482,972 households

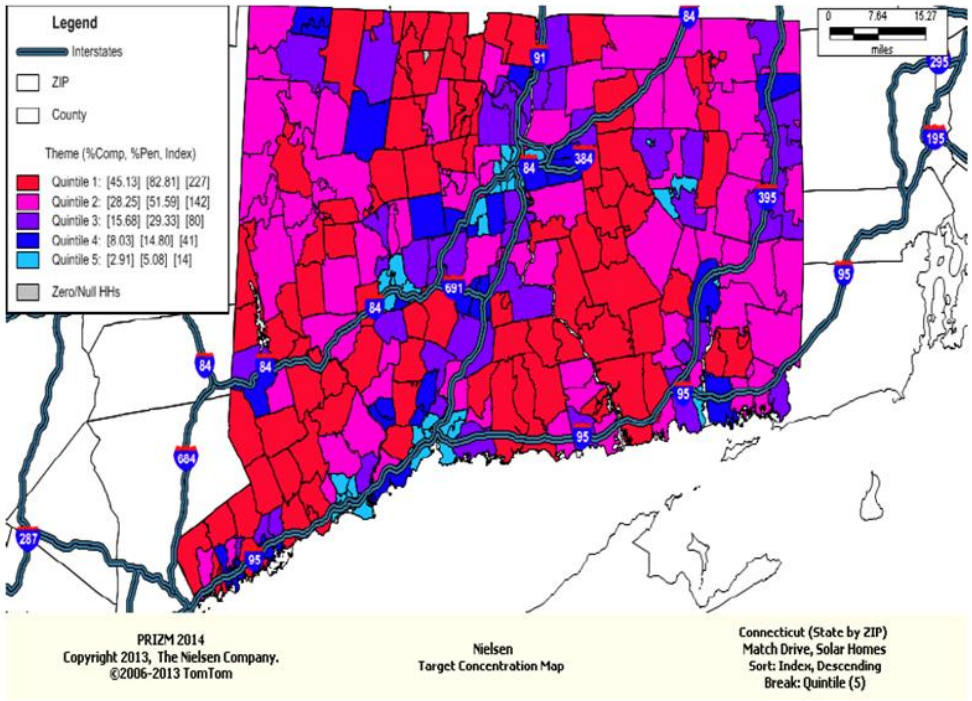
The "Solar Homes" are affluent married couples, likely to have children in the home.

Top Indexing Towns in CT

1. Stamford
2. Easton
3. Weston
4. West Simsbury
5. New Canaan
6. Marlborough
7. Cos Cob
8. South Glastonbury
9. Wilton
10. West Granby

Highest % Composition Towns in CT

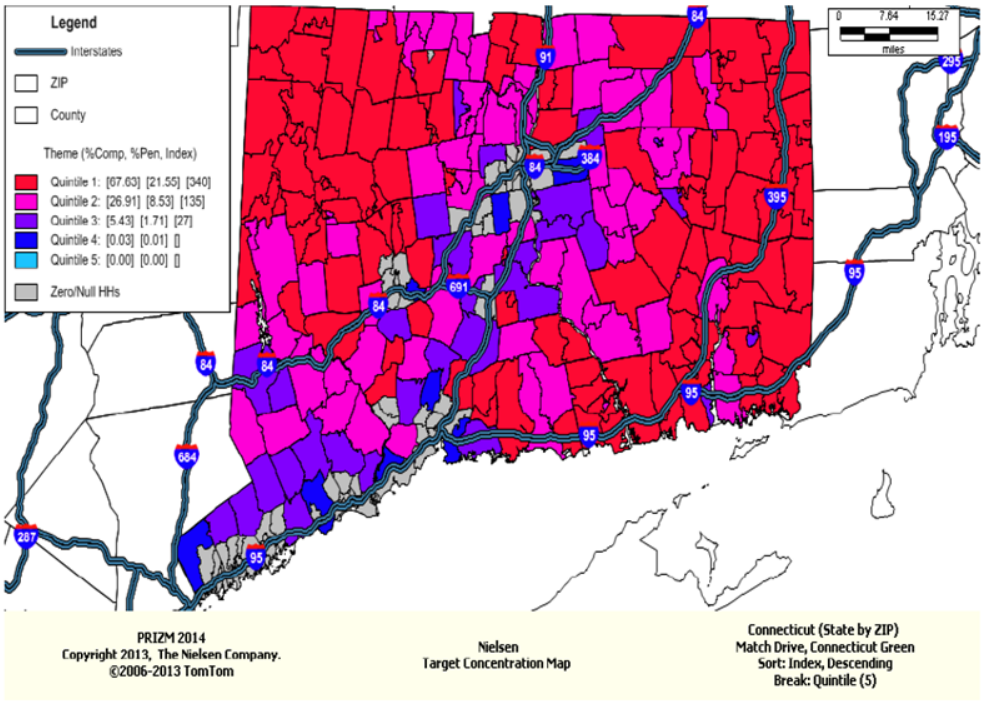
1. Westport
2. Fairfield
3. Cheshire
4. Ridgefield
5. New Canaan
6. Darien
7. Guilford
8. Durham
9. Wilton
10. Madison



Prudent Yankees – 82,857 households

The "Prudent Yankees" are lower income, older, and likely to not have a college degree.

Top Indexing Towns in CT	Highest % Composition Towns in CT
1. Falls Village	1. Southbury
2. Montville	2. Torrington
3. Dayville	3. North Haven
4. East Berlin	4. Mystic
5. Moosup	5. Winsted
6. Westbrook	6. South Windsor
7. Uncasville	7. Old Saybrook
8. South Windham	8. Guilford
9. Old Saybrook	9. Jewett City
10. Plymouth	10. Uncasville



Solar Prospects – 250,904 households

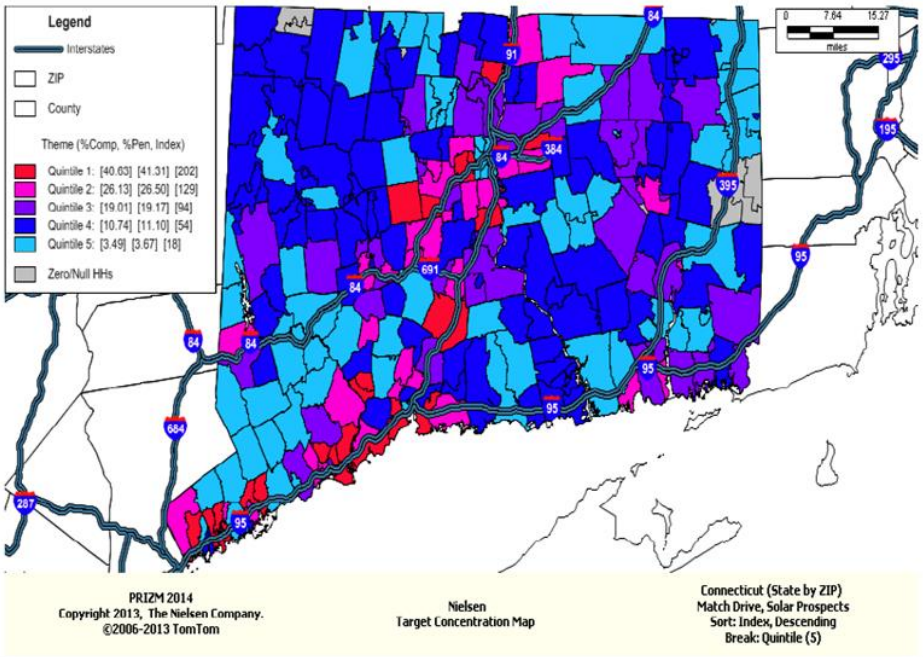
The "Solar Prospects" are middle-aged with an average income, likely to not have children in the home. They are also a higher percent Hispanic than the national average.

Top Indexing CT Towns

1. Stamford (06906)
2. Milford (06460)
3. Stamford (06901)
4. Windsor Locks (06096)
5. Bridgeport (06606)
6. Norwalk (06851)
7. West Hartford (06107)
8. Greenwich (06830)
9. Hartford (06103)
10. East Haven (06512)

Highest % Composition Towns in CT

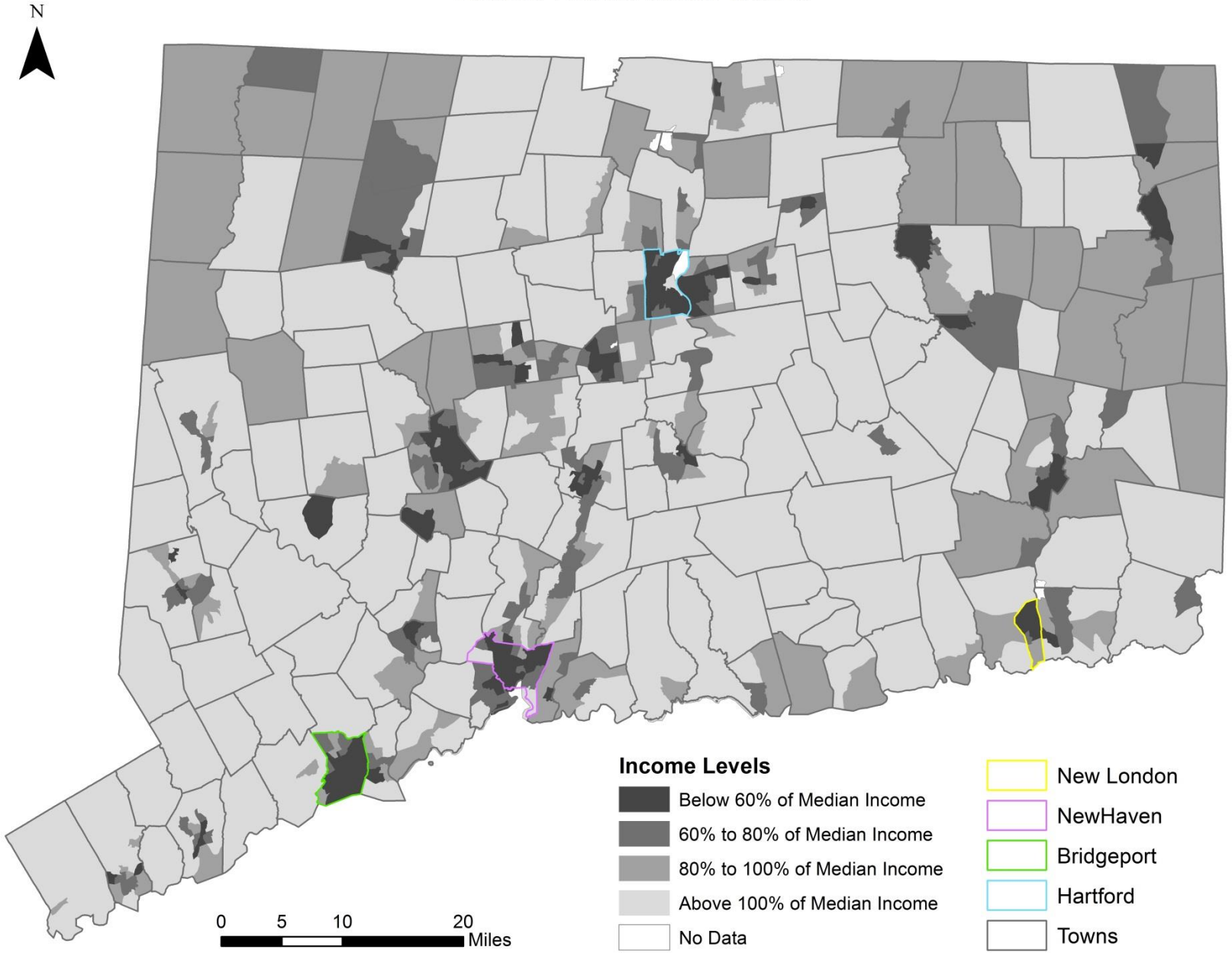
1. Milford (06460)
2. Bridgeport (0660
3. Stamford (06902)
4. Bristol (06010)
5. West Haven (06516)
6. East Haven (0651
7. Norwalk (06851)
8. Greenwich (0683
9. Stratford (06614)
10. Manchester (06042)



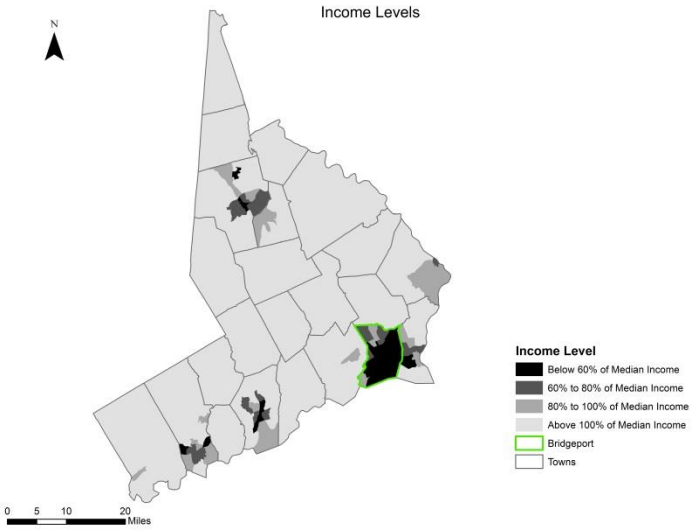
Appendix 3 – Low Income Housing Market Analysis and Maps

Low Income Housing Stock Summary - Look at <80% Totals						
	<60%	<60% # HHs	80%-60%	80%-60% # HHs	<80%	<80% # HHs
Total Population	18%	651,267	15%	518,459	33%	1,169,726
Total Housing Units	19%	286,613	15%	220,657	34%	507,270
In this table, %'s represent % of state totals						
	<60%	<60% # HHs	80%-60%	80%-60% # HHs	<80%	<80% # HHs
% OO	31%	87,758	55%	120,999	41%	208,758
Single Family	19%	55,660	43%	95,833	30%	151,493
2-4 Units	8%	22,384	6%	13,226	7%	35,610
5-19 Units	2%	4,996	3%	6,832	2%	11,828
20+ Units	1%	3,550	2%	3,477	1%	7,027
% Rental	69%	198,855	45%	99,658	59%	298,512
Single Family	7%	20,647	7%	16,149	7%	36,796
2-4 Units	30%	87,231	20%	43,453	26%	130,684
5-19 Units	17%	47,451	9%	19,641	13%	67,092
20+ Units	15%	43,080	9%	20,096	12%	63,176
In this table, %'s represent % of category totals						
Top Housing Categories by Units						
1	30%	Rental 2-4	43%	OO SF	30%	OO SF
2	19%	OO SF	20%	Rental 2-4	26%	Rental 2-4
3	17%	Rental 5-19	9%	Rental 20+	13%	Rental 5-19
4	15%	Rental 20+	9%	Rental 5-19	12%	Rental 20+
In this table, %'s represent % of category totals						
	<60%	<60% # HHs	80%-60%	80%-60% # HHs	<80%	<80% # HHs
# of OO SF + Rental 2-4 units:						
	50%	142,891	63%	139,286	56%	282,177
# of OO SF + Rental 2-20 units:						
	66%	190,343	72%	158,927	69%	349,269
In this table, %'s represent % of category totals						

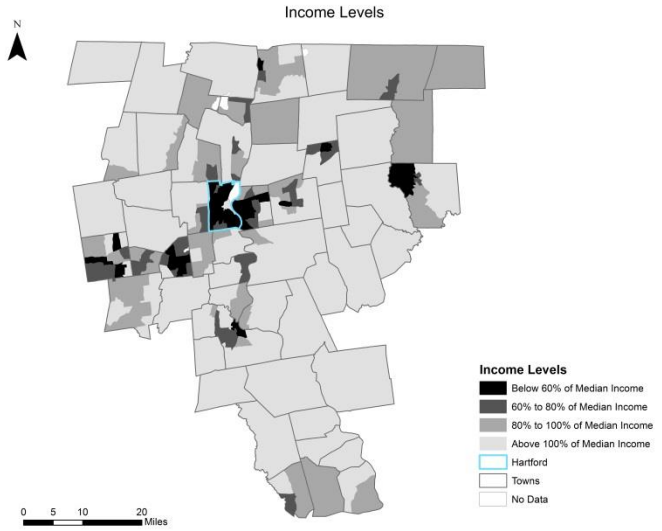
Income Levels within Towns



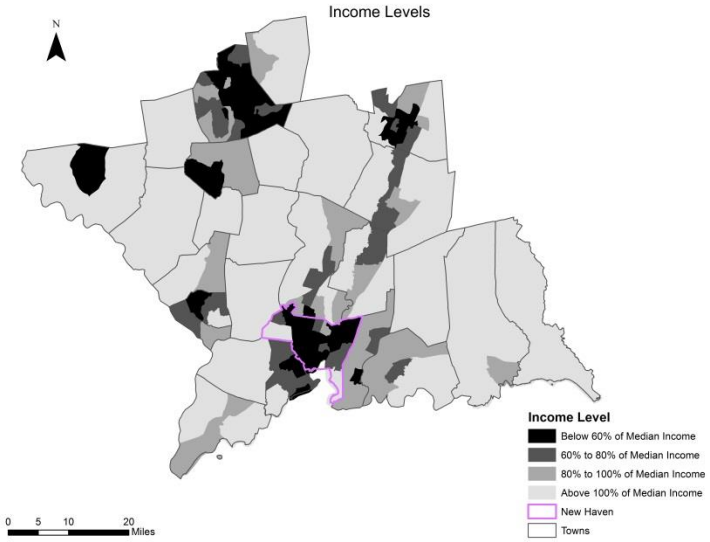
Bridgeport MSA

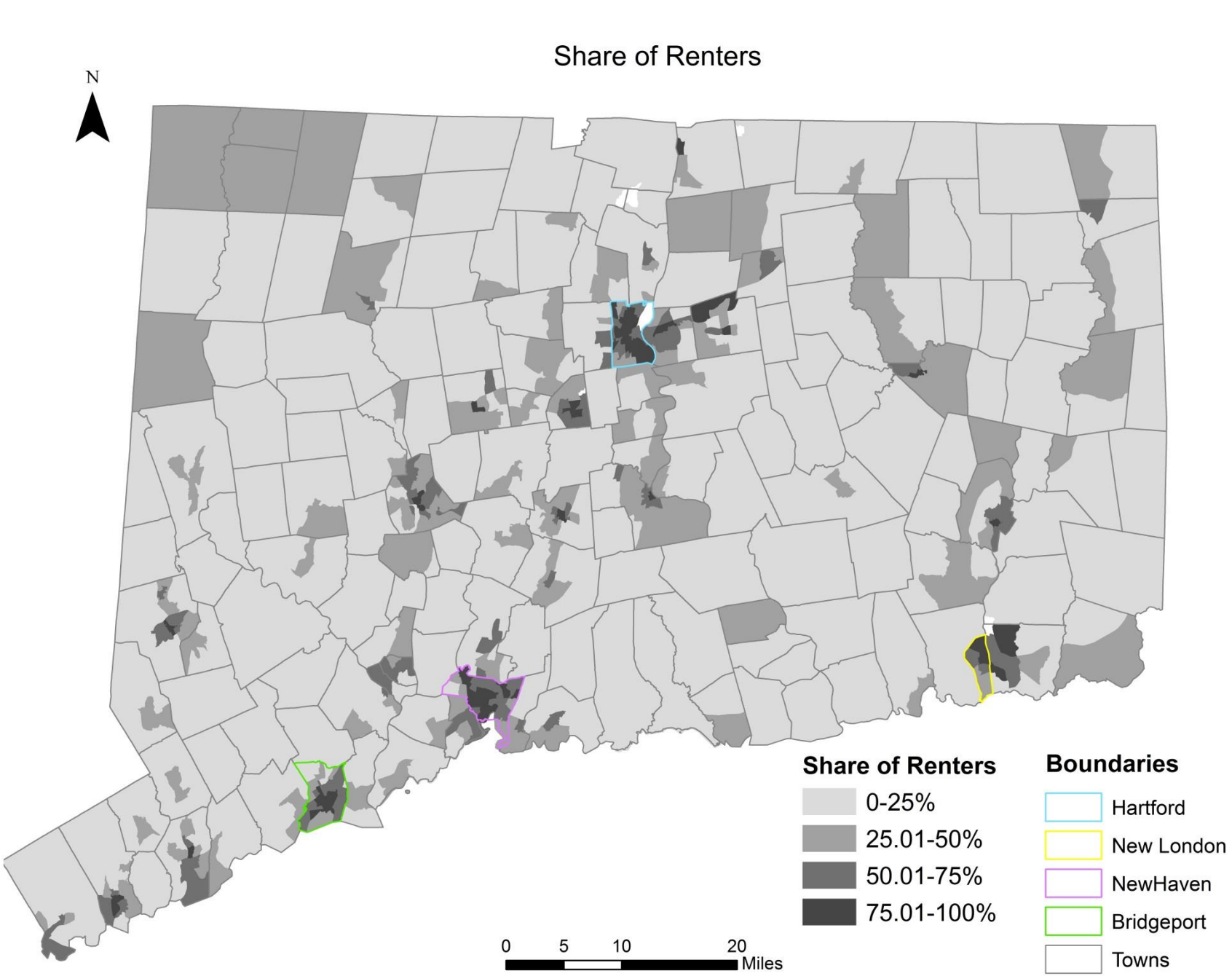


Hartford MSA

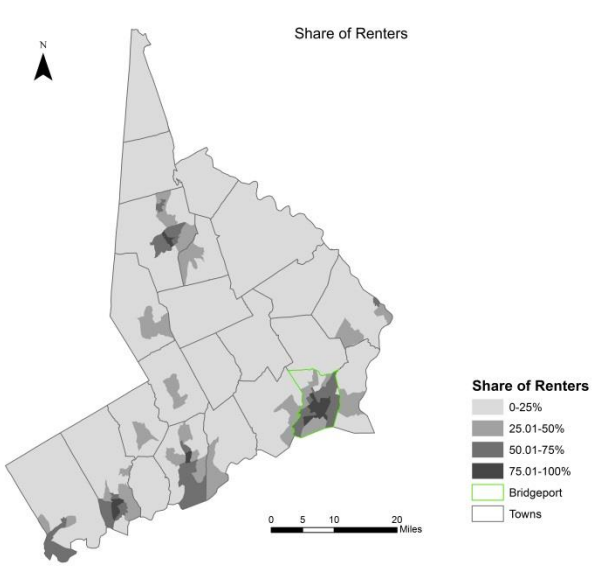


New Haven MSA

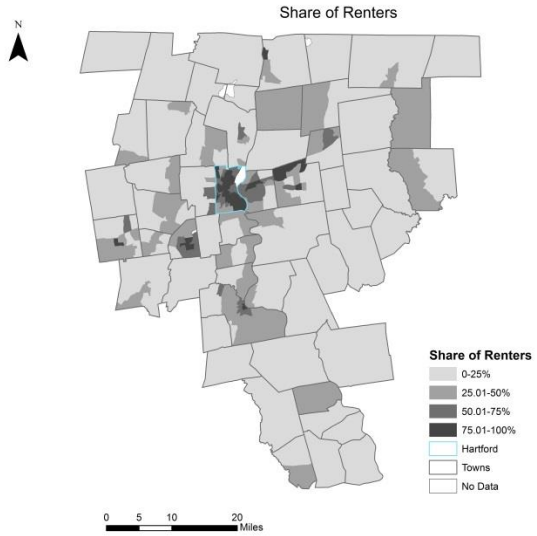


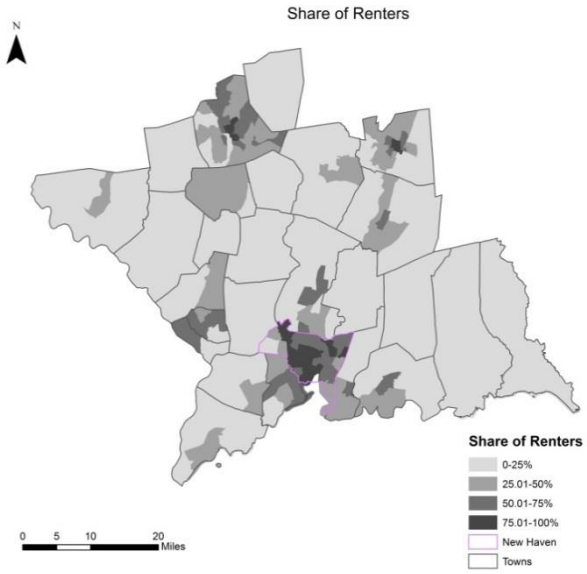

Share of Renters
N
Share of Renters
0-25%
25.01-50%
50.01-75%
75.01-100%
Boundaries
Hartford
New London
NewHaven
Bridgeport
Towns
0
5
10
20
Miles

Bridgeport MSA

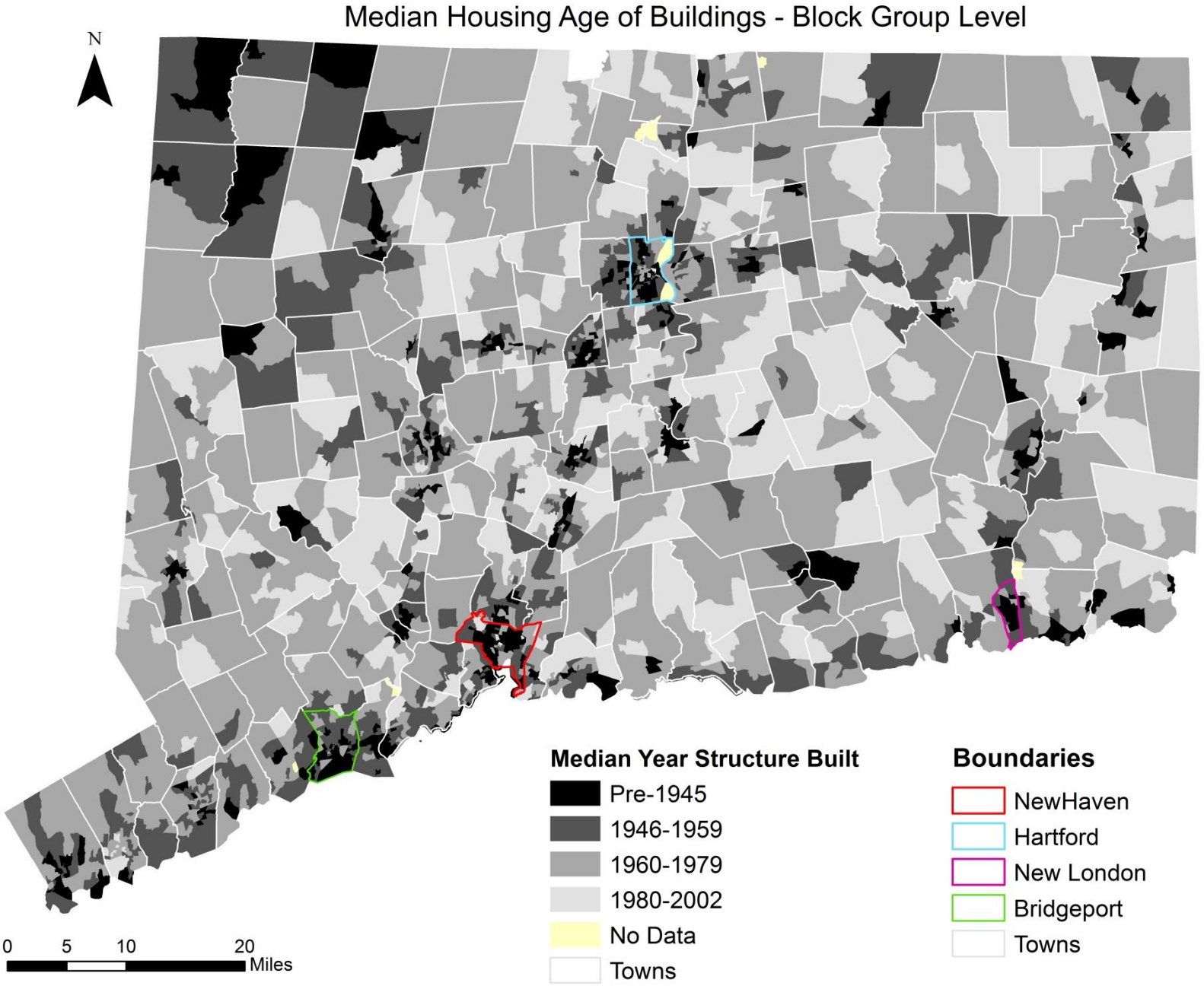


Hartford MSA

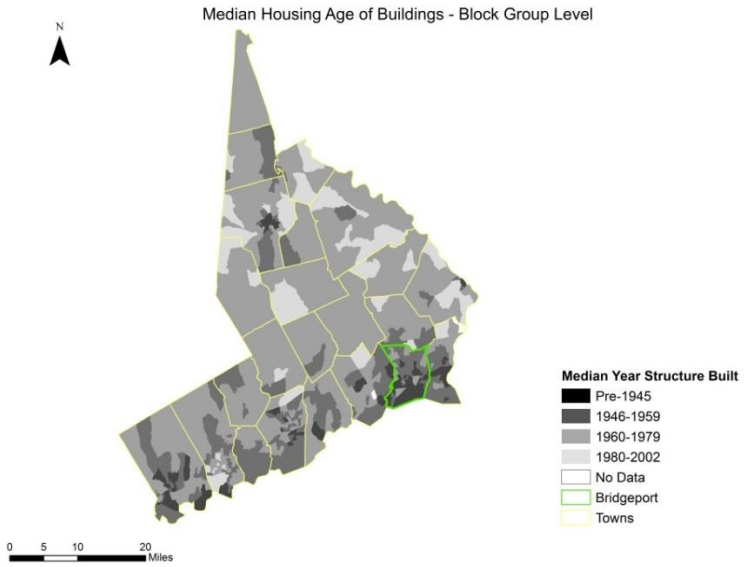




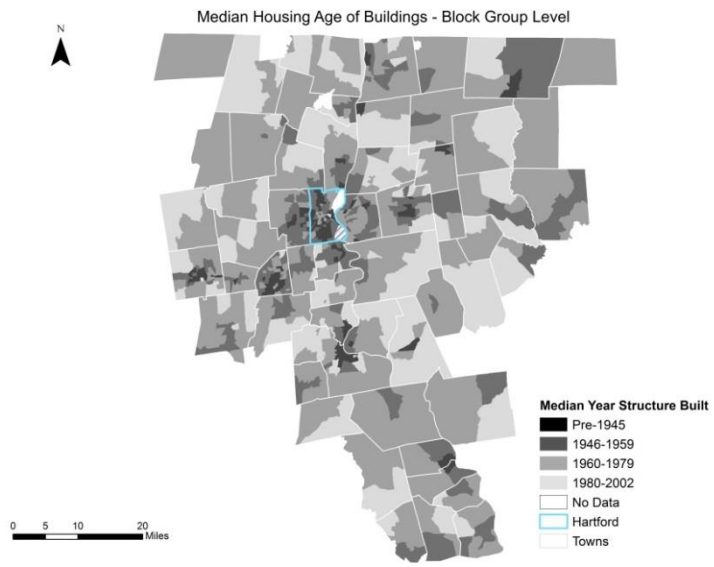
New Haven MSA


Median Housing Age of Buildings - Block Group Level
N
0 5 10 20
Miles
Median Year Structure Built
Pre-1945
1946-1959
1960-1979
1980-2002
No Data
Towns
Boundaries
NewHaven
Hartford
New London
Bridgeport
Towns

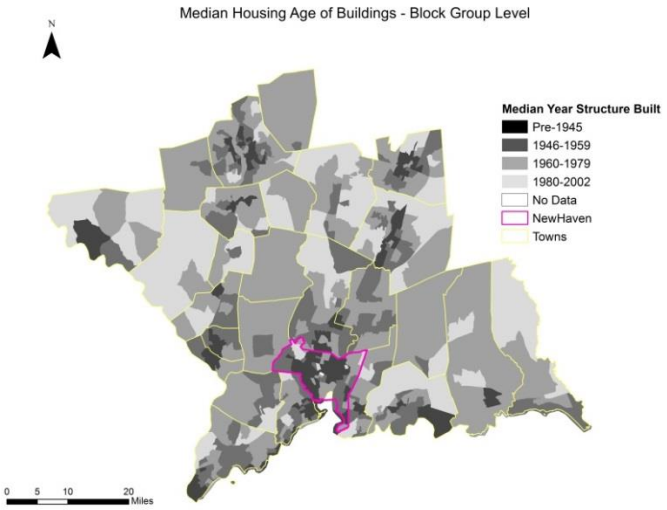
Bridgeport MSA



Hartford MSA



New Haven MSA



845 Brook Street
Rocky Hill, Connecticut 06067

300 Main Street, 4th Floor
Stamford, Connecticut 06901

T: 860.563.0015
F: 860.563.4877
www.ctcleanenergy.com

CLEAN ENERGY
FINANCE AND INVESTMENT AUTHORITY

Memo

To: Connecticut Green Bank Board of Directors

From: Kerry O'Neil, Director of Residential Programs; Kim Stevenson, Associate Director of Multifamily Programs; Ben Healey, Assistant Director of Clean Energy Finance

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

Date: December 12, 2014

Re: Role of a Green Bank – Low Income Solar Deployment

The Residential Solar Investment Program (RSIP) is a quintessential green bank model program. Since the start of the program in 2012, subsidies from the Connecticut Green Bank have decreased by nearly 60% per installed kilowatt (i.e., from $1.78/W in 2012 to $0.76/W in 2014), while the deployment of rooftop solar PV has increased by 650% (i.e., 5.5 MW in 2012 to 35.8 MW in 2014). Investment in residential solar PV deployment has gone from $27 million in 2012 to $156 million in 2014. While the deployment of residential solar PV has increased dramatically across Connecticut, harder to reach customer segments such as low income have not been nearly as successful (see Market Analysis of Residential Solar Deployment and Housing Characteristics of Connecticut's Low Income Sector memo of December 12, 2014). This memo provides an overview of the challenges ahead and proposes steps forward under consideration by the staff in order to engage the Board of Directors in a conversation on the role of the Connecticut Green Bank.

INTRODUCTION

The purpose of this memo is to respond to the Connecticut Green Bank (Green Bank) Board of Director's August 2014 request for staff to detail solar deployment in Connecticut's low income communities and discuss strategies to achieve greater adoption among this demographic. This memo will address:

- The level of residential solar deployment in the low income segment
- Defining characteristics of Connecticut's low income housing market
- Overview of current Green Bank initiatives supporting solar for low income residents
- Proposed priorities, strategies, initiatives, and future policies

RESIDENTIAL SOLAR DEPLOYMENT IN THE LOW INCOME SECTOR

As shared with the Board of Directors at the October 17, 2014 meeting, residential solar is predominantly deployed in moderate and higher income communities in Connecticut, as

expected. Higher relative penetration rates are also seen in communities with strong Solarize campaigns. See the December 12, 2014 CGB Board memo "Market Analysis of Residential Solar Deployment and Housing Characteristics of CT's Low Income Sector" (Market Analysis Memo) for a detailed analysis on current solar deployment in the state, broken out by income bands and census tracts.

The Green Bank is making inroads into lower income communities, but there is significant room for improvement. For example, as the table below shows, current solar penetration rates (in terms of kW installed per capita) in lower income communities strongly lag those of middle and upper class neighborhoods:

- Census tracts at < 60% of area median income (AMI) have **1/10th** the kW per capita of tracts at >80% AMI; and
- Census tracts at 60% to 80% of AMI have **1/4th** the kW per capita of tracts at >80% AMI.

Income Level[1]	# of Census Tracts	Population	# of Projects	Projects per Capita	kW Installed	kW Installed per Capita
<60% AMI	179	651,267	257	.00039	1,422	.00218
60-80% AMI	113	518,459	473	.00091	2,950	.00569
>80% AMI	532	2,395,353	6,756	.00282	48,284	.02016
Total	824	3,565,079	7,486	.00210	52,656	.01477

However, the data also confirms that concentrated and targeted marketing and outreach campaigns can lead to higher than average solar penetration in low income communities. To date, six Solarize campaigns have been run in distressed communities: Bridgeport, Enfield, Montville, Torrington, West Haven and Windham. When looking at the kW per capita in these communities compared to the statewide averages there is:

- 27% higher penetration in <60% AMI census tracts
- 21% higher penetration in 80%-60% AMI census tracts
- Across all census tracts in these 6 communities, the penetration was at 95% of the statewide penetration rate, *almost* at parity

To date the Green Bank and its predecessor organization has invested $103.5 million in residential solar incentives. Solar installed in low income census tracts represents about 8% of the total installed to date, for an estimated investment of $8.6 million in solar incentives in low income tracts. Additionally, 2 C-PACE affordable multifamily solar projects have been financed for $400,000.

The data clearly demonstrates that the challenge in front of us is significant – and we need to be strategic, patient, and diligent, and commit to investing the time and resources, if we hope to make a meaningful impact.

[1] Median Household Annual Income statewide is $76,377, for <60% AMI it is <$45,826, for 80%-60% AMI it is $45,826 - $61,102, and for >80% AMI it is >$61,102.

Recent Green Bank customer segmentation analysis has revealed that going solar resonates with a wide range of income groups and customer profiles, including a customer segment unique to Connecticut that skews older and lower in income. The identification of this specific customer segment is encouraging, as it will support targeted messaging and outreach to a subset of the low income market.

DEFINING CHARACTERISTICS OF CT'S LOW INCOME HOUSING MARKET

Low income housing, defined as units with residents at 80% of area median income or below, represents about 507,000 units or 34% of Connecticut's total housing units. Properties with low income residents run the gamut from single family owner occupied homes, to small and large investor owned buildings. Our analysis shows a clear correlation between lower incomes and high concentrations of renters living in older buildings – predominantly in the core cities, and scattered across the northeastern and northwestern quiet corners of the State.

Connecticut's low income housing market generally falls into the following categories:

- Owner occupied housing (1 to 4 units)
- Naturally occurring affordable rental housing (investor owned small and large properties)
- State funded affordable housing (public and privately owned)
- Federally funded (HUD) properties

As the table below makes clear, nearly 70% of CT's low income residents live in owner-occupied single family homes and small, investor owned multifamily rentals (2 to 19 units). Over half live in single family homes and 2-4 unit rentals. Collectively, this is the hardest of the hard-to-reach markets, in a segment, the low income sector, that is already very hard to serve.

Type of Housing	# of Low Income Households	% of Low Income Households
Single Family Owner-Occupied ("SF OO") Homes	151,493	30%
2-4 Unit Rentals	130,684	26%
5-19 Unit Rentals	67,092	13%
Total SF 00 + 2-19 Unit Rentals	*349,269*	*69%*

Different classes of affordable properties share various important characteristics. For example, smaller rental properties tend to be:

- Concentrated in the urban core (although with a significant disbursement in suburban and rural communities;
- Naturally occurring affordable (i.e. privately owned, non-subsidized);
- Challenged by significant deferred maintenance needs and health and safety issues;
- Operating on thin margins or at a loss, with limited capacity for new debt; and

- Due to tenant paid utilities, unlikely to pursue energy upgrades independently given split incentives, leaving tenants to shoulder hard choices between food, medicine, and heat.[2]

On the other hand, larger properties (50 units and above) as well as State and HUD financed/subsidized properties, feature:

- Better conditions than the smaller, privately owned, non-subsidized properties, due to stronger property management and maintenance budgets enabled by economies of scale, as well as building and other code requirements mandated by Department of Housing (DOH), Connecticut Housing and Finance Authority (CHFA), and Housing and Urban Development (HUD);
- Management and ownership structures better positioned to take advantage of Green Bank programs; and
- Often, master meters (meaning owners pay utilities), particularly for heat and hot water. For master metered properties, owners have a strong incentive to make energy upgrades that will result in utility and maintenance cost savings, and solar can be a particularly attractive investment option.

Overall, with deferred maintenance an overriding issue and property owners who are less well-resourced than the C&I sector, developing projects to a point where they are ready for financing is a huge challenge and requires significant technical support. Thus, this sector requires substantial public investment and grant funding to build out the necessary supporting infrastructure, alongside a nuanced project financing strategy.

Furthermore, given the brutal utility cost burden on low income residents, it is critical that Green Bank-funded programs lower total energy/operating costs and tenant utility costs with high levels of confidence (e.g. guarantees). Solar is a key part of that solution, but care must also be taken to develop initiatives that support the holistic improvement of the building stock.

Comprehensive financing solutions that address deferred maintenance, health and safety, and energy improvements, including solar, all at the same time will be most beneficial.

Additional background on the low income housing market can be found in the December 12, 2014 Green Bank Board Market Analysis Memo.

CURRENT GREEN BANK SOLAR INITIATIVES FOR LOW INCOME RESIDENTS

While the Green Bank has a number of initiatives in place to support development of low income residential solar, they are clearly not sufficient to achieve the same solar penetration levels that moderate and affluent residents currently enjoy. Our strategy has been to target the easiest, most immediate opportunities first, understanding that we will need a sustained and focused effort over the long term to truly make progress in this difficult market segment. Below is a summary of current solar initiatives:

[2] The average low income household owes about $2360 more in annual energy bills than it can afford to pay - http://www.operationfuel.org/wp-content/uploads/Connecticut-2014-HEAG-Final.pdf

MULTIFAMILY PROGRAMS	
Solarize State Sponsored Housing Portfolio (SSHP)	CGB-CHFA partnership that targets state funded multifamily housing. Four CGB-qualified installers are currently working with upwards of 30 properties, representing some 1,200 affordable units across the state, to help them go solar.
Programs for Clean Energy Upgrades, Including Solar:	
CHIF LIME Loan	Unsecured loan funding low income, multifamily energy upgrades, including solar installations
Credit Enhancement RFP	For multifamily energy upgrades including solar
C-PACE for Multifamily	Funds solar and other energy upgrades
MacArthur Foundation	CGB has been approved for a $5M program related investment (PRI) to support the low income, multifamily sector.
OWNER OCCUPIED & SMALL INVESTOR-OWNED PROGRAMS	
Residential Solar Investment Program	Incentives for residential solar PV
Solarize CT	Municipal-led community outreach initiative targeting owner occupied homes. The following distressed communities have participated and, as a group, have seen higher penetration rates than the statewide low income penetration rates for solar: Bridgeport, Enfield, Montville, Torrington, West Haven, and Windham[3]
Housing Development Fund's Cozy Home Loan	Low income loan product for homeowners in Fairfield, Litchfield and New Haven counties, supports solar and energy upgrades and health and safety measures
Residential Solar Financing RFP	Releasing in December 2014, will allow CGB to solicit proposals focused on underserved solar markets including low income populations and credit-challenged consumers. Several potential respondents have shown eagerness to originate and finance solar projects among lower FICO customers, and one potential respondent includes a leasing company that is specifically focused on the low and moderate income market
INFRASTRUCTURE DEVELOPMENT INITIATIVES	
Solar Customer Market Segmentation Analysis	Developing messaging for key segments, including "Prudent Yankees" which skews towards lower income
Owner Technical Support/ One Stop Process	Building capacity through partner New Ecology, Inc.
CHFA-CGB Collaboration	MOU / demo program to inform programmatic approaches
DOH-CGB Collaboration	Strategic discussions for programmatic collaboration/ pilot
Interagency Collaboration	CHFA, DOH, HUD, CHIF, then DPH, DEEP, Utilities
National Engagement	With thought leaders and implementers to learn from others

[3] These 6 communities have seen a 27% higher penetration in the <60% AMI census tracts and a 21% higher penetration in the 80%-60% AMI census tracts than the state averages.

POTENTIAL FUTURE POLICIES AND INITIATIVES

In order to make significant progress on penetration of solar into low income communities, there are a range of new policies and initiatives that should be considered, in addition to the early stage activities already underway. These are outlined below and intended to spark a conversation as to potential future areas worthy of Green Bank focus and dedicated resources.

- **Potential New Legislative Policies Needed**
  - **SHREC** – establish a Solar Home Renewable Energy Credit (SHREC) - a sustainable source of revenues to meet the overall growing market demand is critical if the Green Bank wants to offer tiered incentives to low income residents
  - **Community (or shared) solar** with a low income carve-out
  - **Benchmarking** of energy usage for affordable multifamily buildings to establish best prospects for investment and **Energy Opportunity Assessments/ Audits** to define work scopes that will deliver highest return on investment
  - **Clean energy utility allowances** – establish a clean energy utility allowance that incents owners of properties with tenant paid utilities to invest in energy upgrades and achieve utility cost savings that will benefit both owners and tenants
  - **Sub-metering policy** – this is a medium-term goal, but one necessary to achieve true scale in this market given the prevalence of low income residents in rental properties with tenant paid utilities
  - **Community Reinvestment Act (CRA) advocacy** - National advocacy around expansion of CRA credits for low income and clean energy specifically – American Council for an Energy Efficient Economy ("ACEEE") is pursuing this. State advocacy and outreach to Banking Commissioner and Connecticut Bankers Association – would be ideal to have Banking Commissioner provide guidance to lenders signaling importance of investing in clean energy in CRA-eligible and distressed communities

- **Potential New Green Bank Policies**
  - Over the next year, explore setting a specific target for low income solar (e.g. install XX MW of solar by 20xx date for low income, etc.)
    - President Obama's call for 100 MW of solar on HUD properties has demonstrated setting targets can focus attention and catalyze activity
    - Regardless, SHREC and community solar policies **must** be in place to achieve any scale in the low income segment
  - Over the next year, modify Residential Solar Investment Program (RSIP) incentives to support low income
    - Current RSIP structure restricts incentives to owner-occupied residences; SHREC policy would have no such restriction and would support investor owned 1-4 unit residences
    - Explore feasibility of tiered incentives for low income; questions include how to operationalize, and when to implement (e.g. after we get SHREC, or at Step 7; perhaps keep low income at Step 5 when we move to Step 7)

- **Potential New Capacity Building Initiatives**

- Even with appropriate legislative and Green Bank policies in place, addressing the low income solar opportunity is primarily a DEMAND challenge. To that end, two key areas should be explored:
  - Develop a sustainably funded model for technical support/owner's agent services for the low income multifamily market, with a specific emphasis on 1-20 unit investor owned properties
  - Pilot targeted outreach models – since the majority of Connecticut's low income residents live in owner occupied single family homes and small multifamily rentals, innovative community-based outreach models will need to be developed, with a focus on partnering with social service and other agencies serving this demographic (e.g. Operation Fuel, housing and aging service agencies, municipal community development departments, etc.), drawing on our experience in the state with Solarize and the Neighbor to Neighbor Energy Challenge (and their work with local fuel banks), and work from around the country (including other neighborhood/block outreach models, employer-assisted models, municipal-led neighborhood revitalization initiatives)

- **Potential New Financing Products**
  - There are a variety of targeted financing products that would ultimately be needed to address the low income solar market, including financing structures for investor-owned 1-4 unit and small multifamily (5-20 units) properties, community solar, the HUD - CDBG Sec. 108 Loan Guaranty program for solar (for municipalities), an acquisition/rehab mortgage product that supports solar, a solar + storage warehouse facility for affordable multifamily (multi-state exploration going on now), and portfolio-based approaches for local lenders active in the affordable multifamily sector

STAFF PRIORITIZATION OF MARKET INITIATIVES

Although we have made inroads, we still have much to learn regarding how to address the low income sector and overcome penetration barriers. Over the next year, we plan to focus on our full plate of current initiatives and hone in on the most promising approaches, then work to scale them up in the following years. Below are our proposed sector priorities:

Initiative	Partner(s) / Approach	Description
1	DOH, CHFA Med-Large Rentals	• Engage with DOH CHAMP applicants on energy upgrades as part of broader capital improvement plans • Expand Solarize SSHP model for solar • Establish clean energy benchmarking / energy assessments/ standards / utility allowances for state funded housing to help drive demand and enable successful financing
2	Solar Financing Companies, via Residential Solar RFP	• Expect to partner with at least one fast-growing solar leasing company focused on low and moderate income customers with subordinated debt investment • Pursue strongest proposals addressing credit challenged and/or low income customer population

	Owner Occupied 1-4, Potentially Small-Med Rentals	
3	Targeted Community Campaigns, with Housing Development Fund, Solar Financing Companies Owner Occupied 1-4	• Promote Cozy Home Loan product with local mini campaigns (via agencies like Operation Fuel) focused on bundling solar with other upgrades (efficiency, health & safety) • Run Solarize-style campaigns in communities / neighborhoods, when new partners are identified via the Solar RFP • Test messaging for "Prudent Yankee" customer segment (applicable to owner-occupied single family market, ~ 30% of low income residents in the state).
4	HUD Med-Large Rentals	• Go beyond current EPC model (restricted to largest public housing authorities) to establish a model for self-performing energy performance contracts, rather than working with 3rd party ESCOs, allowing excess savings to be reinvested in the properties
5	DOH, Municipalities, CDCs/CBOs, Developers, and Local Lenders Naturally Occurring Small-Med Rentals	• Initial focus on this challenging market will be analysis and development of a strategic plan with key partners, including DOH, municipal community development offices, utilities, and lenders in this sector • Significant outreach, technical support and education are needed to support owners (and funders) in this market. Goal is to build on existing housing renovation and revitalization initiatives. Key partners will be municipal housing and community development departments, funded by federal HOME and CDBG dollars, as well as local CDCs and other community based organizations

CONCLUDING COMMENTS

The low income market for solar, and energy upgrades more generally, is extremely challenging. The Green Bank will need to be strategic, patient, and diligent, and commit to investing time and resources, if we hope to make a meaningful impact on the penetration of solar in low income communities in Connecticut. This segment will require a level of support traditionally not seen in our other Green Bank initiatives, including funding at a higher level (with lower leverage ratios); budgeting for programmatic and marketing initiatives; and dedicating other resources, including potentially additional staff or partnership support. Staff is ready, willing, and excited to develop a budget to support this work, based on Board of Director feedback and guidance.