



Board of Directors

Meeting Date

January 21, 2022



Board of Directors

Lonnie Reed Chair	Vickie Hackett Vice Chair Connecticut Department of Energy and Environmental Protection (DEEP)
Matthew Ranelli Secretary Partner Shipman & Goodwin	Sarah Sanders State Treasurers Office State of Connecticut
Thomas Flynn Managing Member Coral Drive Partners	Binu Chandy Deputy Director DECD
Adrienne Farrar Houel President and CEO Greater Bridgeport Community Enterprises, Inc.	Dominick Grant Director of Investments Dirt Capital Partners
John Harrity Chair CT Roundtable on Climate and Jobs	Brenda Watson Executive Director Operation Fuel
Jeff Beckham Office of Policy and Management (OPM)	Laura Hoydick Mayor of Stratford

January 14, 2022

Dear Connecticut Green Bank Board of Directors:

I hope everyone had a safe, relaxing, and memorable holiday season – and Happy New Years!

We have a meeting of the Board of Directors scheduled for **Friday, January 21, from 9:00-11:00 a.m.**

Please take note that this will be an online meeting.

For the agenda, we have the following:

- **Consent Agenda** – we have several items on the consent agenda, including a few items requiring resolutions, including:

- Meeting Minutes for December 17, 2021
- FuelCell Energy Groton Project extension to close

And included are a few report outs including an update on the progress to targets for FY 2022 (which we will delve into during the proposed revisions to targets and budget) and an update on our SOC2 audit.

- **Committee Updates and Recommendations** – recommendations from the Audit, Compliance, and Governance Committee (“ACG Committee”) and the Budget, Operations, and Compensation Committee (“BOC Committee”), including:
 - **ACG Committee** – committee recommendation for the selection of the new auditing firm for the Green Bank; and
 - **BOC Committee** – committee recommendation for proposed revisions to the FY22 targets and budget.
- **Financing Program Updates and Recommendations** – staff recommendation of C-PACE transaction in Southington, and proposal to update the C-PACE for New Construction guidelines. Meeting materials will be distributed by close of business on Tuesday, January 18, 2022.
- **Incentive Program Updates and Recommendations** – updates on the Residential Solar Investment Program (“RSIP) and RSIP-E (i.e., extension) program closeouts, revenue grade meter status, and Energy Storage Solutions program launch.

- **Investment Updates and Recommendations** – request to extend the completion date for the Canton Hydro project and update on the Green Liberty Notes issuance and next steps.
- **Federal Opportunities** – with the recent passage of the Infrastructure Investment and Jobs Act, and potential for additional resources from the federal government to state and local governments, we wanted to add an agenda item in each board meeting for 2022 to touch on a specific area of interest. As you may know, the U.S. Department of Energy (“DOE”) received an additional \$62 billion to support its programs. \$21.5 billion will be directed towards the creation of the Office of Clean Energy Demonstration, including \$8 billion to support no less than four (4) hydrogen hubs. We have invited Joel Rinebold, Executive Director of the Connecticut Center for Advanced Technologies (and Connecticut Hydrogen Fuel Cell Coalition) to present their efforts to develop a Connecticut and regional proposal in anticipation of a DOE request for proposal.

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

Until then, enjoy the weekend.

Sincerely,

A handwritten signature in black ink, appearing to read 'Bryan Garcia', with a long horizontal flourish extending to the right.

Bryan Garcia
President and CEO



AGENDA

Board of Directors of the
Connecticut Green Bank
75 Charter Oak Avenue
Hartford, CT 06106

Friday, January 21, 2022
9:00 a.m.– 11:00 p.m.

Dial (408) 650-3123
Access Code: 555-252-957

Staff Invited: Sergio Carrillo, Mackey Dykes, Brian Farnen, Bryan Garcia, Bert Hunter, Jane Murphy, and Eric Shrago

1. Call to order
2. Public Comments – 5 minutes
3. Consent Agenda – 5 minutes*
4. Committee Updates and Recommendations – 20 minutes
 - a. Audit, Compliance, and Governance Committee
 - i. Auditor Recommendation*
 - b. Budget, Operations, and Compensation Committee
 - i. Proposed Revisions to FY22 Targets and Budget*
5. Financing Programs Updates and Recommendations – 30 minutes
 - a. C-PACE Transaction – Southington – 10 minutes*
 - b. C-PACE for New Construction Program Update – 20 minutes*
6. Incentive Programs Updates and Recommendations – 15 minutes
 - a. RSIP and RSIP-E Closeout
 - b. RGM Replacement Status
 - c. Energy Storage Solutions Launch
7. Investment Updates and Recommendations – 15 minutes

- a. Canton Hydro Extension*
 - b. Green Liberty Notes Update
- 8. Infrastructure Investment and Jobs Act Opportunity: Clean Hydrogen Hub – 30 minutes
 - 9. Adjourn

*Denotes item requiring Board approval

Join the meeting online at
<https://global.gotomeeting.com/join/555252957>

Or call in using your telephone:
Dial (408) 650-3123
Access Code: 555-252-957

***Next Regular Meeting: Friday, March 25, 2022 from 9:00-11:00 a.m.
Colonel Albert Pope Room at the
Connecticut Green Bank, 75 Charter Oak Avenue, Hartford***



RESOLUTIONS

Board of Directors of the
Connecticut Green Bank
75 Charter Oak Avenue
Hartford, CT 06106

Friday, January 21, 2022
9:00 a.m.– 11:00 p.m.

Dial (408) 650-3123
Access Code: 555-252-957

Staff Invited: Sergio Carrillo, Mackey Dykes, Brian Farnen, Bryan Garcia, Bert Hunter, Jane Murphy, and Eric Shrago

1. Call to order
2. Public Comments – 5 minutes
3. Consent Agenda – 5 minutes

Resolution #1

Motion to approve the meeting minutes of the Board of Directors form December 17, 2021.

Resolution #2

WHEREAS, in accordance with (1) the statutory mandate of the Connecticut Green Bank (“Green Bank”) to foster the growth, development, and deployment of clean energy sources that serve end-use customers in the State of Connecticut, (2) the State’s Comprehensive Energy Strategy (“CES”) and Integrated Resources Plan (“IRP”), and (3) Green Bank’s Comprehensive Plan (the “Comprehensive Plan”) in reference to the CES and IRP, Green Bank continuously aims to develop financing tools to further drive private capital investment into clean energy projects;

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

WHEREAS, FCE has requested financing support from the Green Bank to develop a 7.4 megawatt fuel cell project in Groton, Connecticut located on the U.S. Navy submarine base and supported by a power purchase agreement (“PPA”) with the Connecticut Municipal Electric

Energy Cooperative (“CMEEC”) (the “Navy Project”);

WHEREAS, staff has considered the merits of the Navy Project and the ability of FCE to construct, operate and maintain the facility, support the obligations under the Loan throughout its 20-year term, and as set forth in the due diligence memorandum (the “Board Memo”) dated December 18, 2020, recommended this support be in the form of a term loan not to exceed \$8,000,000, secured by all project assets, contracts and revenues as well as a pledge of revenues from an unencumbered project as explained in the Board Memo (the “Credit Facility”);

WHEREAS, on the basis of that recommendation, the Green Bank Board of Directors (“Board”) approved of the Credit Facility, in an amount not to exceed \$8,000,000 with the provision that the Credit Facility be executed no later than 315 days from the date of authorization by the Board (June 16, 2021), which was further extended by the Board in July 2021 to October 29, 2021, which was further extended by the Board in October 2021 to December 31, 2021, and which was further extended by the Board in December 2021 to January 31, 2022;

WHEREAS, Green Bank has further advised the Board that the Credit Facility is now expected to close within the next 60 days and to accommodate the additional time needed to execute the Credit Facility requests the permitted time to execute the credit facility be increased from not later than 409 days from the original date of authorization by the Board (January 31, 2022) to not later than 468 days from the date of authorization by the Board (i.e., to March 31, 2022);

NOW, therefore be it:

RESOLVED, that the Green Bank Board hereby approves the extension of time for the execution of the Credit Facility to not later than 468 days from the original date of authorization by the Board (i.e., not later than March 31, 2022); and

RESOLVED, that the President of the Green Bank and any other duly authorized officer is authorized to take appropriate actions to provide the Credit Facility to FCE (or a special purpose entity wholly-owned by FCE) in an amount not to exceed \$8,000,000 with terms and conditions consistent with the memorandum submitted to the Board dated December 18, 2020 (the “Memorandum”), and as he or she shall deem to be in the interests of the Green Bank and the ratepayers; and

RESOLVED, that the proper Green Bank officers are authorized and empowered to do all other acts and execute and deliver all other documents and instruments as they shall deem necessary and desirable to effect the Term Loan and participation as set forth in the Memorandum.

4. Committee Updates and Recommendations – 20 minutes

a. Audit, Compliance, and Governance Committee

i. Auditor Recommendation

Resolution #3

RESOLVED, that the Green Bank Board of Directors hereby approves the Audit, Compliance and Governance Committee recommendation for [selected auditor] to perform professional audit services for the Connecticut Green Bank for the fiscal years 2022, 2023, and 2024.

b. Budget, Operations, and Compensation Committee

i. Proposed Revisions to FY22 Targets and Budget

Resolution #4

WHEREAS, the Budget, Operations, and Compensation (BOC) Committee, pursuant to Section 5.2.2 of the Bylaws of the Connecticut Green Bank's (Green Bank) has recommended the accompanying adjustments to Fiscal Year 2022 targets and budget to the Green Bank Board of Directors;

NOW, therefore be it:

RESOLVED, the Green Bank Board of Directors of the Connecticut Green Bank authorizes Green Bank staff to enter into new or amend existing professional services agreements (PSAs) with the following, contingent upon a competitive bid process having occurred in the last three (3) years (except Craftsman Technology Group):

- I. Craftsman Technology Group
- II. Guidehouse (f.k.a. Navigant)
- III. Stark Raving

For fiscal year 2022 with the amounts of each PSA not to exceed the applicable approved budget line item

RESOLVED, the Green Bank Board of Directors approves the fiscal year 2022 budget and target adjustments outlined in the accompanying memorandum.

5. Financing Programs Updates and Recommendations – 30 minutes

a. C-PACE Transaction – Southington – 10 minutes

Resolution #5

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

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

WHEREAS, the Green Bank seeks to provide a **\$1,382,419** construction and (potentially) term loan under the C-PACE program to The F&F Concrete Corporation, the building owner of 110 West Main St, Southington, Connecticut (the "Loan"), to finance the construction of specified clean energy measures in line with the State's Comprehensive Energy Strategy and the Green Bank's Strategic Plan; and

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

required by the C-PACE authorizing statute, and such Feasibility Study Loan would become part of the Loan and be repaid to the Green Bank upon the execution of the Loan documents.

NOW, therefore be it:

RESOLVED, that the President of the Green Bank and any other duly authorized officer of the Green Bank is authorized to execute and deliver the Loan and, if applicable, a Feasibility Study Loan in an amount not to be greater than one hundred ten percent of the Loan amount with terms and conditions consistent with the memorandum submitted to the Committee dated January 18, 2022, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from the date of authorization by the Board of Directors;

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

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

b. C-PACE for New Construction Program Update

Resolution #6

WHEREAS, Conn. Gen. Stat. Section 16a-40g (the “Authorizing Statute”) authorizes the Commercial Property Assessed Clean Energy Program (“C-PACE”) and designates the Connecticut Green Bank (“Green Bank”) as the state-wide administrator of the program; and

WHEREAS, the Authorizing Statute charges Green Bank to develop program guidelines governing the terms and conditions under which state and third-party financing may be made available to C-PACE.

NOW, therefore be it:

RESOLVED, the Green Bank Board of Directors (the “Board”) approves the proposed changes to C-PACE program guidelines (the “Program Guidelines”), substantially in the form of attached to that certain memo to the Board dated January 19, 2021. The updated Program Guidelines shall also supersede the New Construction Program Pilot which was approved by the Board on January 26, 2018. The Program Guidelines shall then go through a thirty-day public comment period in accordance with Conn. Gen. Stat. Section 1-120 et seq.

RESOLVED, If, after the expiration of public comment period, Green Bank staff considers that significant changes are needed to the Program Guidelines as currently drafted, then Green Bank staff will seek an updated approval from the Board. If no significant changes result from the public comment process, then the final form of the Program Guidelines, as may be edited by Green Bank staff, shall be deemed approved by the Board and Green Bank staff will proceed with implementation of such Program Guidelines.

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

6. Incentive Programs Updates and Recommendations – 15 minutes
 - a. RSIP and RSIP-E Closeout
 - b. RGM Replacement Status
 - c. Energy Storage Solutions Launch
7. Investment Updates and Recommendations – 15 minutes
 - a. Canton Hydro COVID Extension

Resolution #7

WHEREAS, Canton Hydro, LLC (“Developer”) was awarded exclusivity by the Town of Canton to redevelop a 1 MW hydroelectric facility located at the Upper Collinsville Dam (“Dam”), on the Farmington River, in Canton, Connecticut (the “Project”) and the Connecticut Green Bank (“Green Bank”) Board approved approve subordinate debt financing in an amount to exceed \$1,200,000 (the “Loan”) along with an unfunded guaranty, in an amount not to exceed \$500,000 to support the Project;

WHEREAS, Developer has requested to extend the Project’s completion of construction date until October 31, 2022;

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors hereby authorize staff to execute amend the Loan agreement materially based on the terms and conditions set forth in this board memo dated January 14, 2022 to extend the Project’s construction completion date to October 31, 2022;

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

- b. Green Liberty Notes Update

8. Infrastructure Investment and Jobs Act Opportunity: Clean Hydrogen Hub – 30 minutes
9. Adjourn

Join the meeting online at
<https://global.gotomeeting.com/join/555252957>

Or call in using your telephone:
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Access Code: 555-252-957

***Next Regular Meeting: Friday, March 25, 2022 from 9:00-11:00 a.m.
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Connecticut Green Bank Board of Directors



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Board of Directors of the Connecticut Green Bank

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Fri

Gotomeeting

Friday, 1/21/2022 9:00AM - 11:00AM Eastern Time (US & Canada)

My Time Zone: Friday, 1/21/2022 9:00AM - 11:00AM Eastern Time (US & Canada)

Gotomeeting

75 Charter Oak Avenue

Suite 1 - 103

Hartford, CT 06106

US

[Directions](#)

ANNOUNCEMENTS

- **Mute Microphone** – in order to prevent background noise that disturbs the meeting, if you aren't talking, please mute your microphone or phone.
- **Chat Box** – if you aren't being heard, please use the chat box to raise your hand and ask a question.
- **Recording Meeting** – we continue to record and post the board meetings.
- **State Your Name** – for those talking, please state your name for the record.



CONNECTICUT
GREEN BANKSM

Board of Directors Meeting

January 21, 2022

Online Meeting

Board of Directors

Agenda Item #1

Call to Order

Board of Directors

Agenda Item #2

Public Comments

Board of Directors
Agenda Item #3
Consent Agenda

Consent Agenda

Resolutions #1 and #2



1. **Meeting Minutes** – approve meeting minutes of December 17, 2021
2. **FuelCell Energy Project** – extension of time to close the project by March 31, 2022
 - **Progress to Targets** – update on progress to targets through Q2 of FY22
 - **SOC2 Audit** – report out on controls and technology, including security (both cyber and physical), business interruption (systems are up and running and how incidents are handled), confidentiality, processing integrity, and privacy – Green Bank controls of suitably designed

Board of Directors

Agenda Item #4a

Committee Updates and Recommendations

Audit, Compliance, and Governance Committee

Recommendation of Audit Firm for FY22-FY24



The Green Bank received 2 proposals in response to RFP for Professional Auditing Services released November 22, 2021.

The following firms submitted proposals:

PKF O'Connor Davies
BerryDunn

An internal team reviewed and evaluated the proposals:

Bert Hunter, EVP and Chief Investment Officer
Brian Farnen, Chief Legal Officer
Eric Shrago, Vice President of Operations
Jane Murphy, EVP Finance and Administration
Shawn Cartelli, Controller
Dan Smith, Associate Director Finance and Administration

Recommendation of Audit Firm for FY22-FY24



Proposals were evaluated based on the following criteria:

- Firm Independence
- Firm License to Practice/Peer Review
- Firm Qualifications and Experience
- Similar Engagements
- Fees
- References

The evaluation team recommends PKF O'Connor Davies to provide professional audit services to the Green Bank for the fiscal years 2022 to 2024.

Resolution #3



RESOLVED, that the Green Bank Board of Directors hereby approves the Audit, Compliance and Governance Committee recommendation for PKF O'Connor Davies to perform professional audit services for the Connecticut Green Bank for the fiscal years 2022, 2023, and 2024.

Board of Directors

Agenda Item #4b

Committee Updates and Recommendations

Budget, Operations and Compensation Committee

Proposed Revisions to FY22 Targets and Budget

Comprehensive Plan

FY 2022 Incentive Programs Targets – Proposed Revisions



Program	Number of Projects	Total Capital Deployed	Capacity Installed	Total Emissions (tons)
Residential Solar	1,732	\$62,969,713	16.8	29,605
Battery Storage	202	\$5,800,000	2.5	0
Smart-E	800	\$11,200,000	0.8	15,168
Low Income Loans/Leases (PosiGen)	96	\$2,478,528	0.7	1,154
Incentive Programs Total	2,734	\$79,969,713	20.1	44,773

To support **2,734** ~~1,633~~ **projects** attracting investment of **\$79,969,713**
~~\$36,630,000~~ to deploy at least **20.1 MW** ~~9.8~~ of clean energy

Comprehensive Plan

FY 2022 Financing Programs Targets – Proposed Revisions



Product	Number of Projects	Total Capital Deployed	Capacity Installed	Total Emissions (tons)
CPACE	30	\$22,838,680	6.3	11,172
PPA	37	\$17,652,000	11.0	18,503
SBEA	614	\$9,260,800	0.0	83,709
Multi-Family Pre-Dev	0	\$0	0.0	
Multi-Family Term	2	\$300,000	0.2	282
Multi-Family Health and Safety Total	1	\$600,000	0.0	0
Transportation	0	\$0	0.0	16,500
Strategic Investments	0	\$0	0.0	0
Financing Programs Total	679	\$48,951,480	16.5	129,285

To support **679 projects** ~~902 projects~~ attracting investment of **\$48,951,480** ~~\$61,992,000~~ to deploy at least **16.5 MW** ~~19.1 MW~~ of clean energy

Budget - Revenue Changes



	Fiscal Year 06/30/2022			Adjustment
	Budget '22	Original Budget	Variance	
Revenue				
Operating Income				
Utility Customer Assessments	24,677,677	24,449,800	227,877	(A)
RGGI Auction Proceeds-Renewables	9,197,050	6,099,440	3,097,610	(B)
CPACE Closing Fees	123,000	123,000	0	
REC Sales	12,095,148	12,095,149	0	
Sales of Energy Systems	0	0	0	
Grant Income-Federal Programs	40,000	40,000	0	
PPA Income	640,000	640,000	0	
LREC/ZREC Income	350,000	350,000	0	
Total Operating Income	47,122,875	43,797,389	3,325,487	
Interest Income	6,211,341	6,211,341	0	
Interest Income, Capitalized	340,984	340,984	0	
Other Income	504,535	504,535	0	
Total Revenue	\$ 54,179,735	\$ 50,854,249	3,325,487	

Budget - Expense Changes



	Fiscal Year			Adjustment
	06/30/2022			
	Budget	Y22 Original Budget	Variance	
Operating Expenses				
Compensation and Benefits				
Total Compensation and Benefits	9,854,485	10,241,564	(387,079)	(C)
Program Development & Administration	6,735,204	6,610,204	125,000	(D)
Cost of Sales Energy Systems	0	0	0	
Marketing Expense	1,983,725	1,658,725	325,000	(E)
E M & V	638,000	638,000	0	
Research and Development	239,494	85,000	154,493	(F)
Total Consulting and Professional Fees	2,584,750	2,494,750	90,000	(G)
Total-Rent and Location Related Expenses	1,072,261	1,068,094	4,167	(I)
Total-Office, Computer & Other Exp	1,516,972	1,380,472	136,500	(H),(J)
Total Operating Expenses	\$ 24,624,891	\$ 24,176,809	448,081	
Program Incentives and Grants				
Financial Incentives-CGB Grants	205,000	125,000	80,000	(K)
Program Expenditures-Federal Grants	40,000	40,000	0	
EPBB/PBI/HOPBI Incentives	16,712,690	16,712,690	0	
Battery Storage Incentives	1,147,500	0	1,147,500	(L)
Total Program Incentives and Grants	\$ 18,105,190	\$ 16,877,690	1,227,500	
Operating Income/(Loss)	\$ 11,449,654	\$ 9,799,749	1,649,905	
Non-Operating Expenses				
Interest Expense	2,708,079	2,708,079	0	
Realized (Gain) Loss	0	0	0	
Provision for Loan Loss	1,728,196	1,728,196	0	
Interest Rate Buydowns-ARRA	850,000	850,000	0	
Total Non-Operating Expenses	\$ 5,286,275	\$ 5,286,275	0	
Net Revenues Over (Under) Expenses	6,163,380	4,513,475	1,649,905	

Resolution #4



NOW, therefore be it:

RESOLVED, the Green Bank Board of Directors of the Connecticut Green Bank authorizes Green Bank staff to enter into new or amend existing professional services agreements (PSAs) with the following, contingent upon a competitive bid process having occurred in the last three (3) years (except Craftsman Technology Group):

- I. Craftsman Technology Group
- II. Guidehouse (f.k.a. Navigant)
- III. Stark Raving

For fiscal year 2022 with the amounts of each PSA not to exceed the applicable approved budget line item

RESOLVED, the Green Bank Board of Directors approves the fiscal year 2022 budget and target adjustments outlined in the accompanying memorandum.

Board of Directors

Agenda Item #5a

Financing Programs Updates and Recommendations

C-PACE Transaction – Southington

110 W Main St, Southington

Ratepayer Payback



- **\$1,382,419** for a 449.8 kW roof mounted + carport solar PV systems
 - Projected savings are 42,074 **MMBtu** versus **\$1,382,419** of ratepayer funds at risk.
-
- Ratepayer funds will be paid back in one of the following ways
 - ❑ (a) through a take-out by a private capital provider at the end of construction (project completion);
 - ❑ (b) subsequently, when the loan is sold down to a private capital provider; or
 - ❑ (c) through receipt of funds from the Town of Southington as it collects the C-PACE benefit assessment from the property owner.

110 W Main St, Southington

Terms and Conditions



- **\$1,382,419** construction loan at 5% and term loan set at a fixed 5.95% over the 25-year term
- **\$1,382,419** loan against the property
 - Property valued at \$2,635,000
 - Loan-to-value ratio equals [REDACTED] & Lien-to-value ratio equals [REDACTED]
- DSCR > [REDACTED]

110 W Main St, Southington

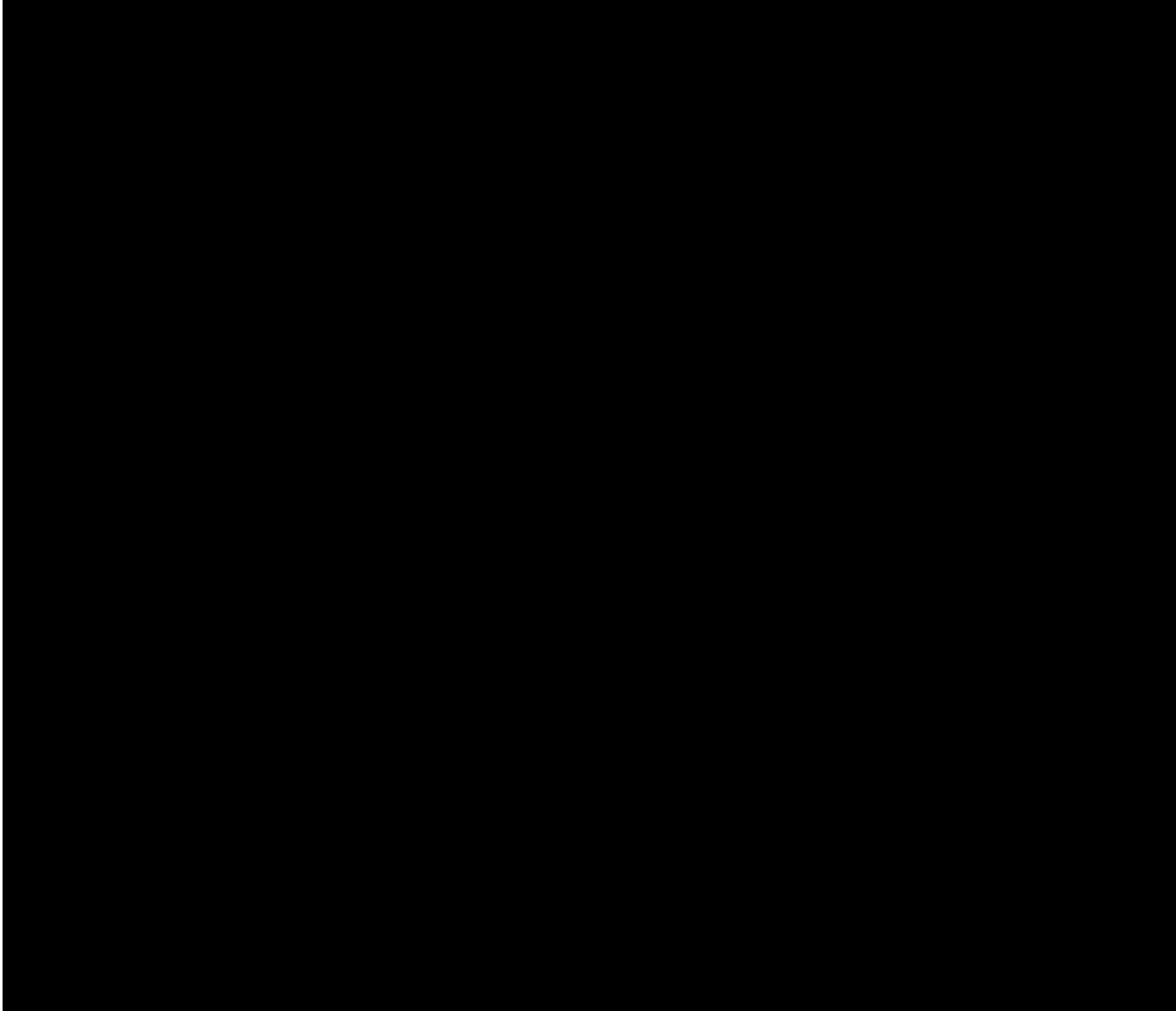
The Five W's



- **What?** Receive approval for a \$1,382,419 construction and (potentially) term loans under the C-PACE program to The F&F Concrete Corporation to finance the construction of specified energy upgrade
- **When?** Project to commence 2022
- **Why?** Allow Green Bank to finance this C-PACE transaction, continue to build momentum in the market, and potentially provide term financing for this project until Green Bank sells it along with its other loan positions in C-PACE transactions.
- **Who?** The F&F Concrete Corporation, the property owner of 110 W Main Street, Southington, CT
- **Where?** 110 W Main Street, Southington CT

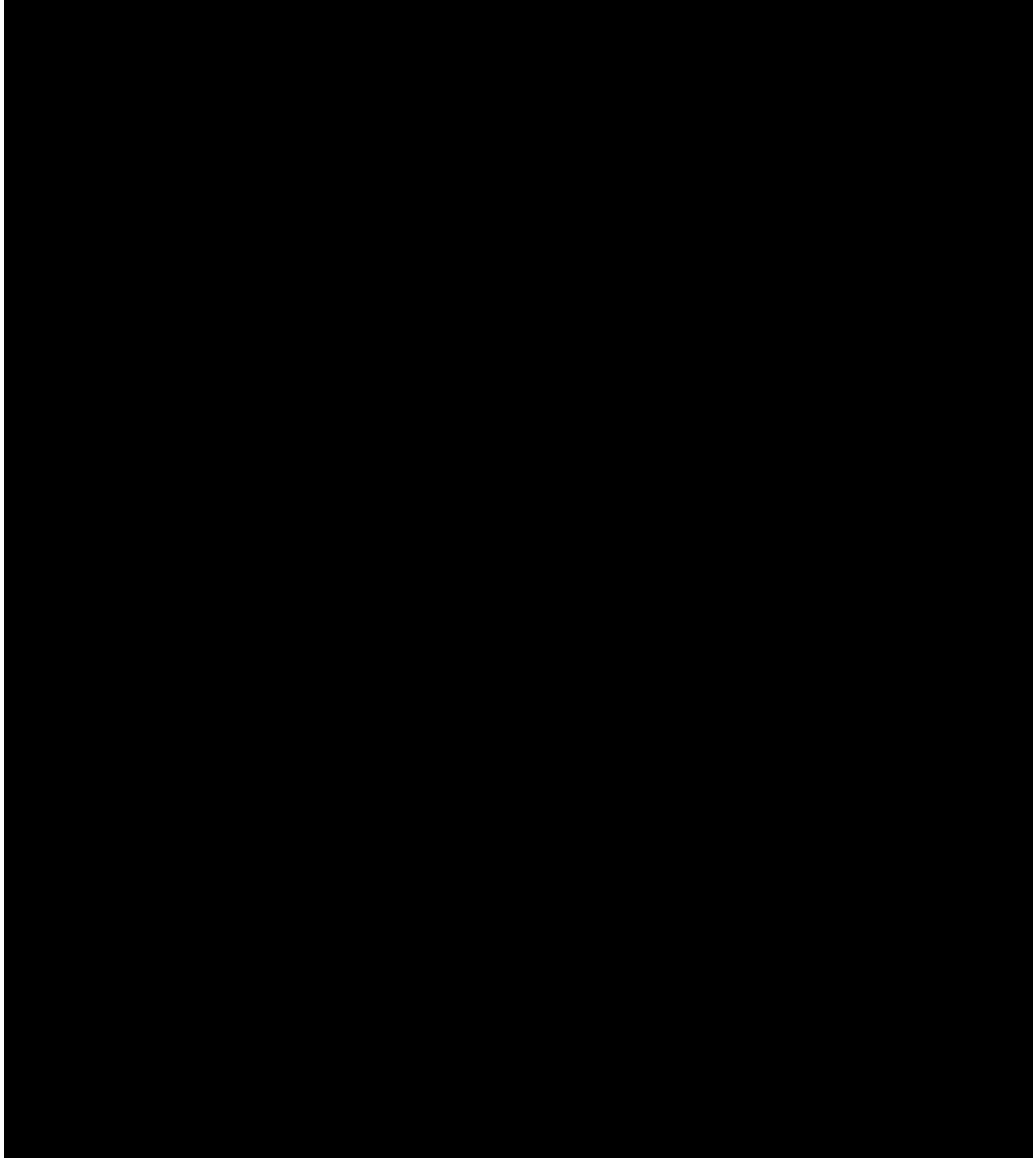
110 W Main St, Southington

Project Tear Sheet



110 W Main St, Southington

Key Financial Metrics



Resolution #5



NOW, therefore be it:

RESOLVED, that the President of the Green Bank and any other duly authorized officer of the Green Bank is authorized to execute and deliver the Loan and, if applicable, a Feasibility Study Loan in an amount not to be greater than one hundred ten percent of the Loan amount with terms and conditions consistent with the memorandum submitted to the Committee dated January 18, 2022, and as he or she shall deem to be in the interests of the Green Bank and the ratepayers no later than 120 days from the date of authorization by the Board of Directors;

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

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

Board of Directors

Agenda Item #5b

Financing Programs Updates and Recommendations
C-PACE for New Construction

C-PACE New Construction

Pilot History



- Launched in 2018 as a C-PACE New Construction Pilot to gather feedback on the CT new construction market
- Proposed using a whole building energy model to demonstrate energy performance
- Min. of 10% energy performance above code was required to qualify
- Total Eligible Construction Cost (TECC) of construction budget determined
- 10% energy performance above code = 10% of TECC in C-PACE financing
- Each additional 1% improvement in energy performance above code = an additional 1% of TECC in C-PACE financing, up to 20% max

C-PACE New Construction

Pilot Performance



Loan Originator	Property Type	Project Amt
CastleGreen Finance	Multifamily	\$13,767,000
Greenworks Lending	Office	\$483,196
Greenworks Lending	Hotel	\$6,452,348
Greenworks Lending	Multifamily	\$1,771,684
Greenworks Lending	Hotel	\$2,300,000
PACE Loan Group	Multifamily	\$2,500,000
		\$27,274,228

C-PACE New Construction Amendments & New Additions



GOAL: to give developers, capital providers, and borrowers a simplified and more accessible way to C-PACE for new construction financing while still preserving the program's public policy aspects

- Simplified how to determine eligible amount of TECC that can be financed by decoupling energy performance % above code from directly corresponding to the same % of TECC in financing
- Added option for eligible multifamily properties to use the HERS Index as a pathway to demonstrate energy performance
- Added option to access additional % of TECC in financing by incorporating bonus technologies that promote emerging clean energy technologies, resiliency, state policy goals, and energy transition goals
- Added option for all-electric net zero projects to access higher % of TECC in financing

C-PACE New Construction

Initial Stakeholder Feedback



- Determining TECC is complicated and subjective, want to explore alternative ways to determine % of C-PACE financing (ie- % of property value)
- Tying % energy performance above code to % of TECC in eligible C-PACE financing is difficult to achieve with IECC 2021 (code already stringent enough, other C-PACE new construction programs in other jurisdictions have lower thresholds)
- Want to access higher amounts of C-PACE financing
- Want to explore other building performance standards as baseline

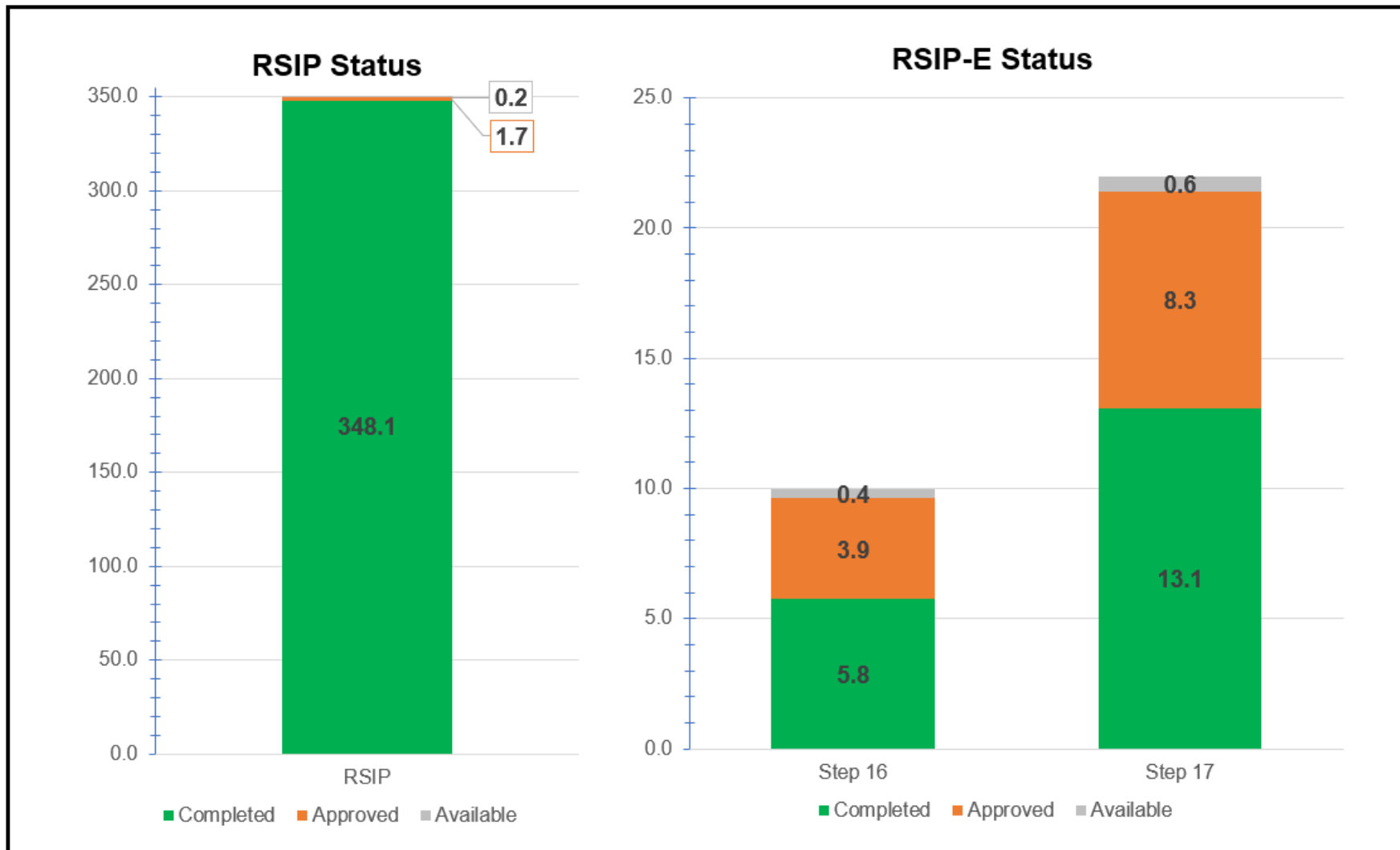
Board of Directors

Agenda Item #6a

Incentive Programs Updates and Recommendations
RSIP and RSIP-E Closeout

RSIP & RSIP-E Status

As of 01/20/22



RSIP

SHREC Creation



	Total (MW)
SHREC Tranche 1	49,213
SHREC Tranche 2	59,832
SHREC Tranche 3	39,287
SHREC Tranche 4	59,344
SHREC Tranche 5	61,904
SHREC Tranche 6 (In Progress)	27,181
	296,760

Board of Directors

Agenda Item #6b

Incentive Programs Updates and Recommendations

RGM Replacement Status

RGM Replacements

As of 01/20/22



1. **Meter replacement** – identified 4,976 homeowner-owned RGM to be replaced.
 - 1,070 replacements completed (22%)
 - 251 priority meters completed (31%)
 - Meter replacements continue despite equipment and labor shortages
2. **Anticipated AT&T 3G shutdown** – February 22, 2022
 - We anticipate all homeowner-owned systems to be 4G compatible or have estimated production data
 - Currently working with TPOs to ensure their systems are 4G compatible
3. **Solar PV Production Data Estimation** – Prof. Ken Gillingham
 - Methodology approved by NEPOOL-GIS Operating Rules Committee on January 12, 2022

Board of Directors

Agenda Item #6c

Incentive Programs Updates and Recommendations

Energy Storage Solutions Launch

Energy Storage Solutions

Progress To Date



- Opened to Contractors and Third-Party Owner Applicants 1/1/22
- 20 applications received, 8 approved as of 1/20/22 (<https://energystoragect.com/eligible-contractors/>)
- Opened to Customer Enrollment 1/14/22:

Project Number	Sector	Contractor	Total Energy Capacity (kWh)	Total Power (kW)	Host Customer Company	Host Customer City	Total System Cost
ESS-00039	C&I	174 Power Global	4,552	1,931	Aero Gear	Windsor	\$ 1,312,000.00
ESS-00019	C&I	CPower	16,500	5,500	Accel International Holdings	Cheshire	\$ 7,012,500.00
ESS-00021	C&I	CPower	16,200	5,400	Levco	Trumbull	\$ 6,885,000.00
ESS-00017	C&I	CPower	21,000	7,000	Taylor & Fenn Company	Windsor	\$ 8,925,000.00
ESS-00014	C&I	CPower	18,000	6,000	Accel International Holdings	Meriden	\$ 7,650,000.00
ESS-00025	Residential	Green Power Energy	10	4		Deep River	\$ 46,597.00
ESS-00032	C&I	ConEdison Solutions	3,070	768	Farmington Displays	Farmington	\$ 1,522,042.00
ESS-00033	C&I	ConEdison Solutions	2,570	1,285	South Windsor Wastewater Treatment Plant	South Windsor	\$ 1,472,411.00
ESS-00031	C&I	ConEdison Solutions	3,070	768	South Windsor Public Schools	South Windsor	\$ 1,522,042.00
ESS-00036	C&I	ConEdison Solutions	3,070	768	Axel Plastics	Monroe	\$ 1,522,042.00
ESS-00034	C&I	ConEdison Solutions	3,070	768	Farmington Sports Arena	Farmington	\$ 1,522,042.00
ESS-00035	C&I	ConEdison Solutions	6,141	1,535	Nizan LLC	Newtown	\$ 2,843,424.00
Total			97,254	31,725			\$ 42,235,100.00



Energy Storage Solutions

Next 3-6 Months



- Complete development work on Customer Enrollment Portal
- Meet with contractors and BESS stakeholders to discuss expectations for 2022
- Outreach campaigns: municipal / clean energy groups, LMI / underserved channels
- Financing products – Residential and C&I
- Meet with stakeholders to develop FTM program, managed EV charging



Board of Directors
Agenda Item #7a
Investment Updates and Recommendations
Canton Hydro Extension

Canton Hydro

Update and COVID Response



- **Background:**
 - 1 MW – 4.3 GWh (est) Hydroelectric facility on the Farmington River in Canton CT
 - Board approval in October 2018: \$1.2M Subordinate Loan + \$500k Guaranty (\$7.4M overall project cost), co financed with \$4.7M senior loan from Provident Bank
 - Approval in June 2020 to provide interest forbearance due to COVID delays and \$100k in additional Green Bank loan (not used, because EPC provided bridge loan to accommodate additional cost)
- **Construction delays** due to i) COVID travel restrictions; ii) additional FERC requirements; and iii) main subcontractor was changed.
- Construction status: Complete except for crest gates, installed during low river flow and warm weather
- Request to extend Final Completion date in loan agreement to October 31, 2022 (already approved by senior lender)
- Once final construction is complete, Green Bank and other stakeholders will have ribbon cutting, signage and media coverage.

Canton Hydro Pictures

18.00107 HEPP Canton Hydro

L1	L2	L3
281.5 V	280.9 V	280.9 V
487.0 V	486.0 V	486.0 V
538.0 A	561.0 A	551.0 A

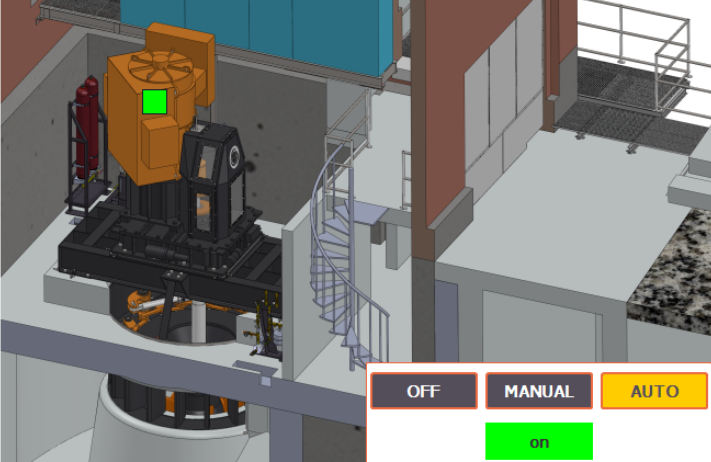
Power

466.7 kVA	448.0 kW	116.0 kVAr
Frequency	Power factor	Quadrant
60.0 Hz	+0.96 PF	0 Quadrant

operating hours
operating cycles

outside
power house

OFF MANUAL AUTO
on



View onto the clean out gate, which is in front of the intake gates



Energy Generated

2021: 15 days 195,000kWh

2022: 18 days 209,447kWh

Canton Hydro Pictures



Inlet and gates

Trash rack cleaner



Resolution #7



NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors hereby authorize staff to execute amend the Loan agreement materially based on the terms and conditions set forth in this board memo dated January 14, 2022 to extend the Project's construction completion date to October 31, 2022;

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

Board of Directors
Agenda Item #7b
Investment Updates and Recommendations
Green Liberty Notes Update

Green Liberty Notes

Offering has closed



Successful Raise contributed to the achievement of Green Bank Goals

- To strengthen Connecticut’s communities, especially vulnerable communities, by making the benefits of the green economy inclusive and accessible to all individuals, families, and businesses.
- To pursue investment strategies that advance market transformation in green investing while supporting the organization’s pursuit of financial sustainability.

Total Investment \$185,900*

Total Investors	114
CT Investors	63
Investments <\$1,000	59

*preliminary results as of 1/18/21

Green Liberty Notes

Earned Media and Investment Distribution

"In terms of investor engagement, the Connecticut Green Bank is one of the more sophisticated issuers in the entire muni bond market,"



THE BOND BUYER

LEADERS WASHINGTON REGIONAL NEWS MARKETS EVENTS MORE

CONNECTICUT

Connecticut Green Bank unit crowdfunds first green notes

By Chip Barnett January 10, 2022, 1:42 p.m. EST 3 Min Read

For the first time, a municipal issuer is crowdfunding a designated municipal green bond offering.

CGB Green Liberty Notes LLC, a subsidiary of the Connecticut Green Bank, will allow retail investors to place orders for as little as \$100 for up to \$250,000 of taxable Green Liberty Notes. The one-year notes will carry a 1% interest rate and close Friday.

Bert Hunter, chief investment officer of the Connecticut Green Bank, said the notes build off the bank's Green Liberty Bond [issue](#) that was offered in [\\$1,000 increments](#).

The Connecticut Green Bank's aim is to leverage public resources and to use private capital investment; to strengthen the state's vulnerable communities by making the benefits of a green economy inclusive and accessible to all individuals, families and businesses; and to follow investment strategies that advance market transformation in green investing while supporting the pursuit of financial sustainability, according to the offering [document](#).

"In a very strategic, deliberate, manner over the last few years, it has been building its own distribution channels to both institutional as well as non-traditional investors, including local investors in their home state and individual investors," MacNaught said. "That's incredibly valuable over the long-term, as it can now activate that distribution any time it is funding its capital program."

While Connecticut has made strides against the COVID-19 virus with 71.9% of state residents vaccinated as of Dec. 1, 2021, the pandemic has had an effect on the SBEA loan pipeline, according to the document. There were only \$4.75 million of loans purchased in 2020 compared to \$14.83 million in 2020.

Board of Directors
Agenda Item #8
Infrastructure Investment and Jobs Act Opportunity
Clean Hydrogen Hub

Northeast Regional Renewable Hydrogen Hub

proposed pursuant to the
Infrastructure Investment and Jobs Act
consistent with the
**U.S. Department of Energy “Hydrogen
Earthshot” Initiative**

Northeast Hydrogen Hub

Infrastructure Investment and Jobs Act

Regional Clean Hydrogen Hubs: \$8 billion to develop at least four large-scale hydrogen hubs for production and utilization across the country.

Clean Hydrogen Electrolysis Program: \$1 billion for demonstration, commercialization, and deployment of electrolyzer systems.

Clean Hydrogen Manufacturing and Recycling: \$500,000 to support a clean hydrogen domestic supply chain.

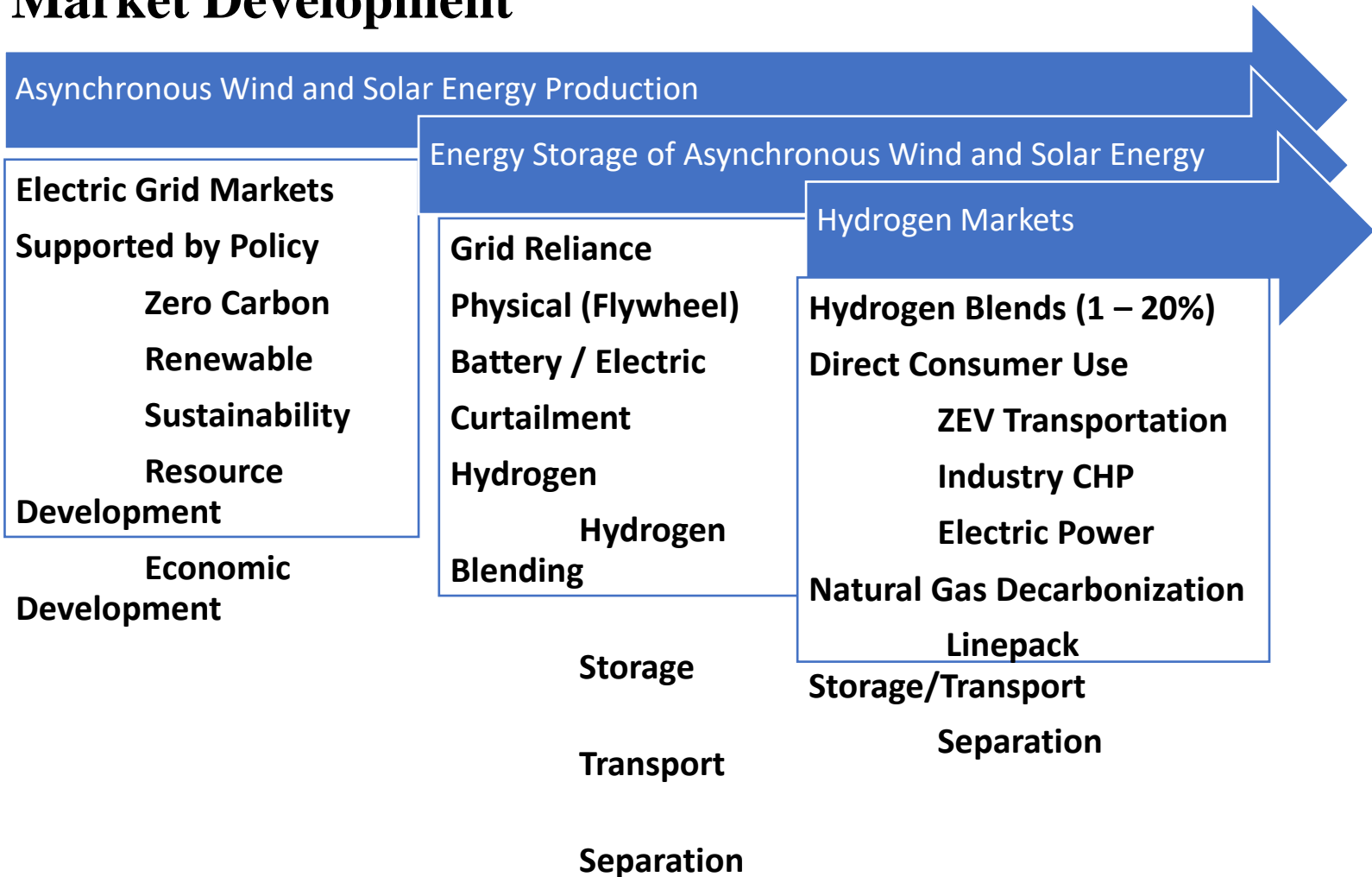
Northeast Hydrogen Hub

Focal points

- Clean carbon-free energy carrier
- Fueled by abundant offshore wind
- Deployment and investment in distressed cities
- Engagement of global research and manufacturing
- Supports non-fossil, non-mineral, domestic technology
- Provides long duration storage for energy sustainability

Northeast Hydrogen Hub

Market Development



Northeast Hydrogen Hub

Value Chain

- **Production of low-cost renewable hydrogen from renewable offshore wind**
- **Generation of electricity and zero emission vehicle transportation**
- **Deployment in distressed communities and communities of need**
- **Provision of storage and transport**
- **Decarbonization of grid and pipeline infrastructure**
- **Advancement of blending/deblending in renewable and natural gas**
- **Energy diversity and grid resiliency**
- **Advanced domestic manufacturing**
- **100% hydrogen production from U.S. resources and manufacturing supply chain**
 - **No dependency on rare earth minerals**
 - **No geopolitical or foreign trade issues to navigate**
- **Leading fuel cell – electrolysis manufacturing in the country**
- **Additional workforce development, job creation, and economic development**

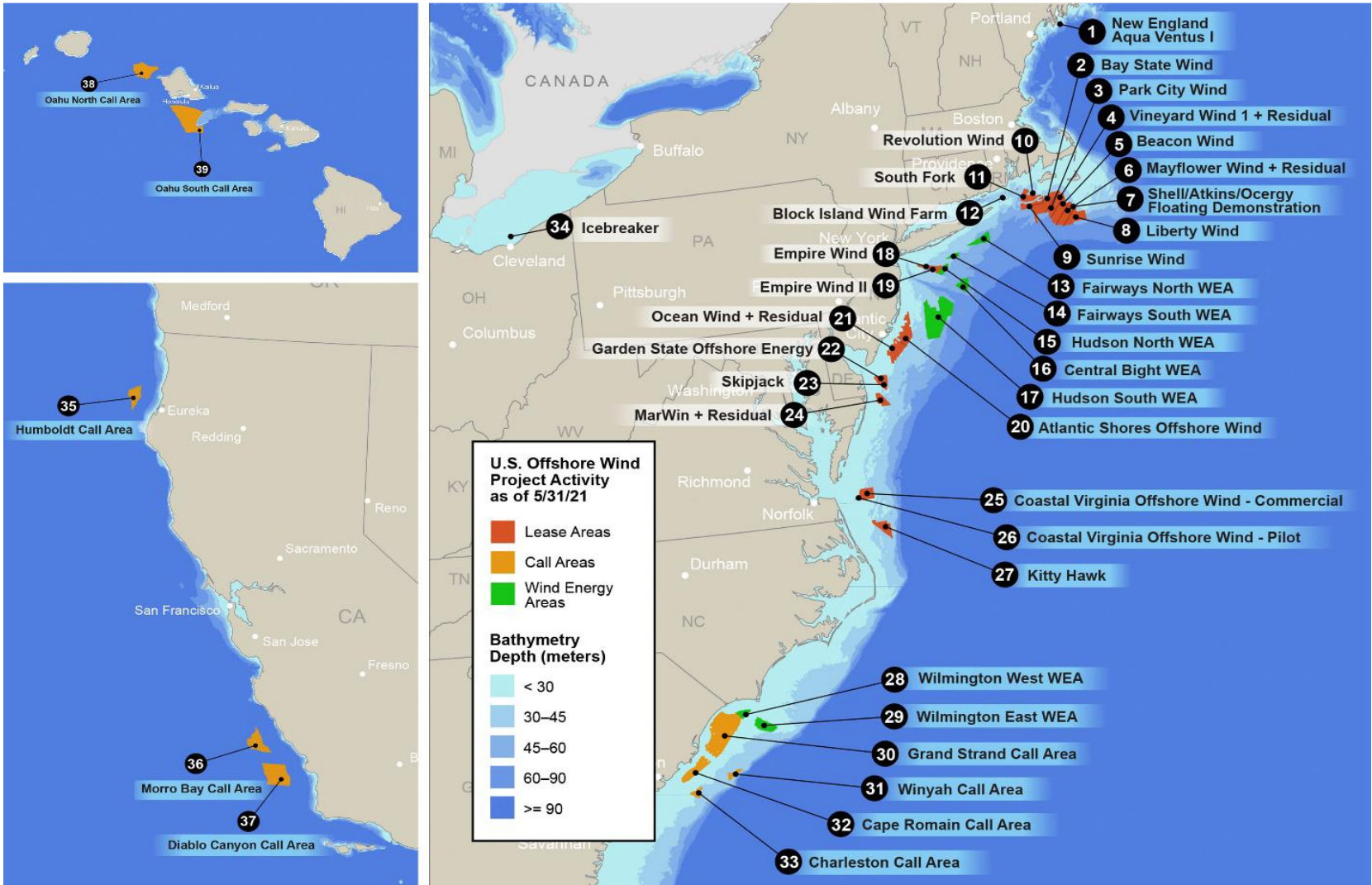
Northeast Hydrogen Hub

Proposal Action

- Rapidly expand the hydrogen manufacturing network
- Advance domestic research
- Expand markets for power and motive applications
- Create opportunities for skilled training and job creation
- Target investment in distressed communities
- Refine integrity management for blending in natural gas
- Leverage hydrogen to drive electrification and decarbonization
- Standardize applications with codes and standards

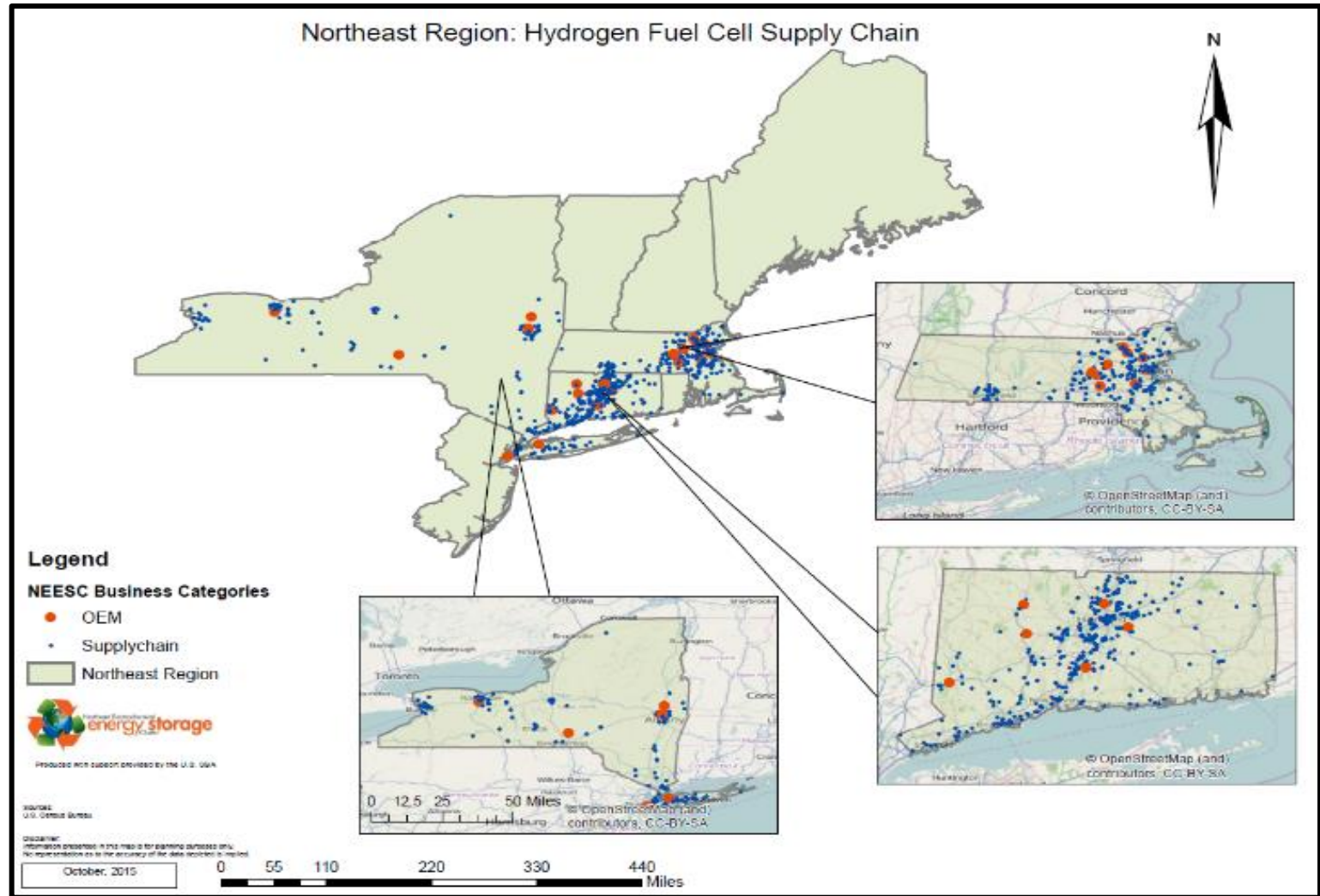
Northeast Hydrogen Hub

Abundant and Expanding Renewable Offshore Wind Feedstock



Northeast Hydrogen Hub

Globally Recognized Research and Manufacturing



Northeast Hydrogen Hub

Abundant Stationary Grid Applications

Northeast Region: Market Potential for Hydrogen and Fuel Cell Stationary Applications

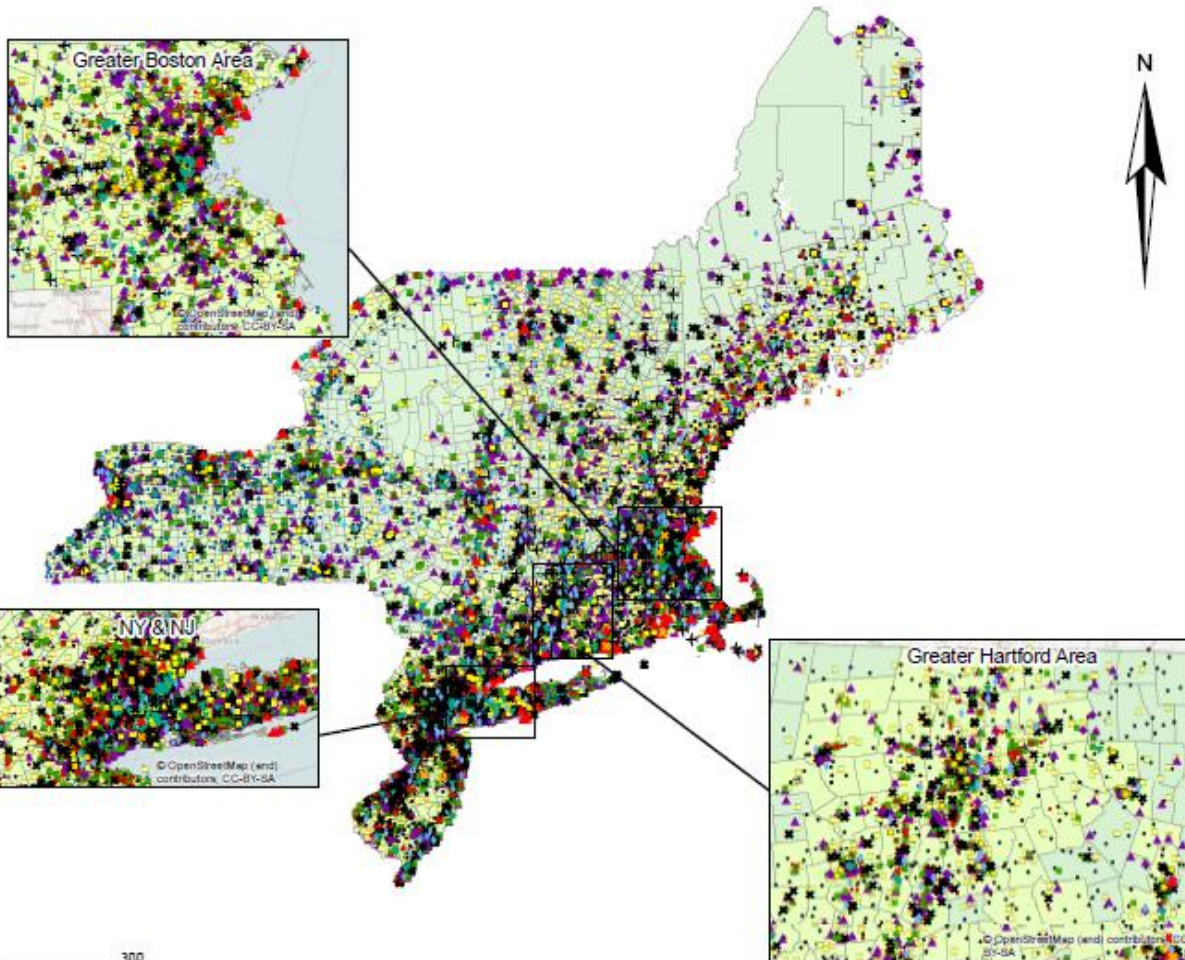
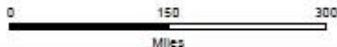
Legend

- Military
- ▲ Port
- ✈ Commercial Airport
- ✱ Healthcare & Lodging
- ◆ Government Owned Building
- ▼ Public Order & Safety
- Education
- Food Sales & Service
- Large Retailer
- WWTPs & Landfill
- ▲ Energy Intensive Industry
- Wireless Communication Tower
- Area Served by Natural Gas



Sources:
U.S. Census Bureau
U.S. General Services Administration
U.S. Environmental Protection Agency
WorldStreetMap
ReferenceUSA
Federal Aviation Administration
Northeast Gas Association
AssistedLivingList.com
Federal Communications Commission
National Restaurant Association
www.ndsh.org
dix.gov
militarybases.com
worldportresources.com
Bookings.com
health.usnews.com
Federal Bureau of Prisons

Disclaimer:
Verification of potential sites has not been undertaken on a site-specific basis. No representation as to the accuracy of the data depicted is implied.



Northeast Hydrogen Hub

Economic Impact

- \$1.4 B in revenue and investment,
- 1,100 supply chain companies with greatest concentration in US,
- 6,600 direct, indirect, and induced jobs,
- \$615 M labor income, and
- Economic impact unmatched by any other region in the U.S.

Northeast Hydrogen Hub

Robust regional industry supply chain greatest in the U.S.

	NEESC Regional Economic Data
Supply Chain Members	1,194+
Direct Revenue & Investment (\$M)	497
Direct Jobs	1,806
Direct Labor Income (\$M)	279
Indirect Revenue & Investment (\$M)	504
Indirect Jobs	2,192
Indirect Labor Income (\$M)	192
Induced Revenue & Investment (\$M)	419
Induced Jobs	2,560
Induced Labor Income (\$M)	148
Total Revenue & Investment (\$M)	1,420
Total Jobs	6,558
Total Labor Income (\$M)	620

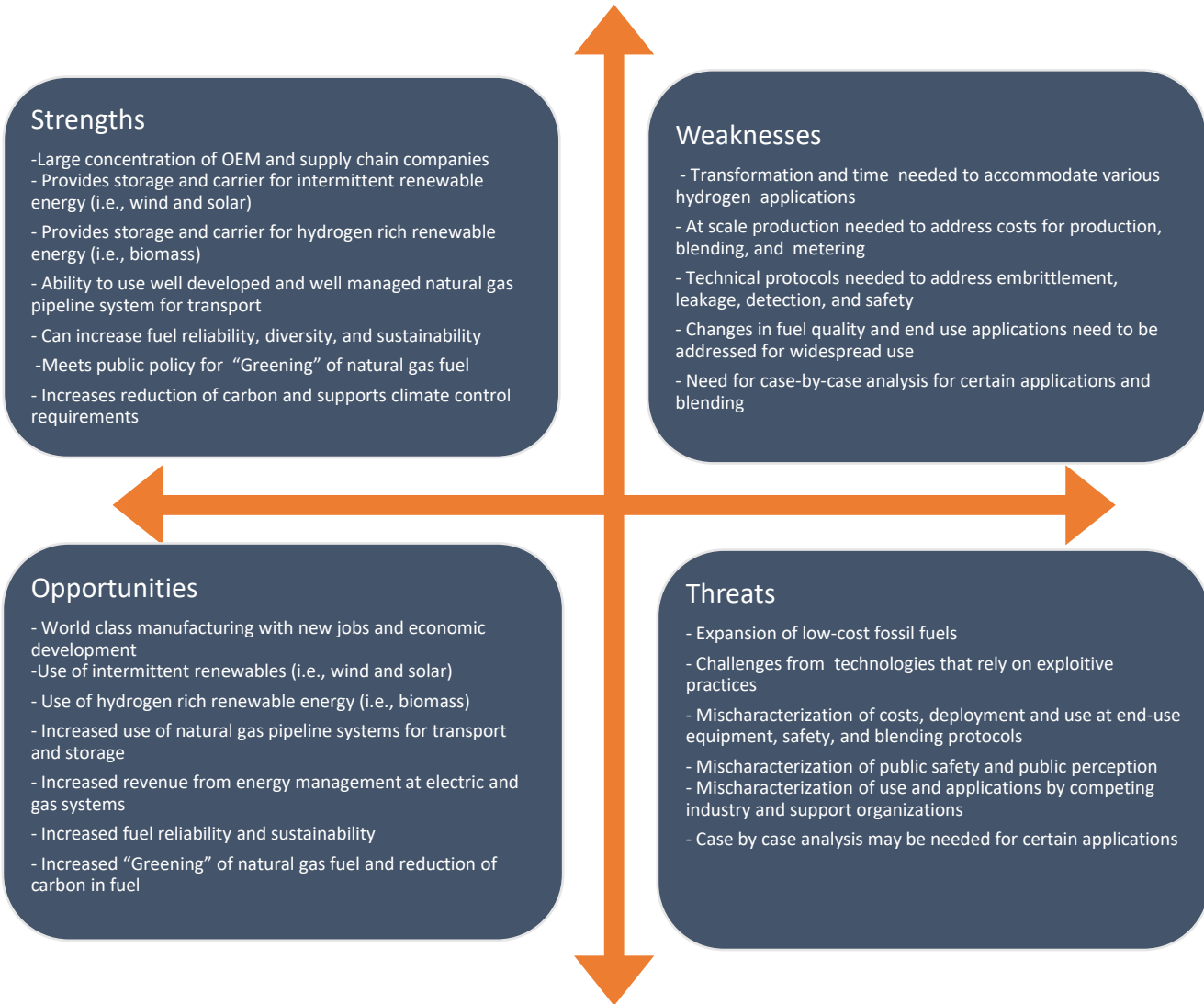
Northeast Hydrogen Hub

Metrics

- **Production cost \$1 per 1 kilogram in 1 decade**
- **Blending rates from 1% to 20% with natural gas infrastructure**
- **Lower cost electric production meet or exceed the current all-in behind the meter retail cost of power**
- **Heat, power, and transportation to meet or exceed safety standards for retail delivery of power**
- **Reliability and resiliency to meet or exceed reliability standards for retail delivery of power**
- **Expansion of the hydrogen and offshore wind supply chain by 50% with increased job creation in advanced clean energy technology.**

Northeast Hydrogen Hub

Favorable SWOT



Northeast Hydrogen Hub

In consideration of the regional OEMs, supply chain resources, research institutions, economic revenues, and opportunities for market deployment and global trade:

There is no other region in the U.S. that can demonstrate the collective research, manufacturing, and deployment of hydrogen and fuel cell technology for the establishment and support of a Regional Hydrogen Hub to meet the goals of the President.

Northeast Hydrogen Hub

Next Steps

- Industry support
 - Coalition
- State Support
 - Legislative Proclamation
- Regional Support
 - Regional Symposium
- Congressional Support
- Federal Agency Support
- Application to the U.S. DOE on or about June 2022

Thank You!

Joel M. Rinebold, Ph.D.

Director of Energy

Connecticut Center for Advanced Technology, Inc.

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Web: www.ccat.us

Web: www.chfcc.org

Board of Directors

Agenda Item #9

Adjourn



**BOARD OF DIRECTORS OF THE
CONNECTICUT GREEN BANK**
Regular Meeting Minutes

Friday, December 17, 2021
9:00 a.m. – 11:00 a.m.

A regular meeting of the Board of Directors of the **Connecticut Green Bank (the “Green Bank”)** was held on December 17, 2021.

Due to COVID-19, all participants joined via the conference call.

Board Members Present: Binu Chandy, Dominick Grant, Victoria Hackett, John Harrity, Adrienne Farrar-Houël, Matthew Ranelli, Lonnie Reed, Brenda Watson, Jeffery Beckham, and Sarah Sanders.

Board Members Absent: Thomas Flynn, Laura Hoydick,

Staff Attending: David Beech, Sergio Carrillo, Mackey Dykes, Brian Farnen, Bryan Garcia, Sara Harari, Bert Hunter, Ed Kranich, Cheryl Lumpkin, Jane Murphy, Eric Shrago, Dan Smith, Mike Yu, Matt Macunas, Shawne Cartelli

Others present: Monica Reed from Kestrel Verifiers, Claire Sickinger, DEEP, Giulia Bambera, DEEP, Louise Della Pesca (Clean Energy Finance Consultant)

1. Call to Order

- Lonnie Reed called the meeting to order at 9:03 am.

2. Public Comments

- No public comments.

3. Consent Agenda

- Bryan Garcia summarized each of the Consent Agenda items.

a. Meeting Minutes of October 22, 2021

Resolution #1

Motion to approve the meeting minutes of the Board of Directors for October 22, 2021.

b. Revisions to the Operating Procedures

Resolution #2

RESOLVED, that the Board of Directors of the Connecticut Green Bank approves the revisions to the Operating Procedures.

c. Position Description for the Vice President of Operations

Resolution #3

Motion to approve the position description for Vice President of Operations

RESOLVED, that the Board of Directors of the Connecticut Green Bank approves the revisions to the Operating Procedures.

d. FuelCell Energy Project – Extension

Resolution #4

WHEREAS, in accordance with (1) the statutory mandate of the Connecticut Green Bank (“Green Bank”) to foster the growth, development, and deployment of clean energy sources that serve end-use customers in the State of Connecticut, (2) the State’s Comprehensive Energy Strategy (“CES”) and Integrated Resources Plan (“IRP”), and (3) Green Bank’s Comprehensive Plan (the “Comprehensive Plan”) in reference to the CES and IRP, Green Bank continuously aims to develop financing tools to further drive private capital investment into clean energy projects;

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

WHEREAS, FCE has requested financing support from the Green Bank to develop a 7.4 megawatt fuel cell project in Groton, Connecticut located on the U.S. Navy submarine base and supported by a power purchase agreement (“PPA”) with the Connecticut Municipal Electric Energy Cooperative (“CMEEC”) (the “Navy Project”);

WHEREAS, staff has considered the merits of the Navy Project and the ability of FCE to construct, operate and maintain the facility, support the obligations under the Loan throughout its 20-year term, and as set forth in the due diligence memorandum (the “Board Memo”) dated December 18, 2020, recommended this support be in the form of a term loan not to exceed \$8,000,000, secured by all project assets, contracts and revenues as well as a pledge of revenues from an unencumbered project as explained in the Board Memo (the “Credit Facility”);

WHEREAS, on the basis of that recommendation, the Green Bank Board of Directors

Subject to Changes and Deletions

(“Board”) approved of the Credit Facility, in an amount not to exceed \$8,000,000 with the provision that the Credit Facility be executed no later than 315 days from the date of authorization by the Board (June 16, 2021) which was further extended by the Board in July 2021 to October 29, 2021 and which was further extended by the Board in October 2021 to December 31, 2021;

WHEREAS, Green Bank has further advised the Board that the Credit Facility is now expected to close within the next 60 days and to accommodate the additional time needed to execute the Credit Facility requests the permitted time to execute the credit facility be increased from not later than 378 days from the original date of authorization by the Board (December 31, 2021) to not later than 409 days from the date of authorization by the Board (i.e., to January 31, 2022);

NOW, therefore be it:

RESOLVED, that the Green Bank Board hereby approves the extension of time for the execution of the Credit Facility to not later than 409 days from the original date of authorization by the Board (i.e., not later than January 31, 2022); and

RESOLVED, that the President of the Green Bank and any other duly authorized officer is authorized to take appropriate actions to provide the Credit Facility to FCE (or a special purpose entity wholly-owned by FCE) in an amount not to exceed \$8,000,000 with terms and conditions consistent with the memorandum submitted to the Board dated December 18, 2020 (the “Memorandum”), and as he or she shall deem to be in the interests of the Green Bank and the ratepayers; and

RESOLVED, that the proper Green Bank officers are authorized and empowered to do all other acts and execute and deliver all other documents and instruments as they shall deem necessary and desirable to affect the Term Loan and participation as set forth in the Memorandum.

Upon a motion made by John Harrity and seconded by Brenda Watson, the Board of Directors voted to approve the Consent Agenda which contains Resolutions 1-4. None opposed or abstained. Motion approved unanimously.

4. Incentive Programs Updates and Recommendations

a. Residential Solar Investment Program

- Sergio Carrillo reviewed the status of RSIP and RSIP-E as of 12/13/21. For RSIP, there are only 2.1 MW of projects that need to be completed, which should be done by the end of January 2022. For RSIP-E, all but 1 MW of projects are approved, and a little less than half of Step 16 and Step 17 projects are completed. By the end of the calendar year, all of RSIP-E should be approved and the team can shift towards completing projects. He explained the next steps and upcoming important dates.
 - John Harrity asked what the solar installers have said about the end of the RSIP program. Sergio Carrillo answered that they are discouraged by the end of the upfront incentive, though the tariff will provide equivalent compensation over time, so it may be a harder selling point for the program.
- Sergio Carrillo summarized the Revenue Grade Meter replacement update. Currently about 13% of the replacements are completed and continue despite equipment

Subject to Changes and Deletions

shortages. The algorithm developed by Prof. Ken Gillingham should help calculate generations that may not be able to be reported when the 3G network shuts down on March 1, 2022, and a decision by NEPOOL GIS to approve the use of the algorithm should be approved by the end of January 2022.

- Matt Ranelli asked if there are financial agreements with third parties, and if so to make sure those agreements are okay so long as the methodology is approved. Brian Farnen answered that a review was done and should be all set, assuming the methodology is approved.

b. Energy Storage Solutions Program

- Bryan Garcia summarized a timeline of the history building up to the creation of the Energy Storage Solutions Program.
- Sara Harari reviewed the overall goals of the program, the key policy objectives of cost-effectiveness, resilience, to serve vulnerable communities, and economic development. She summarized the benefit cost analysis tests performed and the results, which are technically only good-faith estimates.
- Ed Kranich explained the program design, which is divided into residential and commercial/industrial customers. He reviewed the elements of both the upfront and performance-based incentives and gave an example of how both passive and active dispatch events will function. He summarized the EDC collaboration efforts, division of responsibilities, Residential Incentive levels, and Commercial Incentive levels.
 - Matt Ranelli asked if the grid edge customers eligibility would include those in flood hazard areas, whether any assets are put into harm's way by doing so, and what protections are in place for those customers. Sara Harari answered that Circa is developing a vulnerability index tool and the Green Bank is working with Circa to make sure that those in flood risk areas are included in the grid outage definition. Matt Ranelli suggested to review the 2017 Building Code Amendment to address the issue of structures that receive state funding.
 - Matt Ranelli asked if the performance incentives have a penalty if a project goes offline prior to the ten-year duration completion. Ed Kranich answered that on the upfront incentive there is a claw-back mechanism at the end of each year, customers would be assessed for participation and notified if they do not meet the requirements. For the performance-based incentive, the customers would not be paid if they don't participate in the Active Dispatch events.
 - John Harrity commented that the incentives being offered to commercial entities must have an aggressive marketing program as history has shown that many businesses are hesitant to participate in a program that they are unfamiliar with. Bryan Garcia noted that the benchmarks looked at were other C&I markets as well the local ZREC market, so the Green Bank staff feels confident that the transition with this program should be smooth. He also added that the Green Bank's role is to ensure that PURA's policy objective of maximizing battery storage deployment is upheld in areas of resilience as well as deploying it into vulnerable communities.
 - Victoria Hackett commented that the program is very exciting and that a Bureau of Energy and Technology team is involved in the PURA Docket and its marketing approach. She is also abstaining from the vote because of that team's involvement.
 - Dominick Grant asked for more elaboration about the marketing of the backup functionality for the target market. Sara Harari answered that though it is a marketing challenge, there is a strong element of education within the marketing

Subject to Changes and Deletions

plan. As well, part of the program design is that when any storm event is declared, customers will have complete control over their batteries for 2 days preceding the storm to fully charge it. Eric Shrago added that in the marketing materials is information about a battery's capacity and capabilities. Sell sheets for determining which batteries to sell to customers will also be included but have not yet been finalized.

Resolution #5

WHEREAS, pursuant to Public Act 21-53 (attached hereto as Appendix A) and §§ 16-11 and 16-244i of the General Statutes of Connecticut Per and as implemented through the Public Utilities Regulatory Authority ("PURA") Docket No. 17-12-03RE03 "PURA Investigation into Distribution System Planning of the Electric Distribution Companies – Electric Storage" ("the Docket") requires the Connecticut Green Bank ("Green Bank") together with Eversource and United Illuminating ("EDCs") to design, implement and administer a behind-the-meter storage program (the "Program") that results in a minimum of five hundred and eighty (580) megawatts of new residential and non-residential electric storage installation in Connecticut before December 31, 2030.

WHEREAS, pursuant to the Final Decision of the Docket issued December 8, 2021 (attached hereto as Appendix B, the "Final Decision"), PURA ordered the Green Bank and the EDCs (the "Program Administrators") to jointly administer the Program (Green Bank to administer the upfront incentive portion of the Program and be responsible for Program communication and promotion; EDCs to administer the performance incentive and the active dispatch portions of the Program; and together the Program Administrators will develop the appropriate program documents necessary to effectively implement the Program beginning January 1, 2022) pursuant to which the Green Bank has prepared the Program Manual (attached hereto as Appendix C) to offer direct financial incentives, in the form of upfront incentives for qualifying electric storage systems and Marketing Plan (attached hereto as Appendix D) to achieve the goals of customer enrollment, marketing & outreach, data aggregation & reporting, and evaluation, measurement & verification.

WHEREAS, pursuant to the Final Decision the Green Bank has prepared a declining incentive block schedule ("Schedule") for the first three-year cycle of the Program that: (1) provides for a series of storage capacity blocks the combined total of which shall be a minimum of 100 megawatts of new electric storage installation in Connecticut before December 31, 2024 and projected incentive levels for each such block; (2) provides incentives (the "Incentives") that are sufficient to meet reasonable payback expectations of residential and non-residential consumers; and (3) provides incentives that decline over time and will foster the sustained, orderly development of a state-based storage industry.

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors (the "Board") hereby approves the Program Manual and Marketing Plan substantially in the form attached in as Appendix C and Appendix D, respectively.

RESOLVED, the Board directs the Green Bank to submit the proposed Program Manual to PURA pursuant to the Draft Decision in Docket No. 21-08-05.

Subject to Changes and Deletions

RESOLVED, that the Board approves the Green Bank participation in Energy Storage Solutions as a Program Administrator, which is expected to be cost recovered pursuant to the Final Decision.

RESOLVED, that this Board action is consistent with Public Act 21-53 and PURA Dockets No. 17-12-03RE03 & Docket No. 21-08-05.

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

Upon a motion made by John Harrity and seconded by Matt Ranelli, the Board of Directors voted to approve Resolution 5. None opposed and Victoria Hackett and Brenda Watson abstained. Motion approved.

5. Financing Programs Updates and Recommendations

a. Small Business Energy Advantage (SBEA) Program – Extension

- Mackey Dykes summarized the SBEA Loan partnership with Eversource. On December 21, 2021 the program is expiring and all parties are interested in extended the program for another 3 years. The Green Bank has been pushing for changes to increase access to capital and increase its position and revenue. The Green Bank's share of the loans are proposed to be increased from 10% to 20% with a term length increased from 4 years to 7 years. As well, there are proposed changes to customer loan limits and aggregate loan balances to gain access to capital for all eligible borrowers. Currently there is a request for a 6-month extension to the existing agreement to give time to finalize the discussions, with a resolution for the finalized agreement presented to the Board at a future date.
- Mackey Dykes requested a change to the initial request. He requested that staff be given the authority to change the benchmark for the interest rate with a result that would yield a similar interest rate. Bert Hunter commented that the 1-month LIBOR benchmark will continue to be posted after December 31, 2021 but after the first week of the March it will cease to be representative in an official sense, hence the need to adjust the interest rate benchmark and pricing described by Mackey Dykes. Mackey Dykes requested the approval and resolution be updated to reflect this.

Resolution #6

WHEREAS, the successful Connecticut Green Bank (Green Bank), Eversource Energy and Amalgamated Bank Small Business Energy Advantage (SBEA) financing facility, pursuant to that certain Second Amended and Restated Master Purchase and Servicing Agreement dated September 30, 2020 ("MPA"), will expire on December 20, 2021;

WHEREAS, the parties expect to agree to terms to extend and expand the MPA in early 2022; and

WHEREAS, a short-term extension of the MPA is necessary to maintain loan servicing and additional loan purchases until final terms are reached

NOW, therefore be it:

Subject to Changes and Deletions

RESOLVED, that the Green Bank Board of Directors authorizes the Green Bank to extend the MPA under the existing terms for up to six months; and

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

Upon a motion made by Matt Ranelli and seconded by Brenda Watson, the Board of Directors voted to approve Resolution 6. None opposed or abstained. Motion approved unanimously.

6. Investment Updates and Recommendations **a. Skyview Ventures – Additional Investment**

- Louise Della Pesca summarized the Skyview Ventures history and request which was brought to the Deployment Committee and was recommended by that committee. The investment request is for a senior secured term loan facility with a special purpose vehicle (Skyview SPV) 100% owned by Skyview Ventures. The reason for the amendment is that the Green Bank supports the deployment of energy storage solutions in Connecticut and Skyview SPV has a pipeline of several projects already. As well, they have a commercial solar PPA pipeline of several MW which means an increased commitment would be needed. Louise Della Pesca reviewed the transaction structure and facility structure. She summarized the proposed controls and changes to the facility, and the risks and mitigants.
- Matt Ranelli commented that he would be abstaining from the vote.

Resolution #7

WHEREAS, the Connecticut Green Bank (“Green Bank”) has significant experience in the development and financing of commercial solar power purchase agreement (“PPA”) projects in Connecticut;

WHEREAS, the Green Bank Board of Directors (the “Board”) approved at its meeting held on March 25, 2020 a senior secured loan facility (“Original Term Loan”) transaction with a Skyview Ventures special purpose vehicle (“Skyview”) in an amount not to exceed \$2.3M as a Strategic Selection and Award pursuant to the Green Bank Operating Procedures Section XII given the special capabilities, uniqueness, strategic importance, urgency and timeliness, and multi-phase characteristics of the Original Term Loan transaction. The Original Term Loan was first expanded to \$3.5M, and then to \$7M (the (Existing Term Loan”), as approved by the Board at its meetings on April 24 and October 23, 2020, respectively;

WHEREAS, as of November 2021, approximately 70% of the Existing Term Loan commitment has been advanced to finance PPA projects;

WHEREAS, in light of the financial incentives available (starting 2022) for the deployment of energy storage solutions (“ESS”) projects, Skyview is developing a pipeline of ESS projects in CT; and

WHEREAS, given the rate of utilization of the Existing Term Loan by Skyview for

Subject to Changes and Deletions

Skyview PPA projects, and the opportunity to develop ESS projects, following diligence of Green Bank staff, Green Bank staff proposes increasing the Existing Term Loan size and amending its terms to allow for ESS project financing, and requests Board approval.

WHEREAS, the Green Bank Deployment Committee recommended that the Board approve of the staff's request to amend and restate the Board's existing approval of the Existing Term Loan transaction as described in the Project Qualification Memo submitted by the staff to the Deployment Committee and dated November 12, 2021 (the "Deployment Committee Memorandum")

NOW, therefore be it:

RESOLVED, that the Board approves staff's request to amend and restate the Board's existing approval of the Existing Term Loan transaction as described in the "Deployment Committee Memorandum and consistent with the memorandum to the Board dated December 10, 2021 (the "Memorandum") to include ESS projects to be qualified for future advances within the increased limit of \$10,000,000 on terms and conditions substantially consistent with those described in the Memorandum as a Strategic Selection and Award pursuant to the Green Bank Operating Procedures Section XII given the special capabilities, uniqueness, strategic importance, urgency and timeliness, and multi-phase characteristics of the Existing Term Loan transaction.

Upon a motion made by Binu Chandy and seconded by John Harrity, the Board of Directors voted to approve Resolution 7. None opposed and Matt Ranelli abstained. Motion approved.

7. Environmental Infrastructure Programs Update

- Bryan Garcia reviewed the mission of the Green Bank and the Environmental Infrastructure topic approach plan. He explained the plan for Nature Based Solutions and Forest Carbon Markets.
 - John Harrity asked if there will be funds available to assist local land trusts to purchase land and remove from the development stream. Bryan Garcia answered that it is to be determined but broadly speaking there is an opportunity to support landowners in those kinds of efforts. Lonnie Reed commented that she agrees with John Harrity but understands the need for a good plan before diving in.
 - Victoria Hackett commented that there is some overlap with the current discussion and the new Executive Order 21-3 as well as the Green Bank's role in the Clean Economy Council. There is also a provision about climate resilient economic development as well as several other provisions.
 - Matt Ranelli advised to not lose sight of the opposite side of land conservation which are healthy urban environments.
 - Dominick Grant commented that the Green Bank has been successful in leveraging capital in the past and to think about what is needed to provide that flexibility in the different facets of environmental infrastructure.

8. Other Business

Subject to Changes and Deletions

- Monica Reed from Kestrel Verifiers summarized the shared history with the Green Bank and company overview.
 - Eric Shrago and Lonnie Reed thanked Monica Reed for her and her team's efforts.
- Bert Hunter noted that the Historic Cargill Falls project closed during the week and thanked the Board for their support.
 - John Harrity commented that he hoped for signage to indicate the Green Bank's involvement and Bert Hunter answered that it was worked into the paperwork and so one may be ready for the ribbon cutting expected in the Spring.
 - Adrienne Houël asked if that project had any connection to Preservation CT and Bert Hunter responded that he did not believe they were involved.
 - Matt Ranelli thanked the team and gave his congratulations.
- David Beech gave an update on the Green Liberty Notes which Kestrel Verifiers verified. The Notes went live on Tuesday, December 14, 2021, and are backed by the SBEA capitalization. First prioritization are Connecticut residents who invest \$1000 or less, then secondarily all others investors of \$1000 or less, and then all others (over \$1,000) after that.

9. Adjourn

Upon a motion made by John Harrity and seconded by Victoria Hackett, the Board of Directors Meeting adjourned at 11:00 am.

Respectfully submitted,

Lonnie Reed, Chairperson



Connecticut Municipal Electric Energy Cooperative (CMEEC) & US Naval Submarine Base – Groton, CT Fuel Cell Project

A Fuel Cell Debt Financing Strategic Selection
Green Bank Term Loan Facility Extension Request
January 14, 2022



Document Purpose: This document contains background information and due diligence on a proposed credit facility for the FuelCell Energy, Inc. (“FCE” and NASDAQ: FCEL) fuel cell project under a power purchase agreement between FCE and the Connecticut Municipal Electric Energy Cooperative (“CMEEC”) and located at the US Naval Submarine Base – Groton, CT. The information herein is provided to the Connecticut Green Bank Board of Directors for the purposes of reviewing and approving recommendations made by the staff of the Connecticut Green Bank.

In some cases, this package may contain, among other things, trade secrets and commercial or financial information given to the Connecticut Green Bank in confidence and should be excluded under C.G.S. §1-210(b) and §16-245n(D) from any public disclosure under the Connecticut Freedom of Information Act. If such information is included in this package, it will be noted as confidential.

Strategic Selection Financing Extension Memo

To: Connecticut Green Bank Board of Directors
From: Bert Hunter, EVP & CIO
Cc: Bryan Garcia, President & CEO; Brian Farnen, General Counsel & CLO; Sergio Carrillo, Director, Incentive Programs; Jane Murphy, EVP of Finance and Administration
Date: January 14, 2022
Re: FuelCell Energy / US Navy / CMEEC / Groton Fuel Cell Project
Term Loan Facility Update & Extension Request

At the December 2021 meeting of the Connecticut Green Bank (“Green Bank”) Board of Directors (the “Board”), the Board approved an extension to complete the financing for a term loan facility to finance the 7.4 megawatt FuelCell Energy, Inc. (“FCE”) fuel cell at the US Naval Submarine Base, Groton, CT (the “Navy Project”) in partnership with and subordinated to loans (the “Senior Loans” and together with Green Bank’s loan, the “Term Loans”) from two bank lenders: Liberty Bank and Amalgamated Bank (the “Senior Lenders” and together with Green Bank, the “Lenders”).

The senior lenders and FCE have entered into a commitment for the financing, subject to finalization of diligence and credit approval, both of which are in progress. The project financing is now expected to close with the next 60 days and legal meetings between the lenders have commenced. However, in an abundance of caution since the next meeting of the Board is March 25, 2022, staff requests the approval be extended to 468 days from its original approval date (to March 31, 2022).

Resolutions

WHEREAS, in accordance with (1) the statutory mandate of the Connecticut Green Bank (“Green Bank”) to foster the growth, development, and deployment of clean energy sources that serve end-use customers in the State of Connecticut, (2) the State’s Comprehensive Energy Strategy (“CES”) and Integrated Resources Plan (“IRP”), and (3) Green Bank’s Comprehensive Plan (the “Comprehensive Plan”) in reference to the CES and IRP, Green Bank continuously aims to develop financing tools to further drive private capital investment into clean energy projects;

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

WHEREAS, FCE has requested financing support from the Green Bank to develop a 7.4 megawatt fuel cell project in Groton, Connecticut located on the U.S. Navy submarine base and supported by a power purchase agreement (“PPA”) with the Connecticut Municipal Electric Energy Cooperative (“CMEEC”) (the “Navy Project”);

WHEREAS, staff has considered the merits of the Navy Project and the ability of FCE to construct, operate and maintain the facility, support the obligations under the Loan throughout its 20-year term, and as set forth in the

due diligence memorandum (the “Board Memo”) dated December 18, 2020, recommended this support be in the form of a term loan not to exceed \$8,000,000, secured by all project assets, contracts and revenues as well as a pledge of revenues from an unencumbered project as explained in the Board Memo (the “Credit Facility”);

WHEREAS, on the basis of that recommendation, the Green Bank Board of Directors (“Board”) approved of the Credit Facility, in an amount not to exceed \$8,000,000 with the provision that the Credit Facility be executed no later than 315 days from the date of authorization by the Board (June 16, 2021), which was further extended by the Board in July 2021 to October 29, 2021, which was further extended by the Board in October 2021 to December 31, 2021, and which was further extended by the Board in December 2021 to January 31, 2022;

WHEREAS, Green Bank has further advised the Board that the Credit Facility is now expected to close within the next 60 days and to accommodate the additional time needed to execute the Credit Facility requests the permitted time to execute the credit facility be increased from not later than 409 days from the original date of authorization by the Board (January 31, 2022) to not later than 468 days from the date of authorization by the Board (i.e., to March 31, 2022);

NOW, therefore be it:

RESOLVED, that the Green Bank Board hereby approves the extension of time for the execution of the Credit Facility to not later than 468 days from the original date of authorization by the Board (i.e., not later than March 31, 2022); and

RESOLVED, that the President of the Green Bank and any other duly authorized officer is authorized to take appropriate actions to provide the Credit Facility to FCE (or a special purpose entity wholly-owned by FCE) in an amount not to exceed \$8,000,000 with terms and conditions consistent with the memorandum submitted to the Board dated December 18, 2020 (the “Memorandum”), and as he or she shall deem to be in the interests of the Green Bank and the ratepayers; and

RESOLVED, that the proper Green Bank officers are authorized and empowered to do all other acts and execute and deliver all other documents and instruments as they shall deem necessary and desirable to effect the Term Loan and participation as set forth in the Memorandum.

Submitted by: Bryan Garcia, President and CEO; Bert Hunter, EVP and CIO;



Memo

To: Connecticut Green Bank Board of Directors
From: Eric Shrago, Managing Director of Operations
CC: Bryan Garcia (President and CEO), Sergio Carrillo (Director of Incentive Programs), and Mackey Dykes (VP of Financing Programs and Officer)
Date: January 21, 2022
Re: Fiscal Year 2022 Progress to Targets through Q2

The following memo outlines Connecticut Green Bank (CGB) progress to targets for Fiscal Year (FY) 2022 as of December 31, 2021¹.

Table 1. Incentive Programs FY 2022 Progress to Targets

Product/Program	Projects			Capital Deployed			Capacity (MW)		
	Closed	Target	% to Target	Closed	Target	% to Target	Closed	Target	% to Target
RSIP	1,732	471	368%	\$62,969,713	\$13,680,000	460%	16.8	4.0	420%
Battery Storage	0	362	0%	\$0	\$11,750,000	0%	0.0	5.0	0%
Smart-E	493	800	62%	\$7,682,202	\$11,200,000	69%	0.2	0.8	25%
Solar for All	362	96	377%	\$9,233,188	\$2,478,528	373%	2.4	0.7	369%
Total	2,470	1,633	151%	\$75,929,787	\$36,630,000	207%	18.6	9.8	189%

Table 2. Smart-E Channels

Smart-E Loan Channels	Closed	% of Loans
EV	0	0%
Home Performance	41	8%
HVAC	416	84%
Solar	15	3%
(blank)	5	1%
Total	493	100%

¹ Power BI data source: <https://app.powerbi.com/groups/289235dd-d77d-4043-8dae-d232a51a116a/reports/b24ec66b-a2c1-49f0-9a62-3f7443077b3f/ReportSection13c15e79a907a30b650e>

Table 3. Financing Programs FY 2022 Progress to Targets

Product/Program	Projects			Capital Deployed			Capacity (MW)		
	Closed	Target	% to Target	Closed	Target	% to Target	Closed	Target	% to Target
Commercial Solar PPA	5	42	12%	\$1,157,166	\$25,557,000	5%	0.5	13.4	4%
CPACE	9	44	20%	\$7,222,456	\$23,260,000	31%	1.4	6.5	22%
CPACE backed Commercial Solar PPA	1	0	0%	\$491,502	\$0	0%	0.3	0.0	0%
SBEA	317	818	39%	\$4,684,323	\$14,470,000	32%	0.0	0.0	0%
Multi-Family H&S	0	2	0%	\$0	\$600,000	0%	0.0	0.0	0%
Multi-Family Pre-Dev.	0	0	0%	\$0	\$0	0%	0.0	0.0	0%
Multi-Family Term	3	4	75%	\$2,060,000	\$650,000	317%	0.9	0.2	450%
Strategic Investments	0	0	0%	\$0	\$0	0%	0.0	0.0	0%
Total	333	902	37%	\$13,616,446	\$61,992,000	22%	2.2	19.1	11%

Table 4. Multi-Family Units

MFH # of Units	Closed
Affordable	102
Market Rate	82
Total	184

Table 5. CGB Totals FY 2022 Progress to Targets

Segment	Projects			Capital Deployed			Capacity (MW)		
	Closed	Target	% to Target	Closed	Target	% to Target	Closed	Target	% to Target
Incentive Programs	2,470	1,633	151%	\$75,929,787	\$36,630,000	207%	18.6	9.8	189%
Financing Programs	333	902	37%	\$13,616,446	\$61,992,000	22%	2.2	19.1	11%
Total	2,803	2,530	111%	\$89,546,233	\$98,622,000	91%	20.7	28.9	72%



Memo

To: Audit, Compliance and Governance Committee
From: Jane Murphy (EVP Finance and Administration)
Date: January 11, 2022
Re: Audit RFP Process

The Green Bank recently issued an RFP for Professional Audit Services for fiscal years ending June 30th 2022 through 2024 as required by our operating procedures. Our current audit firm, CliftonLarsonAllen (formerly blumshapiro), is required to rotate off the audit in compliance with Section 1-127 of the Connecticut General Statutes which prohibits a Quasi-Public Agency from contracting with the same audit firm for a period greater than six consecutive years. We posted the RFP on our website and sent solicitation letters to 4 national/regional firms in the area. We received responses from the following two firms:

1. PKF O'Connor Davies
2. BerryDunn

I have formed a staff working group to review the proposals and present a recommended audit firm to the Committee at its meeting on January 18, 2022.

The following is a brief statistical summary of each firm I extracted from "The 2021 Top 100 Firms" published by *Accounting Today*, an industry publication. I have also indicated the local office that will be performing the audit services and I have also enclosed each firm's proposal.

PKF O'Connor Davies

1. Revenues: \$202 million
2. Offices: 13
3. Headquarters: New York City
4. Offices(s) performing CGB audits: Wethersfield, CT (from proposal)
5. Partners: 128
6. Total Professionals: 728
7. Total employees: 1,005
8. Total staff local offices: Not disclosed in proposal
9. Government services staff: 65 (from proposal)
10. National ranking- 2021 Accounting Today: 27

BerryDunn

1. Revenues: \$100.87 million
2. Offices: 8
3. Headquarters: Portland, Maine
4. Office (s) performing CGB audits: Manchester, NH with support from Waltham, MA
5. Partners: 47
6. Total Professionals: 401
7. Total employees: 505
8. Total staff local offices: 50 (Manchester, NH office - from proposal)
9. Government services staff: Not disclosed in proposal
10. National ranking – 2021 Accounting Today: 52

RESOLVED, that the Audit, Compliance and Governance Committee hereby recommends to the Board of Directors for approval _____ to perform professional audit services for the Connecticut Green Bank for the fiscal years 2022, 2023, and 2024.

Second. Discussion. Vote

Memo

To: Connecticut Green Bank Board of Directors
From: Bryan Garcia (President and CEO), Jane Murphy (Executive Vice President of Finance and Administration), and Eric Shrago (Vice President of Operations)
Date: January 13, 2022
Re: Proposed updates to FY2022 Targets and Budget

The Budget, Operations, and Compensation Committee of the Connecticut Green Bank Board of directors met on January 12, 2022 to discuss targets and updates to the budget. They recommend the updates below.

I. Targets

After two quarters of assessing program performance and market conditions, the Green Bank staff has proposed the following adjustments to targets for this fiscal year:

- Changes to the Incentive Programs targets include:
 - Adjusting the RSIP target from 471 projects, \$13.68 Million in capital deployed and 4MW installed to include the projects approved in the RSIP-Extension approved by the board in 2020 to 1732 projects, \$62.9 Million in capital deployed and 16.8 MW of capacity installed.
 - Decreasing the battery storage targets to reflect potential hurdles to deployment such as installer readiness, technology onboarding, and supply chain delays.
- Changes to the Financing Programs Targets include:
 - We are revising down the targets for SBEA. This is driven by slower uptake than the original utility forecasts suggest.
 - We are reducing our CPACE target by 14 projects, \$420,000, and .2MW driven by fewer but larger projects in the pipeline for 3rd Party developers.
 - We are reducing the targets for the PPA by 5 projects and \$7.9 million.
 - Slight decrease in multifamily term and health and safety targets.
 - Targets for Smart-E and Solar for All remain flat.

The targets are summarized in the following tables:

Table 1. Proposed FY 2022 Targets for the Incentive Programs Business Unit

Program	Number of Projects	Total Capital Deployed	Capacity Installed	Total Emissions (tons)
Residential Solar	1,732	\$62,969,713	16.8	29,605
Battery Storage	202	\$5,800,000	2.5	0
Smart-E	800	\$11,200,000	0.8	15,168
Low Income Loans/Leases (PosiGen)	96	\$2,478,528	0.7	1,154
Incentive Programs Total	2,734	\$79,969,713	20.1	44,773

Table 2. Proposed FY 2021 Targets for the Financing Programs Business Unit

Product	Number of Projects	Total Capital Deployed	Capacity Installed	Total Emissions (tons)
CSPACE	30	\$22,838,680	6.3	11,172
PPA	37	\$17,652,000	11.0	18,503
SBEA	614	\$9,260,800	0.0	83,709
Multi-Family Pre-Dev	0	\$0	0.0	
Multi-Family Term	2	\$300,000	0.2	282
Multi-Family Health and Safety Total	1	\$600,000	0.0	0
Transportation	0	\$0	0.0	16,500
Strategic Investments	0	\$0	0.0	0
Financing Programs Total	679	\$48,951,480	16.5	129,285

II. Proposed Changes to the Green Bank Investment and Operating Budgets

The overall net proposed budget represents an increased spend of \$448,081 and an increase in revenue of \$3,325,487. The proposed updated budget differs from the original, approved budget in the following ways:

Financing Programs

The Green Bank is proposing adjusting the Financing Programs revenue upward by \$3,325,487 based on Utility Customer Assessments income being \$227,877 higher than expected (Adjustment A in the attachment) and RGGI auction Proceeds being \$3,097,610 higher than forecast (Adjustment B in the attachment). The Increased RGGI proceeds is reflective of a higher clearing price and increased demand in allowances.

Staff also proposes additional expenses of \$84,110 in the Financing Programs. Most of this increase is driven by the reallocation of staff and resources which is a result of the reductions in the incentive programs. This \$28,506 increase is part of adjustment C in the attachment and includes \$10,000 to support an EDF Climate Corps Fellow for the summer. There were

additional changes to overhead (office and rent and location related expenses) due to the changes in staff allocation for \$40,604. Finally, there was an increase in marketing expenses for the PPA to support a platform to help schools showcase the solar they are installing and use it as part of their curriculum (adjustment E).

Incentive Programs

Staff proposes \$363,972 additional expenses in the Incentive Programs primarily related to the Public Utilities Regulatory Authority's (PURA) order directing the Green Bank to co-administer the new Energy Storage Solutions (ESS) program. The expenses for ESS are cost recoverable, but that recovery is not expected to take place this year. The expense changes are composed of the following:

- Increase of \$125,000 in Program Administration (Adjustment D in the attachment), to cover the costs of implementing our customer enrollment platform and for increased inspections as we onboard installers for ESS;
- Increase of ESS's marketing budget by \$310,000 to support the program launch (Adjustment E in the attached);
- Increase of \$90,000 in consulting expenses related to ESS including support for the PURA mandated development of benefit-cost-analyses for front-of-the-meter storage in Connecticut (Adjustment G in the attached);
- Increase of \$129,000 in office expense (Adjustment I) to cover the cost of commitment fees related to the SHREC warehouse facilities;
- A decrease in compensation and benefits and the associated overhead for ESS \$270,903 is off-setting the additional expenses (Adjustment C in the attached).

Program Incentives will increase by \$1,207,500 which includes \$1,147,500 in incentives for ESS (Adjustment L). There was an additional \$60,000 grant (Adjustment K) added to the incentives programs to support specific customer acquisition channels (low-income residents and multi-family property owners) related to ESS.

Environmental Infrastructure

Staff are proposing changes to the budget that reflect a delay in hiring a director of this program (part of adjustment C). These changes, and the accompanying changes in overhead (part of adjustment H) total \$154,494. Staff are proposing using the savings from this delay in hiring to further support the program's development by increasing the research and development expense by \$154,494, thus leaving the net budget for the program flat.

III. Strategic Partners

As you recall, the committee recommended that board instruct staff to contract with 14 strategic partners in June 2021 with specific not-to-exceed thresholds. As we prepare to launch ESS, we need to add an additional strategic partner and increase the not-to-exceed thresholds with two others. The details are as follows:

Partner	New Not-to-Exceed Threshold
Craftsman Technology Group	\$ 105,000.00
Guidehouse (f.k.a. Navigant)	\$ 527,408.00
Stark Raving	\$ 583,500.00

We look forward to our meeting this week and to discussing these with you at that time.

Connecticut Green Bank
Fiscal Year Budget - Recast vs. Original

	TOTAL CONNECTICUT GREEN BANK			INCENTIVE PROGRAMS			FINANCING PROGRAMS			ENVIRONMENTAL INFRASTRUCTURE		
	Recast	Original	Variance	Recast	Original	Variance	Recast	Original	Variance	Recast	Original	Variance
	Budget	Budget		Budget	Budget		Budget	Budget		Budget		
Revenue												
Operating Income												
Utility Customer Assessments	24,677,677	24,449,800	227,877 (A)	-	-	-	24,677,677	24,449,800	227,877 (A)	-	-	-
RGGI Auction Proceeds-Renewables	9,197,050	6,099,440	3,097,610 (B)	-	-	-	9,197,050	6,099,440	3,097,610 (B)	-	-	-
CPACE Closing Fees	123,000	123,000	-	-	-	-	123,000	123,000	-	-	-	-
REC Sales	12,095,148	12,095,149	-	11,339,399	11,339,399	-	755,750	755,750	-	-	-	-
Grant Income-Federal Programs	40,000	40,000	-	-	-	-	40,000	40,000	-	-	-	-
PPA Income	640,000	640,000	-	-	-	-	640,000	640,000	-	-	-	-
LREC/ZREC Income	350,000	350,000	-	-	-	-	350,000	350,000	-	-	-	-
Total Operating Income	47,122,875	43,797,389	3,325,487	11,339,399	11,339,399	-	35,783,477	32,457,990	3,325,487	-	-	-
Interest Income	6,211,341	6,211,341	-	73,000	73,000	-	6,138,340	6,138,341	-	-	-	-
Interest Income, Capitalized	340,984	340,984	-	-	-	-	340,985	340,984	-	-	-	-
Other Income	504,535	504,535	-	-	-	-	504,535	504,535	-	-	-	-
Total Revenue	54,179,735	50,854,249	3,325,487	11,412,399	11,412,399	-	42,767,337	39,441,850	3,325,487	-	-	-
Operating Expenses												
Compensation and Benefits												
Employee Compensation	5,288,761	5,478,983	(190,222) (C)	1,557,683	1,694,657	(136,974) (C)	3,691,314	3,671,877	19,437 (C)	39,764	112,448	(72,684) (C)
Employee Benefits	4,565,724	4,762,581	(196,857) (C)	1,322,551	1,456,481	(133,929) (C)	3,216,216	3,207,147	9,069 (C)	26,957	98,955	(71,998) (C)
Total Compensation and Benefits	9,854,485	10,241,564	(387,079)	2,880,234	3,151,138	(270,903)	6,907,530	6,879,024	28,506	66,721	211,403	(144,682)
Program Development & Administration	5,368,985	5,243,985	125,000 (D)	4,516,000	4,391,000	125,000 (D)	852,985	852,985	-	-	-	-
Program Administration-IPC Fee	1,366,219	1,366,219	-	243,385	243,384	-	1,122,835	1,122,835	-	-	-	-
Marketing Expense	1,983,725	1,658,725	325,000 (E)	661,116	351,116	310,000 (E)	1,322,609	1,307,609	15,000 (E)	-	-	-
E M & V	638,000	638,000	-	453,000	453,000	-	185,000	185,000	-	-	-	-
Research and Development	239,494	85,000	154,493 (F)	-	-	-	35,000	35,000	-	204,494	50,000	154,494 (F)
Consulting and Professional Fees												
Consulting/Advisory Fees	1,173,000	1,083,000	90,000 (G)	455,000	365,000	90,000 (G)	718,000	718,000	-	-	-	-
Accounting and Auditing Fees	267,750	267,750	-	-	-	-	267,750	267,750	-	-	-	-
Legal Fees & Related Expenses	294,000	294,000	-	85,000	85,000	-	209,000	209,000	-	-	-	-
Bond Issuance Costs	850,000	850,000	-	850,000	850,000	-	-	-	-	-	-	-
Total Consulting and Professional Fees	2,584,750	2,494,750	90,000	1,390,000	1,300,000	90,000	1,194,750	1,194,750	-	-	-	-
Rent and Location Related Expenses												
Rent/Utilities/Maintenance	304,694	304,694	-	91,065	94,242	(3,177) (H)	209,082	204,199	4,883 (H)	4,546	6,252	(1,706) (H)
Telephone/Communication	93,400	93,400	-	27,915	28,889	(974) (H)	64,092	62,595	1,496 (H)	1,393	1,917	(523) (H)
Depreciation & Amortization	674,167	670,000	4,167 (I)	201,448	207,231	(5,782) (H)	462,683	449,021	13,663 (H),(I)	10,035	13,748	(3,714) (H)
Total-Rent and Location Related Expenses	1,072,261	1,068,094	4,167	320,428	330,362	(9,933)	735,857	715,815	20,042	15,974	21,917	(5,943)
Office, Computer & Other Expenses	1,516,972	1,380,472	136,500 (H),(J)	339,681	219,872	119,808 (H),(J)	1,168,896	1,148,334	20,562 (H)	8,396	12,265	(3,869) (H)
Total Operating Expenses	24,624,891	24,176,809	448,081	10,803,844	10,439,872	363,972	13,525,462	13,441,352	84,110	295,585	295,585	-
Program Incentives and Grants												
Financial Incentives-CGB Grants	205,000	125,000	80,000 (K)	60,000	-	60,000 (K)	145,000	125,000	20,000 (K)	-	-	-
Program Expenditures-Federal Grants	40,000	40,000	-	-	-	-	40,000	40,000	-	-	-	-
EPBB/PBI/HOPBI Incentives	16,712,690	16,712,690	-	16,712,690	16,712,690	-	-	-	-	-	-	-
Battery Storage Incentives	1,147,500	-	1,147,500 (L)	1,147,500	-	1,147,500 (L)	-	-	-	-	-	-
Total Program Incentives and Grants	18,105,190	16,877,690	1,227,500	17,920,190	16,712,690	1,207,500	185,000	165,000	20,000	-	-	-
Operating Income/(Loss)	11,449,654	9,799,749	1,649,905	(17,311,635)	(15,740,163)	(1,571,472)	29,056,875	25,835,498	3,221,377	(295,585)	(295,585)	-
Non-Operating Expenses												
Interest Expense	2,708,079	2,708,079	-	2,521,873	2,521,873	-	186,205	186,205	-	-	-	-
Provision for Loan Loss	1,728,196	1,728,196	-	-	-	-	1,728,196	1,728,196	-	-	-	-
Interest Rate Buydowns-ARRA	850,000	850,000	-	850,000	850,000	-	-	-	-	-	-	-
Total Non-Operating Expenses	5,286,275	5,286,275	-	3,371,873	3,371,873	-	1,914,401	1,914,401	-	-	-	-
Net Revenues Over (Under) Expenses	6,163,380	4,513,475	1,649,905	(20,683,508)	(19,112,036)	(1,571,472)	27,142,473	23,921,096	3,221,377	(295,585)	(295,585)	-

See budget memo for details of adjustments (A) through (L).

Memo

To: Connecticut Green Bank Board of Directors

From: Mackey Dykes, Vice President, Financing Programs, Alex Kovtunenکو, Associate General Counsel, and Alysse Lembo-Buzzelli, Associate Director, Financing Programs

Date: January 19, 2022

Re: C-PACE Program Guidelines Update

Overview

Conn. Gen. Stat. Section 16a-40g authorizes what has come to be known as the Commercial Property Assessed Clean Energy Program (“C-PACE”), designates the Connecticut Green Bank (“CGB”) as the state-wide administrator of the program and charges CGB to “develop program guidelines governing the terms and conditions under which state and third-party financing may be made available to the commercial sustainable energy program.” Since 2013, CGB has developed and maintained the “Program Guidelines” for the C-PACE program in accordance with this statutory requirement.

CGB Staff is seeking approval for an update to the Program Guidelines, which include: 1) incorporating the New Construction Program Pilot (as defined below) into the Program Guidelines as an appendix thereto, and 2) amending the New Construction Program Pilot as set forth herein and more particularly described in the attached “New Construction Technical Standards” appendix.

C-PACE New Construction Pilot History & Performance

Currently the technical review requirements for new consultation projects seeking C-PACE financing are described in the guidelines which were approved by the Board on January 26, 2018 (the “New Construction Program Pilot” or “Pilot”). The New Construction Program Pilot was published separately from the Program Guidelines. The Pilot was implemented as a way for Staff to explore how offering a financing solution to the Connecticut market for new construction, repositioning, and gut rehabilitation could promote more energy efficient building design. Given the lack of a pre-improvement energy baseline against which to measure energy savings and the difficulty of isolating and assigning portions of new construction costs to particular energy savings, the Pilot proposed using a whole building energy model as an alternate methodology to the

traditional savings-to-investment ratio (“SIR”) calculation to demonstrate a certain level of energy performance above code. A minimum threshold of 10% energy performance above code was required to qualify for C-PACE financing. Working with the C-PACE Technical Administrator, the Green Bank would then determine Total Eligible Construction Cost (“TECC”) by reviewing the project’s construction budget and including hard and soft costs directly related to a building’s design and construction. The C-PACE Eligible Finance Amount for a building that demonstrated a 10% improvement over the code baseline was 10% of the TECC. For each additional 1% improvement in performance over baseline, an additional 1% of TECC was made available for financing up to a maximum of 20% of TECC.

Since the New Construction Pilot’s adoption, 3 different approved C-PACE Capital Providers have closed a total 6 New Construction projects for a total of over \$27M in financing. The 6 closed projects included 3 multifamily, 2 hotels, and 1 office building.

Pilot Feedback

Based on feedback from the market and our C-PACE Capital Provider partners, as well as research of new construction programs in other C-PACE jurisdictions, one of the main goals of the New Construction Technical Standards was to simplify the implementation of the program. There was uncertainty around how much C-PACE financing could potentially be accessed until time and money was spent performing a whole building energy model and determining the anticipated energy performance above code. The minimum threshold of energy performance 10% above code also seemed to be higher than the minimum of other C-PACE New Construction programs. Even though 6 projects were closed under this Pilot design, the determination of eligible C-PACE financing and the minimum threshold of 10% above code seemed to be barriers for other projects to pursue C-PACE financing, especially given more stringent building codes that have been implemented since launching the pilot and even more stringent codes to come

New Additions & Amendments

In order to give developers, capital providers, and borrowers a simplified and more accessible way to use C-PACE for new construction financing while still preserving the program’s public policy aspects, Staff has made the following changes:

- Determining the eligible amount of TECC that can be financed with C-PACE has been simplified to say that a minimum energy performance above code (either 5% or 10%, depending on the code year of the permits) is required to be eligible for a fixed C-PACE financed amount of 15% the TECC. This change both lowered the minimum energy performance threshold to access C-PACE financing, as well as decoupled the energy performance % above code from directly corresponding to the same % of TECC eligible for financing
- Added the ability for eligible multifamily properties to use the HERS Index as a pathway to demonstrate the project meets minimum required levels of energy performance to be eligible for financing

- Added an option to access an additional 5% of TECC in financing by incorporating 3 of certain bonus technologies that promote emerging clean energy technologies, resiliency, state policy goals, and energy transition goals
- Added an option for projects designed to be all-electric and to achieve net zero to access 25% of TECC in financing
- A list of supporting documents needed for project review, along with more defined lists of both eligible and ineligible TECC costs were added

Recommendation

Staff recommends that the Green Bank Board (the “Board”) recommend approval of the amended C-PACE Program Guidelines in accordance with this memorandum and as more particularly described in the attached “New Construction Technical Standards” appendix . The amended Program Guidelines would then go through a thirty-day public comment period. If, after public comments are received, CGB staff considers that significant changes are needed to the Program Guidelines as currently drafted, then staff will come back to the Board for an updated approval. If no significant changes result from the public comment process, then the final form of the C-PACE Program Guidelines shall be deemed approved by the Board and CGB staff will proceed with implementation of such C-PACE Program Guidelines. Additionally, once the updated Program Guidelines are implemented, they will supersede the New Construction Program Pilot, which will then be terminated.

Resolution

WHEREAS, Conn. Gen. Stat. Section 16a-40g (the “Authorizing Statute”) authorizes what has come to be known as the Commercial Property Assessed Clean Energy Program (“C-PACE”), the Authorizing Statute designates the Connecticut Green Bank (“CGB”) as the state-wide administrator of the program; and

WHEREAS, the Authorizing Statute charges CGB to develop program guidelines governing the terms and conditions under which state and third-party financing may be made available to C-PACE.

NOW, therefore be it:

RESOLVED, the CGB Board of Directors (the “Board”) approves the proposed changes to C-PACE program guidelines (the “Program Guidelines”), substantially in the form of attached to that certain memo to the Board dated January 19, 2021. The updated Program Guidelines shall supersede the New Construction Program Pilot which was approved by the Board on January 26, 2018. The updated Program Guidelines shall then go through a thirty-day public comment period in accordance with Conn. Gen. Stat. Section 1-120 et seq.

RESOLVED, If, after the expiration of public comment period, CGB staff considers that significant changes are needed to the Program Guidelines as currently drafted, then CGB staff will seek an updated approval from the Board. If no significant changes result from the public comment process, then the final form of the Program Guidelines, as may be edited by CGB staff, shall be deemed approved by the Board and CGB staff will proceed with implementation of such Program Guidelines.

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

CONNECTICUT COMMERCIAL PROPERTY ASSESSED CLEAN ENERGY (C-PACE) NEW CONSTRUCTION
TECHNICAL STANDARDS AND APPROVAL PROCESS

[TO BE ADDED TO ARTICLE IV (TECHNICAL STANDARDS OVERVIEW) OF THE C-PACE GUIDELINES
ALONG WITH A NEW APPENDIX]

Draft Date: January 19, 2022

Connecticut Green Bank
75 Charter Oak Ave, Suite 1-103
Hartford, CT 06106
Tel: (860) 563-0015
www.ctgreenbank.com

[TO BE ADDED TO ARTICLE IV (TECHNICAL STANDARDS OVERVIEW) OF THE C-PACE GUIDELINES]

Sec. 4 New Construction Repositioning, and Gut Rehabilitation

Given the lack of a pre-improvement energy baseline against which to measure energy savings and the difficulty of isolating and assigning portions of new construction, repositioning, and gut rehabilitation costs to particular energy savings, the traditional SIR methodology for comparing savings against that baseline is not applicable. For Qualifying Projects, an alternate methodology will apply for determining the amount of allowable C-PACE financing based upon the level of energy performance the building is designed to reach, as set forth in Appendix [X] attached hereto.

Appendix [X]: C-PACE NEW CONSTRUCTION TECHNICAL STANDARDS AND APPROVAL PROCESS

1. Overview
2. Supporting Documentation
3. Total Eligible Construction Cost (TECC) Determination
4. Energy Performance Determination
 - a. Whole Building Energy Model Path
 - b. Home Energy Rating System (HERS) Index Multifamily Path
5. Bonus Technologies & Net Zero Design Determination
 - a. Bonus Technologies
 - b. Net Zero Design
6. Total Eligible C-PACE Financed Amount Determination
7. Clean Energy Generation for New Construction
8. Project Examples

1. Overview

Given the lack of a pre-improvement energy baseline against which to measure energy savings and the difficulty of isolating and assigning portions of new construction, repositioning and gut rehabilitation costs to particular energy savings, the traditional SIR methodology for comparing savings against that baseline is not applicable. C-PACE eligibility for new construction, repositioning or gut rehabilitation will instead be determined by the overall energy performance of the property. Projects seeking C-PACE for new construction, repositioning or gut rehabilitation projects (each being a “New Construction Project”) must demonstrate a minimum level of energy performance using one of the two paths outlined here. Based on that determination, a percentage of the project’s TECC will be eligible for C-PACE financing (“C-PACE Eligible Finance Amount”). Fees and interest associated with the C-PACE financing can be added to the C-PACE Eligible Finance Amount to determine the total C-PACE benefit assessment amount.

Below is a flow chart of the New Construction Project approval process:

[flow chart to be inserted]

2. Supporting Documentation

The applicant must submit the following documents to the Green Bank and the Technical Administrator, in a form acceptable to both in their discretion:

- Narrative describing the New Construction Project and scope (typically prepared by the modeler)
- Energy modeling input and output files
- Supporting spreadsheet calculations, if any
- Design drawings
- Equipment cutsheets and AHRI certificates
- Detailed construction budget
- Letter of agreement from utility programs, if applicable
- For projects opting to use the HERS Index Multifamily path (as described in Section 4(b) below):
 - HERS Index Rating analyses
 - Data collection sheets for non-residential spaces

3. Total Eligible Construction Cost (TECC) Determination

For a New Construction Project, the sum of construction hard and soft costs directly related to a building's design and construction (the "Total Eligible Construction Cost" or "TECC"), shall be determined by the Green Bank and Technical Administrator pursuant to this Section. The applicant must submit a detailed construction budget that includes the itemized hard costs and soft costs in an .xls or .csv format. The Technical Administrator will review the budget and send comments and questions to the applicant regarding specific line items to determine eligibility. Based on the applicant's submitted materials and responses, the Technical Administrator will provide a final TECC determination.

The following list contains examples of eligible costs that may be included in the TECC calculation. This is not an exhaustive list; the Green Bank and Technical Administrator will ultimately determine the maximum TECC for each New Construction Project:

- Engineering and design services
- Energy modeling services
- Building core and shell
- Energy consuming equipment and energy saving measures
- Permits
- Insurance
- Building safety systems such as sprinklers and fire alarms
- Legal and accounting fees
- Construction period interest
- Financing fees
- Operating losses during construction
- Contingencies

The following costs are *not* eligible to be included in the TECC calculation. This is not an exhaustive list; the Green Bank and Technical Administrator will ultimately determine the maximum TECC for each New Construction Project:

- Costs related to land acquisition
- Marketing expenses
- Landscaping
- Plug-in equipment (appliances, bulbs, etc.)
- Furniture, fixtures, and equipment
- Interior decorations such as artwork
- Any items not affixed to the property

4. Energy Performance Determination

There are two paths that a New Construction Project can use to demonstrate it meets a required levels of energy performance:

- (a) Whole Building Energy Model Path, and
- (b) HERS Index Multifamily Path

Applicants are strongly encouraged to discuss and review their projects with the Green Bank and Technical Administrator before applying for project approval. This step will help the applicant determine which path may be best for a New Construction Project and answer any questions related to the requirements set forth below.

Technical review of a New Construction Project must be completed by the Technical Administrator.

a. Whole Building Energy Model Path

A New Construction Project using this path must use a whole building energy model to demonstrate that the proposed building's energy performance will exceed, to a minimum level, a baseline building energy performance. The baseline building energy performance is based on a building that is designed and built to meet Connecticut building and energy code requirements applicable at the time building permits are obtained (<https://portal.ct.gov/DAS/Office-of-State-Building-Inspector/Connecticut-State-Building-Code>). All C-PACE New Construction projects can use this path, including projects for commercial, industrial, multifamily, and other C-PACE eligible properties, as well as gut rehabilitation or repositioning to change the use of an existing facility at C-PACE eligible properties.

For projects using IECC 2021 as the baseline code, a minimum improvement in energy performance of 5% over the baseline building is required to be eligible for C-PACE financing. The C-PACE Eligible Finance Amount for such a building that demonstrates a 5% improvement over the baseline will be 15% of the TECC (as summarized in Table 1 below).

For projects using a baseline of IECC 2018 or prior, a minimum improvement in energy performance of 10% over the baseline building is required to be eligible for C-PACE financing. The C-PACE Eligible Finance Amount for such a building that demonstrates a 10% improvement over the baseline will be 15% of the TECC (as summarized in Table 1 below).

The following energy modeling software can be used to model the baseline and proposed buildings' energy performance. Software other than those outlined below can be utilized upon review and approval by the Technical Administrator:

- eQuest
- Energy Plus (Open Studio)
- Trane Trace or Trace 3D
- Design Builder

Submittals made to the Connecticut public utilities Energy Conscious Blueprint Program in support of energy efficiency program incentives would be acceptable documentation to provide in support of the C-PACE technical requirements. The Connecticut public utilities energy modeling guidelines can be found here (<https://energizect.com/your-business/solutions-list/Energy-Conscious-Blueprint>). These submittals will be subject to the review of the technical administrator to ensure conformity with the C-PACE program guidelines.

An example of a project using the Whole Building Energy Model Path can be found in Section 8 (Project Examples).

b. HERS Index Multifamily Path

C-PACE New Construction projects for multifamily properties, or eligible mixed-use properties which include multifamily, can use this path to demonstrate that the proposed building's energy performance will exceed, to a minimum level, a baseline building energy performance through the Home Energy Rating System ("HERS") Index.

The HERS index is a nationally recognized system for inspecting, calculating, and estimating residential and multifamily energy performance (<https://www.hersindex.com/>). The HERS index rating is determined by a certified Home Energy Rater, who assesses the energy efficiency of a residence or multifamily dwelling unit and assigns it a relative performance rating. Every point below 100 on the HERS index translates to roughly 1% energy savings compared to a IECC 2006 code-built residence or multifamily dwelling unit. The lower the rating, the more efficient the dwelling unit. For multifamily buildings, each unique dwelling unit type receives a HERS index rating. After a rating is determined for each dwelling unit type, a weighted average of the total units is calculated based on the quantity of each dwelling unit type. This weighted average is used as the overall HERS index rating. For example, if there 3 unit types (A with a HERS index rating of 40, B with a HERS index rating of 45, and C with a HERS index rating of 60) and there are 10 each of A and B, and 20 of C (for a total of 40 units), then the weighted average HERS index rating would be 51.25.

For the purposes of the HERS Index Multifamily Path, only corridors, stairwells, exterior lighting, and lobbies are considered to be common areas in multifamily buildings (collectively being "Common Areas"). All other spaces, including but not limited to, clubhouses, gymnasiums, enclosed parking areas, swimming pools, etc. will be considered commercial spaces (collectively being "Commercial Spaces").

For Common Areas and Commercial Spaces for mixed-use facilities, the Technical Administrator will provide data collection sheets for commonly applicable energy technologies/measures. These

completed data collection sheets need to be provided by the applicant along with the other relevant project documentation, including the HERS index rating analyses. The data collection sheets will be used to compare the specifications of proposed equipment in non-residential spaces to code-compliant or industry standard practice baseline equipment.

For projects using IECC 2021 as the baseline code, a maximum weighted HERS index rating of 40 is required to be eligible for C-PACE financing. For projects where the weighted HERS index rating is 35 and under, the equipment serving the Common Areas and Commercial Spaces would need to meet IECC 2021 code requirements, at minimum. For projects where the weighted HERS index rating is between 36 and 40, the efficiencies of the equipment serving the Common Areas and Commercial Spaces would need to exceed IECC 2021 code requirements by at least 5%.

For projects using a baseline of IECC 2015 or IECC 2018, a maximum weighted HERS index rating of 51 is required to be eligible for C-PACE financing. For projects where the weighted HERS index rating is 46 and under, the equipment serving the Common Areas Commercial Spaces would need to meet IECC 2015/2018 code requirements, at minimum. For projects where the weighted HERS index rating is between 47 and 51, the equipment serving the Common Areas Commercial Spaces would need to exceed IECC 2015/2018 code requirements by at least 10%.

For projects using a baseline of IECC 2012 or prior, please refer to Table 2 below for the weighted HERS index rating required to be eligible for C-PACE financing.

The following tools, accredited by the Residential Energy Services Network (RESNET), can be used to determine the HERS index rating including:

- REM/Rate
- EnergyGauge® USA
- Ekotrope

Energy efficiency incentive submittals made to the Connecticut utilities Residential New Construction Program would be acceptable documentation to provide in support of the C-PACE technical requirements (<https://energizect.com/your-home/solutions-list/residential-new-construction-program>). These submittals will be subject to the review of the technical administrator to ensure conformity with the C-PACE program guidelines.

The following multifamily properties are NOT eligible to use the HERS Index Multifamily Path. These properties would need to use the “Whole Building Energy Model Path” as outlined above in Section 4a. Please contact the Technical Administrator in situations that need further clarification:

- Multifamily facilities with dwelling units served by central plants (including geothermal)
- Mixed-use facilities with significant process loads such as refrigeration, compressed air, manufacturing processes, etc.
- Mixed-use facilities where the commercial space, as referenced earlier in this section, is greater than 20% of total occupied space
- Historic buildings as designated by the state of CT (https://portal.ct.gov/DECD/Content/Historic-Preservation/01_Programs_Services/Historic-Designations/State-Registry-of-Historic-Places)

An example of a project using the HERS Index Multifamily Path can be found in Section 8 (Path Examples).

5. Bonus Technologies & Net Zero Design Determination

a. Bonus Technologies

In order to promote emerging clean energy technologies, resiliency, state policy goals, and energy transition goals, if a New Construction Project design contains at least three of the technologies listed below (each being a “Bonus Technology” and collectively being “Bonus Technologies”), an additional 5% of C-PACE financing is made available, for a total C-PACE Eligible Finance amount of 20% of the TECC (as summarized in Table 1 & Table 2).

- Electric vehicle charging stations (Level 2 or better)
- Battery storage systems (behind the meter)
- High-efficiency heat pumps (air, ground, or water source, better than code)
- Networked lighting controls
- Hard wired smart plug load controls
- Heat pump water heaters
- Passive window shading system
- Fuel cell in combined heat and power mode (please note that these systems can either be included as a Bonus Technology under the Whole Building Energy Model path OR as a clean energy electric generation measure as defined in Section 7)

b. Net Zero Design

If a New Construction project is designed to be all-electric and to achieve net zero, as defined by the New Buildings Institute (NBI), the C-PACE Eligible Finance amount is 25% of the TECC (as summarized in Table 1 & Table 2). Table 3 in the NBI document titled “Zero Energy Commercial Building Targets” (<https://newbuildings.org/wp-content/uploads/2019/09/ZeroEnergyCommercialBuildingTargets.pdf>) specifies the energy use intensity (EUI) that needs to be achieved for various building types prior to the implementation of on-site renewables. Connecticut falls under climate zone 5A and should be referenced when determining the desired EUI. If a building type is not specified or clearly identified in the referenced NBI document, please reach out to the Green Bank and Technical Administrator for guidance on how to determine the appropriate target EUI. A detailed review of project documentation and proposed designs would be conducted by the Technical Administrator in order to approve a net zero design and eligibility to receive 25% of the TECC.

6. Total Eligible C-PACE Financed Amount Determination

Based on determinations made by the Green Bank and Technical Administrator pursuant to the requirements above, the total eligible C-PACE financed amounts for New Construction Projects are set forth in tables 1 and 2.

Table 1- Whole Building Energy Model Path Eligible Financed Amount

IECC Code	Min. Energy Performance Above Code to be eligible for C-PACE Financing	C-PACE Financed Amt. of TECC	C-PACE Financed Amt. after Addition of Min. 3 Bonus Technologies	C-PACE Financed Amt. Designed for Net Zero
2021	5%	15%	20%	25%
2018 or prior	10%	15%	20%	25%

Table 2- HERS Index Multifamily Path Eligible C-PACE Financed Amount

IECC Code Year	Weighted HERS Index Rating	Min. Common Area and Commercial Space equipment efficiency requirement	C-PACE Financed Amt. of TECC	C-PACE Financed Amt. after Addition of Min. 3 Bonus Technologies	C-PACE Financed Amt. Designed for Net Zero
2021	35 and under*	Meets code	15%	20%	25%
	36-40*	5% > code	15%	20%	25%
2018 & 2015	46 and under	Meets code	15%	20%	25%
	47-51	10% > code	15%	20%	25%
2012	55 and under	Meets code	15%	20%	25%
	56-60	10% > code	15%	20%	25%
2009	70 and under	Meets code	15%	20%	25%
	71-75	10% > code	15%	20%	25%
2006	85 and under	Meets code	15%	20%	25%
	86-90	10% > code	15%	20%	25%

*Please note: At this time, the values listed as the "Weighted HERS Index Rating" for 2021 in Table 2 above are an *estimate*. Once IECC 2021 code has been finalized, we will finalize those values, if needed.

7. Clean Energy Electric Generation for New Construction

C-PACE financing for clean energy electric generation measures (e.g. solar photovoltaic) as part of a new construction project will not be evaluated using the C-PACE New Construction methodology. All clean energy electric generation measures will be reviewed against the standard C-PACE upgrade requirements and SIR methodology, regardless of property condition (new construction vs retrofit). The impact of the generation on the associated building's energy performance will not be included in the assessment of energy savings against the Baseline Building Energy Performance. The costs and savings associated with the clean energy electric generation measure will be evaluated separately. If approved, the total eligible C-PACE-financed cost associated with the clean energy electric generation measure will be added to the C-PACE Eligible Finance Amount allowable under New Construction. C-PACE New Construction clean energy electric generation measures shall be reviewed by the Technical Administrator.

Fuel cells in combined heat and power mode can either be included as a Bonus Technology when using the Whole Building Energy Model Path OR as a clean energy electric generation measure using standard SIR methodology. If included using the standard SIR methodology, these costs cannot be included in the TECC or in the energy model as an efficiency measure.

Geothermal systems must be included in a whole building energy model as part of the new construction analysis since they are not electric generation systems and not subject to treatment as clean energy electric generation as outlined in this section.

8. Project Examples

Whole Building Energy Model Path Example

If a project has a TECC of \$10 million and is modeled to have an improvement in energy performance over the IECC 2021 energy code of 7%, it will be eligible for a maximum C-PACE financing of 15% of the TECC (\$1.5 million in this case). If that same project also includes three Bonus Technologies, it will be eligible for a maximum C-PACE financing of 20% of the TECC (\$2 million in this case). If the project is designed to achieve net zero, it will be eligible for a maximum C-PACE financing of 25% of the TECC (\$2.5 million in this case). If the same project was permitted prior to 2022, it would need to exceed the applicable IECC code by at least 10%. The TECC eligibility remains the same as in the example.

HERS Index Rating Path Example

A 200,000 square foot C-PACE eligible new construction multifamily building consisting of 175,000 square feet of residential space and 25,000 square feet of Common Areas and Commercial Space has a TECC of \$10 million. The applicable energy code for the project is IECC 2015. The facility is modeled by a HERS rater to have a weighted HERS index rating of 50. If the Common Area and Commercial Space equipment is at least 10% more efficient than the IECC 2015 code requirements, the project would be eligible for a maximum C-PACE financing of 15% of the TECC (\$1.5 million in this case). If that same project also includes three Bonus Technologies, it will be eligible for a maximum C-PACE financing of 20% of the TECC (\$2 million in this case). If the project is designed to achieve net zero, it will be eligible for a maximum C-PACE financing of 25% of the TECC (\$2.5 million in this case). If the facility had a weighted HERS index rating of 46 or under, then the Common Area and Commercial Space equipment would only need to meet the IECC 2015 code.



When panels produce electricity to save money, they also create **Solar Home Renewable Energy Credits (SHRECs)**.

Utilities enter into **Master Purchase Agreements (MPAs)** with the Green Bank to buy SHRECs to comply with policy programs.

Green Bonds are created via SHREC revenue, and purchased by both individual and institutional buyers.

The **Residential Solar Investment Program (RSIP)** provides rebates and incentives to make rooftop solar more affordable for homeowners.

Revenue from MPAs and Green Bonds support RSIP incentives and cover administrative costs.

Residential Solar Investment Program (RSIP)

Through a network of contractors, the Green Bank helped **43,000+** households access solar energy since 2012, surpassing the statutory target of 350 MW one year ahead of the December 2022 deadline.

\$1.33 billion
Total investment

\$149.7 million
Total incentive

\$0.43/W*
Incentive (\$31 per Zero Emission Renewable Energy Credit Equivalent)

\$3.80/W
Installed Cost



Solar Power Generation

350 MW Capacity **9,966,706 MWh** Estimated lifetime generation



Connecticut's Solar Industry

15,437 Jobs created **\$41.9 million** Tax revenue generated

6,291 Direct **9,146** Indirect and induced



Solar and Energy Efficiency for All

- **50%** of RSIP projects have been deployed in **vulnerable communities**
- **98%** of RSIP projects had **energy audits** (i.e., Home Energy Solutions)



SHREC Backed Bonds

Consumer demand is greater than the supply of bonds, showing consumers' high interest in supporting investment to confront climate change in Connecticut.

Green bonds are certified and verified by a third-party for consumer protection.



Environmental Impact

Through the production of zero emission renewable energy, the lifetime reduction of greenhouse gases is equivalent to:

5.5 million Tons of CO₂ **606,686** Homes energy use

6.1 million Acres of forests **12.6 billion** Miles driven

\$397.8 million Public health cost reduction from cleaner air

*Average incentive over life of the program

MEMORANDUM

TO: NEPOOL Markets Committee

FROM: Paul Belval, NEPOOL Counsel

DATE: October 6, 2021

RE: Referral to GIS Operating Rules Working Group
Connecticut Green Bank Residential Rooftop Solar Metering

At its October 14 meeting, the NEPOOL Markets Committee (the “Markets Committee”) will be asked to direct the NEPOOL Generation Information System (“GIS”) Operating Rules Working Group (the “Working Group”) to consider potential changes to the GIS and the GIS Operating Rules (the “Rules”) regarding metering for certain residential solar generating systems. The changes were requested by the Connecticut Green Bank (“CGB¹”), as administrator of the Connecticut Residential Solar Investment Program (“RSIP”).² The Connecticut Public Utilities Regulatory Authority as well as The Connecticut Light and Power Company (“CL&P”) and The United Illuminating Company (“UI”) have been involved in these discussions and may provide additional feedback.

Rule 2.1(e) provides that generators registered in the GIS that do not meet the metering requirements of ISO-NE Operating Procedure No. 18 must either satisfy the requirements of any applicable state regulations for metering standards (e.g., deemed savings for Class III Renewable Portfolio Standard in Connecticut) or follow the Small Generator Metering Protocol set out in that Rule. That protocol prescribes minimum meter accuracy values and other requirements depending upon the size of the generator.

For the generators in the RSIP, meter data is currently collected and aggregated using cellular telecommunications technology that is incorporated into each solar generating system. The Certificates created based on that data – which CGB refers to as Solar Home Renewable Energy Credits or SHRECs -- are initially owned by CGB and then transferred to CL&P and UI pursuant to long-term contracts with each. For certain of the systems installed prior to 2020, the telemetering technology uses 3G capability, and the major cellular carriers have announced plans to phase-out 3G technology by the end of 2022. CGB has plans to replace the telemetering equipment on the roughly 5,000 homeowner-owned systems in its RSIP that are impacted by this change, but it expects to need several years to accomplish that switchover. CGB issued an RFP

¹ CGB was formerly known as the Connecticut Clean Energy Financing and Investment Authority and is one of the “Regulators” listed on Appendix 5.3 of the Rules. CGB does not, however, have the authority to adopt regulations on its own.

² CGB performs that role pursuant to Section 16-245ff of the Connecticut General Statutes.

in May 28, 2021 to identify contractors that can replace the telemetering equipment, which will cost approximately \$2.5 million, and work has begun on those replacements. CGB states that there are up to 30,000 third-party owned solar systems that have outdated 3G technology that will need to be replaced in order for the performance of the solar system to be communicated to CGB.

CGB proposes that, until it can replace those meters, it would use a predictive model, similar to the existing deemed savings model described above except that this model would use actual performance data to calculate the generation of the impacted RSIP systems for purposes of creating Certificates in the GIS. That model was developed by Dr. Kenneth Gillingham at the Yale School of the Environment and uses each system's specific characteristics (including size, age, orientation and equipment efficiency) and historic performance, as well as the performance of other systems in the surrounding area that are not included in the model (i.e., are not using phased out 3G technology) and hourly irradiance statistics to predict the performance of each system. Dr. Gillingham has said that his model is able to predict the system-specific hourly generation of at least 78 percent of the systems within five percent accuracy. When looked at in aggregate across all of the RSIP systems proposed to have their generation modelled for purposes of the GIS and measured on the basis of quarterly Trading Periods in the GIS, the current model predictions are within no more than 5 percent of the actuals and there is room to improve further. Estimations on smaller subsamples than the entire state suggest a difference of 2 percent or less is possible according to Dr. Gillingham, who will be providing additional modeling data to the Working Group.

The 3G sunset is a problem across the U.S. residential solar market, so it seems likely that other small solar generators in the GIS may be encountering this issue as well. For this reason, a discussion of the issue among the people in the Working Group with specific knowledge about the 3G sunset might be particularly helpful.

The Markets Committee is not being asked to vote on any changes to the Rules at this time. Rather, the Markets Committee is only being asked to refer the issues outlined above to the Working Group so that the Working Group can further discuss and determine the Rule revisions needed if the Working Group supports the proposal. Of course, if the Markets Committee decides to refer these issues to the Working Group, its input at this time would be appreciated, as it may help direct the Working Group's discussions.

cc: NEPOOL GIS Operating Rules Working Group
Brian Farnen, Connecticut Green Bank General Counsel
Thomas Lopez, Connecticut PURA Director of the Office of Education, Outreach, and Enforcement



October 6, 2021

To: NEPOOL Market Advisory Committee
From: Bryan Garcia, President and C.E.O.
Re: Estimation approach for Connecticut residential solar systems affected by the 3G Sunset

Executive Summary

Background

Solar photovoltaic (PV) systems installed in Connecticut under the Connecticut Green Bank (Green Bank) Residential Solar Investment Program (RSIP) receive a financial incentive to reduce the cost of the installation. In exchange for the incentive, the Green Bank retains ownership of the renewable energy credits (RECs) generated with these assets. The Green Bank uses the solar electricity generation data from these systems to create RECs and monetize them through 15-year Master Purchase agreement with Electric Distribution Companies, Eversource and United Illuminating, which they use to satisfy their Class I renewable portfolio standard under Connecticut General Statutes 16-245gg.

As a large portion of solar PV systems participating in RSIP transmit solar PV generation data through 3G revenue grade meters to the Green Bank monitoring platform (Also Energy), the well-publicized sunset of 3G cellular networks announced for early 2022 poses a significant risk to the creation and monetization of RECs.

The Green Bank partnered with Yale Professor, Ken Gillingham, to develop a statistical approach to estimate the solar production of an estimated 5,000 homeowner-owned or Green Bank-owned solar PV systems affected by the 3G sunset, which will allow the Green Bank to programmatically replace these non-communicating systems over a period of no more than four (4) years, while continuing to create and monetize RECs.

Findings

The main finding from Professor Gillingham's research is that the generation of the systems can be estimated with a high degree of confidence: the estimated monthly generation for over 95% of the systems is within 1% of the true values in our validation sample.

Request

The Green Bank is working diligently to replace approximately 4,964 older 3G revenue grade meters with 4G-compatible communication devices. During this period, the Green Bank proposes an estimation methodology and a true-up mechanism to ensure that any deviation between the actual generation and the estimated generation is negligible. Unless such an estimation approach is approved by NEPOOL GIS, the Green Bank will lose revenue associated with the RECs created under its statutorily mandated RSIP program. Our proposal is meant to balance the needs of all stakeholders as the proposed estimation methodology and true-up mechanism results in minimal, if any, discrepancies between the true generation and the generation used to produce the RECs.

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September 29, 2021

To: NEPOOL Market Advisory Committee

Re: Estimation approach for Connecticut residential solar systems affected by the 3G Sunset

Summary

This memo describes the 3G sunset issue and lays out an empirical approach to reliably estimate the solar generation of the 4,964 impacted systems. The main finding from the implementation of the empirical approach is that the true generation of the systems can be estimated with a high degree of confidence: the estimated monthly generation for over 95% of the systems is within 1% of the true values in our validation sample. As 4G-compatible communication devices are installed, a “true-up” can be performed to ensure that any deviation between the actual generation and the estimated generation is negligible.

Background

All of the major cellular providers plan to sunset their 3G service in the upcoming months, shifting towards more technologically advanced 4G and 5G service. For example, AT&T plans the 3G sunset by February 22, 2022 and T-Mobile plans the 3G sunset on March 31, 2022.

Solar photovoltaic systems installed in Connecticut under the Connecticut Green Bank (henceforth the “Green Bank”) Residential Solar Investment Program (RSIP) receive a financial incentive to reduce the cost of the installation. This incentive is either paid upfront to homeowners to help lower installation costs, in a program known as the Expected Performance-Based Buydown (EPBB). 25% of all installed systems are EPBB systems. Alternatively, the incentive can be paid quarterly over six years to companies who install systems under a third-party ownership (TPO) model, allowing the companies to lower PPA or lease costs to homeowners. This program is known as the Performance-Based incentive (PBI), and systems installed under this program represent the remaining 75% of all installed systems.

The recipient of the incentive is legally required, based on the signed contract, to ensure that the system is communicating with the Green Bank’s solar generation monitoring platform. This platform is currently maintained by Also Energy (formerly known as Locus Energy). The monitoring platform relies on the cellular network to send solar generation data from each solar system to the monitoring platform. Recently installed systems all use communication devices that rely on newer technology than the 3G network, but older devices rely on the 3G network. The last communication devices relying on the 3G technology were installed in mid-2020.

As explained above, of these systems that rely on the 3G network, approximately 75% are owned by companies under the TPO model. However, 4,964 homeowner-owned or Green Bank-owned systems rely on the 3G network. It costs roughly \$500 to replace each communication device. The systems owned by companies under the TPO model are legally required to maintain communication with the monitoring platform and are in the process of replacing the communication devices to ensure that they are still eligible for future RSIP incentive payments. However, while legally obligated to maintain communication, the homeowners have little to motivate them to pay for the cost of upgrading the communication devices. Thus, we expect that these systems would no longer communicate their generation to the monitoring platform after the 3G sunset unless action is taken by the Green Bank to install new communication devices.

The continued communication of the devices is crucial to the Green Bank because the solar generation provided from each system to the home also produces Solar Home Renewable Energy Credits (SHRECs). Per statute (i.e., CGS 16-245ff), the Green Bank collects all of the SHRECs produced. The investor-owned utilities in Connecticut, Eversource and United Illuminating, are required to enter into 15-year master purchase agreements with the Green Bank to purchase the stream of SHRECs produced, allowing the utilities to comply with their clean energy goals under the renewable portfolio standard (Class I). The Green Bank then creates Green Bonds from the SHREC revenues, which are sold to investors. The Green Bond proceeds, along with the SHREC revenues are used to support on-going solar incentives through the RSIP, cover administrative costs, and cover financing costs. These allow the Green Bank to achieve its mandate of 350 megawatts of solar photovoltaic deployment by 2022 and the development of a local solar installation industry.

Accordingly, the Green Bank plans to install new communication devices in all 4,964 systems that are affected by the 3G sunset. All of these systems are on the AT&T and T-Mobile networks, with 83% of the affected systems on the AT&T network. However, there are serious logistical challenges to replacing 4,964 communication devices by late February or early March 2022. The Green Bank is already underway in beginning the process of installing the new communication devices. Yet it takes a contractor time to visit each home to replace each device, and at around \$500 per system, it requires a very substantial upfront capital outlay for the Green Bank.

One promising avenue to help overcome these logistical challenges would be to stagger the installation of the communication devices for the 4,964 homeowner-owned affected systems over several years. However, a reliable estimate would be needed for the generation of the systems that do not yet have a new communication device at the time of the 3G sunset. Thus, the author of this memo, Prof. Kenneth Gillingham of Yale, has been tasked with developing an empirical approach to *reliably estimate* the generation of the impacted systems affected by the 3G sunset. This memo lays out the details of the approach.

Conceptual Explanation of the Approach

The goal of this exercise is to provide a methodology to estimate the generation for each 3G sunset-affected solar system after the sunset. The focus is on estimating the generation at the monthly or quarterly level for each impacted system. In a sense, this exercise is somewhat

analogous to the “deemed savings” approach used in utility regulation (e.g., for energy efficiency investments). However, it is using actual data from local devices to demonstrate the accuracy of the methodology, rather than engineering estimates.

The primary data source available for this estimation is from the monitoring platform (Also Energy) and cover the period 2014 to mid-2021. These data provide hourly generation in kilowatt hours (kWh) for each system in Connecticut that received an RSIP incentive. The secondary data source includes the characteristics of each system, including the date it was installed, estimated generation at the time of installation, and location.

At a high level, the approach estimates generation for each impacted system based on the historical generation from that system and the concurrent generation by nearby systems. The approach also brings in data on the characteristics of each impacted system and the nearby systems, although these data are less crucial for the estimation. The estimation is performed at an hourly level and the results are aggregated up to the month and quarter.

An important challenge in the estimation is that many systems are not communicating with the monitoring platform for some fraction of the days in each year. Thus, the problem lends itself to a “two-part” estimation approach.

The first part estimates the generation for each impacted system on days when the system is generating electricity during all normal hours in the middle of the day. Using this estimate alone would underestimate the total generation of any system that has days where the system is intermittently communicating with the monitoring platform, and thus is still producing some electricity.

The second part estimates the solar generation on these days when the systems are imperfectly communicating with the monitoring platform. This estimation is performed using historical data from each impacted system. It may be surprising, but the probability of a noncommunication event appears only very loosely related with the age of the system (or the noncommunication events of other systems), so the most effective modeling approach focuses just on historical data for each system. The final total estimated generation is calculated as the estimated generation from the first part of the approach plus the additional generation from the second part of the approach.

For any given system, this final estimated generation will be an underestimate or overestimate, but when aggregated into groups of systems, or tranches, the approach aims to provide a reliable estimate of the group total generation. The “tranches” used could be the six tranches designed by the Green Bank or could be some other grouping.

This approach lends itself to a true-up or reassessment on a periodic basis. For the systems that receive a new communication device, the recent historical generation can be communicated (meters hold up to two months of production data), and thus for at least part of the period, the actual generation can be compared to the estimated generation. Furthermore, the estimated generation that is being communicated going forward can be compared to the actual generation, providing a further check on the estimation results. In addition, at the end of each year, the tranche total can be recalculated including the systems with the new communication devices to

ensure that the estimate with the new data from these new devices does not change appreciably from the estimate without these data.

To assess the reliability of this methodology, one can break the existing data sample into a model estimation or “training” sample and a “validation” sample. The data for the impacted systems in the validation sample are ignored in estimating the parameters of the model. Thus, the validation sample serves as a proxy for the “future” generation for testing purposes and the estimated values in the validation sample can be compared to the known true values. The next section discusses the results, followed by a technical appendix with further details on the approach.

Results

Estimation Part I: Modeling System Generation

In the first part of the estimation approach, the goal is to model the generation of a system. Thus, after some straightforward data cleaning (which is detailed below in the appendix), the training and validation samples were designated. For the validation sample, I set aside the 2020 and 2021 data for the impacted systems. The model is then estimated assuming those data did not exist. Thus, the training sample used for model estimation includes all historical data prior to 2020 and the data from 2020 and 2021 for the non-impacted systems. Note that this is only one of many ways to designate the training and validation samples. It was chosen for the simplicity and transparency. Other validation approaches, such as forward-chaining cross-validation could be appropriate for this setting and could be explored too.

Thus, the results shown here are focus on the period of 2020 and 2021. They are also for a representative, randomly drawn sample of systems across Connecticut. The sample is restricted to days that have nonzero generation in the peak hours of the day (e.g., noon to 2pm). Note that even if the day is extremely overcast and raining, there will be at least a small amount of generation from the system during those hours. It might be 0.001 kWh, but it will be nonzero. Thus, this filter allows me to distinguish between days when the systems are not communicating with the monitoring platform, perhaps because they are broken down or the monitoring device is not working properly.

A first finding is that the model appears to fit the data extremely well. For most systems, the R-squared, which is a measure of the fit of the model, appears to be extremely high and in most cases is above 0.95 (where zero is a very poor fit and one is a perfect fit). To illustrate this visually, I randomly pick an impacted homeowner-owned solar system (RPV-02888). This system is an 9.75 kW system (nameplate rating) that was installed in 2014.

Figure 1 presents an example of the reliability of the model by showing the generation from the solar system on a typical day for an individual system in the training sample (July 16, 2019) to illustrate the power of the model to match the data within-sample. The results from the model and the true generation are shown so that they can be easily compared.

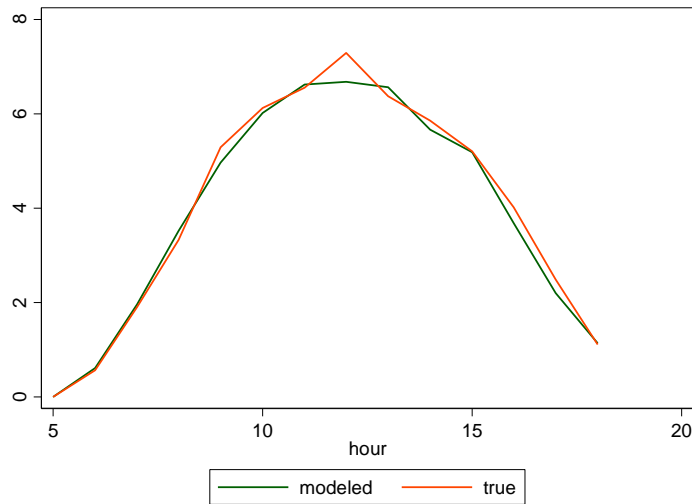


Figure 1. In-sample predictive power shown for RPV-02888 on July 16, 2019

However, the goal of the exercise is out-of-sample prediction. Thus, Figure 2 presents the generation from the solar system on a typical day for the same system in the validation sample (July 16, 2020). Again, the results from the model and the true generation are presented.

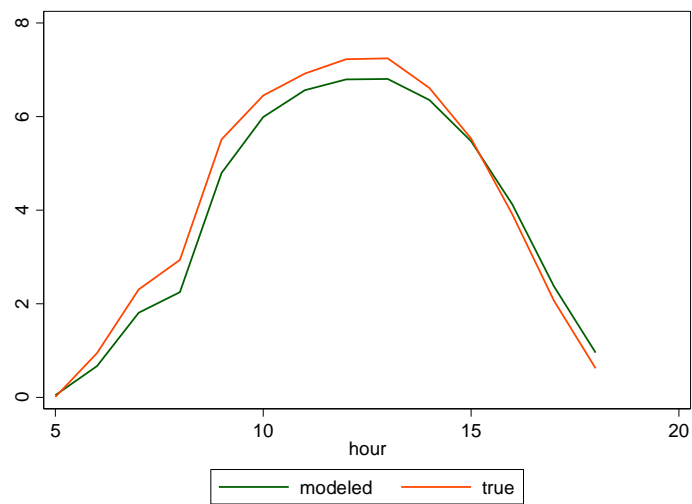


Figure 2. Out-of-sample predictive power shown for RPV-02888 on July 16, 2020

As is clear in both Figure 1 and Figure 2, for at least this illustrative example, the model can fit the data quite well. The modeled results are very similar to the true generation and the pattern over the day matches closely.

Of course, those are just the results for a single randomly-drawn system and a single day. Table 1 presents the results across the entire validation period for a sample of 165 systems randomly drawn in Connecticut. The totals for all of the 165 systems for each quarter are shown in each row, along with the difference between the two and the percent difference. **The key takeaway is the percent difference is on the order of 0.01%.**

year	quarter	Modeled total generation (kWh)	True total generation (kWh)	Difference (kWh)	Percent difference (%)
2020	1	72,243	72,190	53.7	0.07
2020	2	153,538	153,397	141.4	0.09
2020	3	83,976	83,838	137.9	0.16
2020	4	29,047	29,038	8.4	0.03
2021	1	57,717	57,643	73.9	0.001
2021	2	18,993	18,982	11.2	0.06
Total		415,514	415,087	426.5	0.01

In summary, Part I of the estimation approach works extremely well for estimating out-of-sample electricity generation for days where the generation is being successfully communicated to the monitoring platform. Additional tests with other subsamples are consistent with this result. In short, when a solar system is working, its generation can be very reliably estimated.

Estimation Part II: Modeling Noncommunication Events

A remaining challenge is that solar systems occasionally stop communicating with the monitoring platform. While there are many ways to define a noncommunication event, this analysis continues to define such an event based on whether the day has zero generation reported to the monitoring platform in the peak hours of the day (e.g., noon to 2pm). Specifically, a noncommunication event is defined as a zero in either the noon hour or the 1pm hour. Note that this definition is somewhat inclusive and will catch systems that are actually broken down, as well as systems that are still generating electricity, but simply have a short-term communication issue with the monitoring platform.

What is crucial for this exercise is that when these systems are communicating a zero to the monitoring platform in at least some of the key hours of the day, it is extremely difficult to estimate the reported generation based on historical generation and concurrent generation from nonimpacted systems. Yet, as discussed above, there is still some electricity generation on some of the days that have been intermittently communicating with the monitoring platform. Ignoring this electricity generation would lead to a systematically underestimated total electricity generation in a quarter or year.

One can overcome this issue by modeling the electricity generation during noncommunication events (i.e., zero generation communicated to the system during peak hours of a given day) separately from the generation on all of the other days. If the days with noncommunication events are ignored entirely, the generation estimate from Part I would still be fairly accurate but would underestimate total generation because there is at least some generation during the days that have such noncommunication events. Thus, the goal of the Part II of the estimation is to model the average daily generation by quarter during the days that have a noncommunication event.

In presenting the results, first we present the percentage of days where a noncommunication event occurs. This again uses the definition above: days when at least one of the peak hours of the day (noon to 1pm and 1pm to 2pm) communicates a zero to the monitoring platform. The average percentage of days with a noncommunication event in the impacted sample is 3.5% and most systems have a very small number of noncommunication events (if any), but some systems seem to have many noncommunication events. Figure 3 presents the fraction of days where a noncommunication event occurs for the impacted systems by year. The percentage tends to hover around 3 or 4%.

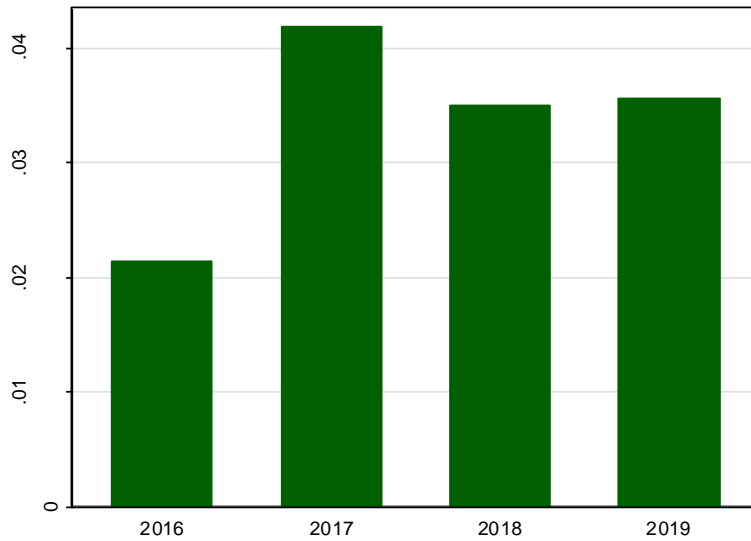


Figure 3. Fraction of days with a noncommunication event across the years in the training sample.

The next step in the analysis is to calculate the solar generation on the days that have noncommunication events. This generation is extremely hard to estimate at an hourly level, but at a quarterly level there appear to be consistent patterns when the data are examined in aggregate. Figure 4 shows these patterns in aggregate by presenting the solar generation on noncommunication event days by quarter over the training sample.

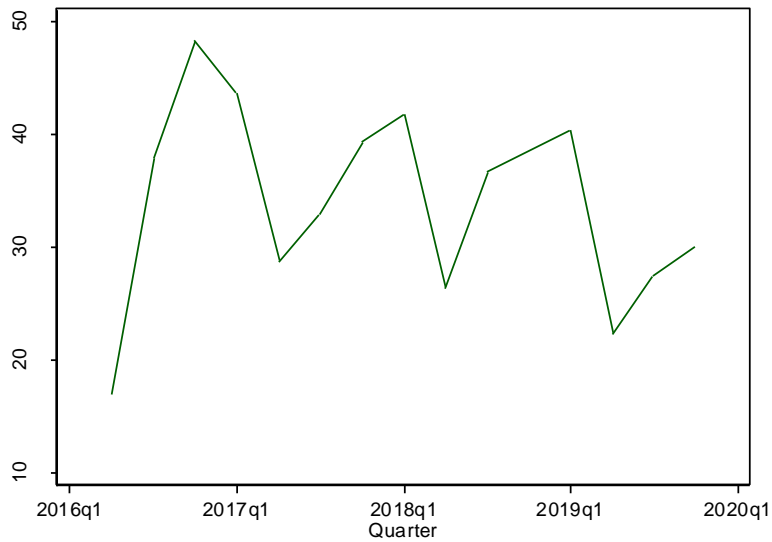


Figure 4. Solar generation from impacted systems during noncommunication event days in the training sample

A key take-away from Figure 4 is that the amount of generation from noncommunication events is both quite small and is decreasing over time. Thus, the bias from not including it in the overall calculations may be fairly small. Figure 5 emphasizes this further by plotting the solar generation on normal days and noncommunication event days for the impacted systems. The solar generation for the normal days dwarfs the generation during the noncommunication event days.

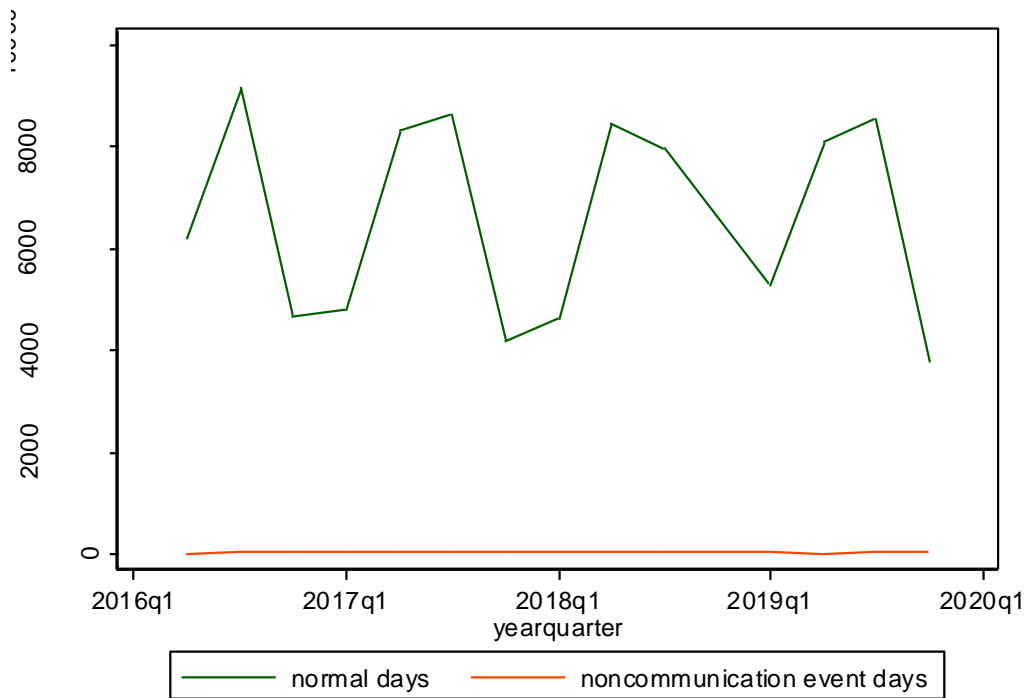


Figure 5. Solar generation from impacted systems during normal days and noncommunication event days in the training sample

This finding suggests that the level of generation lost by not accounting for the noncommunication event days is minimal. In fact, the generation during the noncommunication event days is less than 1% of the generation in the normal days in every quarter (in most quarters is it less than 0.4%). The extra generation from the noncommunication event days could be added to the total for any given grouping (e.g., a tranche) to improve the tranche’s estimate, but the bias would be minimal if this additional generation is ignored.

All of the results so far have been in aggregate, and they suggest that noncommunication events are minor issue. One worry might be that a small number of systems have a very large issue due to noncommunication events. For example, some systems may have issues with their communication device and thus have a higher fraction of their generation on noncommunication event days. Table 2 presents the detailed summary statistics of the fraction of the normal day generation that is the noncommunication event day generation (for all of the impacted systems). A value of 1 indicates that the generation on noncommunication event days equals the generation on normal days. Any values larger than a small fraction (maybe 0.1) suggest an issue with the communication device on that system.

Table 2. Summary statistics for fraction of normal day generation that is noncommunication event day generation	
Percentiles	Value
1%	0
5%	0
10%	0
25%	0.00004
50% (Median)	0.0001
75%	0.0003
90%	0.0008
95%	0.0017
99%	1.7
Mean	0.036
Standard deviation	0.334

Table 2 clearly shows that all but a small number of the impacted systems have the noncommunication event days making up a very tiny fraction of generation. For example, the 95th percentile indicates that noncommunication event days generation is only 0.17% of normal day generation. A small number of the systems (in the 98th percentile and up) have major issues with communication. Of the impacted systems, this turns out to be about 60 systems. These systems appear to systematically have issues and can be prioritized for the replacement of their communication devices.

There are also a very small (on the order of 10) systems that did not have issues in previous years and yet have notable communication issues in the validation sample of 2020 and 2021. Such

communication issues cannot be predicted and would impart a small amount of bias in the estimation methodology.

This then raises the final question: how reliable is the combined approach for calculating the total solar generation if only the Part I of the estimation approach is used and the generation from the noncommunication event days is ignored (or added in at the end at the group level)? The next section addresses this question.

Combined Estimation

The evidence presented thus far lends itself to a combined estimation approach using the total solar generation from the Part I approach for the generation of each system – simply ignoring the noncommunication event days. Using the sample of 165 randomly-drawn systems, the results indicate that over 95% of the systems have the modeled generation within 1% of the true generation if the noncommunication event days are ignored. Aggregating these results up using this approach would lead to a slight underestimate of the total generation of less than 5%. This underestimate could be addressed at an annual true-up period.

Appendix

Data Cleaning

The raw data from the Locus platform (Also Energy) came with a few idiosyncrasies. The first task in the project was to perform some data cleaning for data integrity purposes. The data cleaning consisted of the following:

- Removing duplicate observations
- Removing nighttime hours, which always have zero generation
- Realigning the hours, since the hour-of-the-day index appears off by four hours based on the generation profiles. With the realigned hours, the peak generation (on average) is in the middle of the day.
- Coding as missing obviously miscoded electricity generation estimates. The rule of thumb used here is to code any hour that has generation greater than 1.5 times the PTC-rated system size. While the system size is rated in kilowatts (kW), it is impossible for a system to consistently produce over an hour a much larger number of kW than the rated system size. If there are conditions that are ideal for solar generation, there could be somewhat higher production than under the test conditions, but it is unlikely that the production is too much higher. Some of the systems had generation values at times that were many multiples of the system size for that system. These outliers are best coded as missing. This recoding effectively removes less than 0.05% of the full 2014-2021 sample (about 270,000 observations out of 547 million).
- Creating a new index for a system based on the RPV project number and the node, since a small number of RPV systems appear to have multiple nodes, each with their own generation. For these systems, I cannot use the system characteristics, as it is unclear how to attribute the characteristics to the nodes.

Estimation Approach Details

The two-part estimation approach described above models normal days with no noncommunication events separately from days with noncommunication events. The results indicate that the model is extremely reliable for estimating solar generation for normal days and that noncommunication event days—while being only a small percentage of the days and an even smaller percentage of total generation—can also be modeled reasonably well.

First Part: Modeling Solar Generation on Normal Days. The estimation problem for normal days is a classic “prediction” problem. We know quite a lot about how each impacted system has performed in the past and we also know quite a lot about how other nearby nonimpacted systems are currently performing, and we would like to predict the generation of the impacted system. This requires a model of the following sort:

$$Gen_{it} = f(Gen_{-it}, X_i, X_{-i}, \gamma_i, \mu_t)$$

Where the solar generation of the impacted system i at time t is given by Gen_{it} , and is modeled as a function of a vector of the solar generation of all other non-impacted systems at the same time Gen_{-it} , as well as a vector of characteristics of the systems X_i , a vector of characteristics of the other non-impacted systems X_{-i} , time-invariant factors specific to the system γ_i , and factors that vary over time that affect all systems (such as the weather in Connecticut) μ_t . All of these variables have potential to explain the variation in the solar generation by the impacted system, and the goal of the exercise is to provide the most accurate out-of-sample prediction possible.

There are several possible approaches to this prediction problem. The classic simple approach is to simply assume a linear relationship between each of the variables in the function f and the solar generation from the impacted system. Furthermore, variables that seem to provide very little information, such as the solar generation from systems on the other side of Connecticut from the impacted system, are not likely to be useful to include in estimating the model. Similarly, some combinations of variables, such as the difference in the characteristics between the impacted system and the characteristics of other non-impacted systems (e.g., the difference in system size). Thus, the fastest and most transparent approach to estimating the parameters of the model (which are then used for prediction) is to simply assume a linear relationship and restrict the variables used to the most relevant ones—such as the generation of systems that are in the same municipality as the impacted system or systems that are the same size as the impacted system.

Assuming a simple linear relationship implies that the empirical specification is as follows:

$$Gen_{it} = \sum_{j \neq i} \beta_j Gen_{jt} + X_i \beta_X + X_{-i} \alpha_X + \gamma_i + \mu_t + \epsilon_{it}.$$

In this specification, ϵ_{it} is a mean-zero error term.

It may be possible to improve upon this approach for out-of-sample prediction by using machine learning approaches. These approaches work best when the data set is very large and there are

many variables to choose from. They work by using different decision rules to select the set of variables that are the most useful for explaining the solar generation of the impacted system. They can be prone to overfitting at times. And just as in the linear regression approach, the out-of-sample prediction may be poor if there are important underlying factors that influence the solar generation of the impacted system that remain unmodeled. Some examples of machine learning approaches include random regression forests, lasso regression, XGBoost, and neural networks. In general, machine learning makes greater use of the data and can be expected to perform better at classic prediction problems than linear regression, but this comes at a cost of greater computational burdens. The run time for these approaches is substantially longer than the run time using the linear regression approach.

For this project, all options were explored on randomly drawn subsamples. Machine learning indeed takes much longer to run than linear regression approaches—often 5 times or more as long. Yet the simple linear regression approach works extremely well in this context, as the out-of-sample prediction error shown above in the results section was very small (<0.1%). Thus, this project relies on the linear regression.

The choice of variables to include in a linear fashion in the linear regression approach is also an important question. Adding further variables with little explanatory power slows down computation but may not improve out-of-sample prediction accuracy. The results shown above use the generation of up to 200 nonimpacted systems in the same municipality as the impacted system (the first 200 are chosen, as the gains to optimally choosing the systems appear to be minimal). If the municipality only has a few systems, then nonimpacted systems in the same county are used.

This approach leverages the solar generation of many nearby nonimpacted systems to model the generation of the impacted system. In addition, the model includes year-month-day fixed effects and system fixed effects. The year-month-day fixed effects capture the overall weather in each day that influences all systems and the system fixed effects capture anything idiosyncratic and systematic (time invariant) about a system. It is possible to add system characteristics and differences in system characteristics, but these seem to add very little explanatory power, so for the sake of computational speed (and in some cases perfect collinearity), these variables are not used in the final specification used for estimation. In short, just the generation of a couple hundred nonimpacted systems within the same municipality does extremely well in fitting a model that can be used for out-of-sample prediction of the solar generation of the impacted system.

Thus, the final specification that appears to do very well for out-of-sample prediction accuracy is the following linear model:

$$Gen_{it} = \sum_{j \neq i} \beta_j Gen_{jt} + \gamma_i + \mu_t + \epsilon_{it}.$$

Here $j \in J$, where J is the set of the first 200 nonimpacted systems in the same municipality (or county), where the sorting is based on RPV project number. The RPV numbers are assigned roughly based on the timing of adoption, so this approach uses generation by more of the older systems in the municipality (or county) that have a larger data sample to work with. One minor

note is that if a nonimpacted system has more than two noncommunication event days it is not included in set J , which assures that we use as complete of a panel data set as possible.

Second Part: Modeling Noncommunication Event Days. The goal of the second part is to characterize and estimate the generation that does occur on noncommunication event days. As was shown in the results section above, nearly all generation will be on normal days, but for a small percentage of the systems, solar generation on noncommunication event days can be a reasonable fraction of the solar generation on normal days.

As discussed before, the noncommunication event days are defined as days where there is a zero generation input into the monitoring platform from the hours of either noon-1pm or 1pm-2pm. The methodology thus consists of flagging the noncommunication event days and calculating the generation on those days. This calculation of noncommunication event day generation for each system – and for the group of systems as a whole – for the training period can then be compared to the validation sample’s noncommunication event day generation. As long as the likelihood and timing of noncommunication events does not change appreciably over a several year period, this simple approach should successfully estimate the noncommunication event day generation, especially at the group level. It appears that the fraction of days with a noncommunication event is relatively constant over time (as was shown in Figure 3), and not surprisingly, the average generation per system from noncommunication events is also relatively constant over time.

Thus, to summarize, the proposed methodology for the small amount of generation on noncommunication event days that would be missed by using only the Part I of the estimation approach is simply to calculate the average generation (per system or per group) from these noncommunication event days in the training period. This generation per system or group of systems could then be added to the results from Part I to reduce the underestimation of solar generation from that using that approach alone. Efforts to use a more sophisticated methodology (e.g., modeling by age or other characteristics of the system) showed very little improvement in estimation accuracy over this simple and transparent approach.

Short Biography

Kenneth Gillingham is a Professor of Economics at Yale University, with a primary appointment in the School of the Environment and secondary appointments in the Department of Economics and School of Management. He is also a Research Associate at the National Bureau of Economic Research. In 2015-2016 he served as the Senior Economist for Energy and the Environment at the White House Council of Economic Advisers. He has published widely on consumer decisions and policy in the energy sector in top journals in economics and science. His work focuses on the adoption of new energy technologies, energy efficiency, and transportation energy use. He is an Associate Editor at the Review of Economics & Statistics and is on the editorial boards of the Energy Journal and Energy Efficiency. His research has been funded by National Science Foundation, U.S. Department of Energy, and the U.S. Environmental Protection Agency. He was a Fulbright Fellow in New Zealand and has also worked at Resources for the Future, the California Air Resources Board, and Pacific Northwest National Laboratory. He received a Ph.D. in Management Science & Engineering and Economics, as well as M.S. degrees in Statistics and Management Science & Engineering from Stanford University, and an A.B. in Economics and Environmental Studies from Dartmouth College.

**PROPOSED CHANGES TO NEPOOL GENERATION INFORMATION SYSTEM
OPERATING RULES**

CONNECTICUT GREEN BANK RESIDENTIAL ROOFTOP SOLAR METERING

Rule 2.1 Creation of Certificates

(e) Meter data for Non-NEPOOL Generators, Included Generators, Non-NEPOOL Generator Representatives and BMG Resources shall either (x) meet the requirements of ISO New England Operating Procedure No. 18 or (y) satisfy either (i) the requirements of any applicable state regulations for metering standards or (ii) the following metering standards (the applicable state metering standards described in clause (y)(i) and the following metering standards are collectively referred to as the “Small Generator Metering Protocol”).

Minimum Meter Accuracy		
Meter Accuracy: Only "revenue grade" (also called "revenue quality") meters tested and certified to ANSI C-12 standards are allowed. Minimum accuracy and other requirements, based on nameplate capacity, are as follows:		
Nameplate Capacity	Minimum Meter Accuracy (all values are +/-)	Other Requirements
Up to 10 kW	2% (ANSI C-12.1-2008)	Electromechanical meters may be used. Refurbished meters, if retested and certified, may be used. Allowable configurations for meters are : <ul style="list-style-type: none"> • Single-phase 120 volt - Form 1S, Class 100 • Single-phase 240 volt - Form 2S, Class 200 • Three-phase 120 - 480 volt - Form 14- 16S, Class 200 Meters used as part of a Data Acquisition System (“ <u>DAS</u> ”) must meet the "Greater than 10 kW and up to 1 MW" nameplate capacity requirements below.
Greater than 10 kW and up to 1 MW	1% (ANSI C12.16 or better)	Only new solid state meters are allowed. Current transformers (“ <u>CTs</u> ”) must conform to the 0.6% (ANSI/IEEE C57.13-2008) accuracy class, or the meter must be tested using the CT and certified to meet the minimum accuracy requirement.

Greater than 1 MW	0.5% (ANSI C12.20-2010)	Only new meters are allowed. CTs must conform to the 0.3% (ANSI/IEEE C57.13-2008) accuracy class.
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Notwithstanding the foregoing, until July 1, 2026, generation data for solar photovoltaic systems included in the Residential Solar Investment Program administered by the Connecticut Green Bank (“RSIP Generators”) may either be metered as described above or be provided to the GIS Administrator by the Connecticut Green Bank via a secure internet portal and using an estimation methodology approved the Connecticut Green Bank from time to time (the “RSIP Estimation Methodology”).

* * * *

Rule 2.5 Sources of Generation Data

(b) Generation and conservation data used in the development of Certificates for NEPOOL Generators and DR Resources, respectively, shall be obtained from the ISO and will be based upon the monthly settlement statements issued by the ISO, as adjusted (subject to the last sentence of this Rule 2.5(b)) to reflect meter reconciliation and data corrections (“MMAs”) under Section 6 (Data Reconciliation Accounting) of Manual M-28 or any successor thereto prior to the Creation Date for the applicable Certificates. Such Certificates will therefore reflect any unit output adjustments initially made by the ISO in such settlement statements prior to such Creation Date. Generation data used in the development of Certificates for Non-NEPOOL Generators, Included Generators, BMG Resources and Non-NEPOOL Generator Representatives shall be provided to the GIS Administrator by either (x) such Non-NEPOOL Generator, Included Generator, BMG Resource or Non-NEPOOL Generator Representative in accordance with the procedures established in ISO New England Operating Procedure No. 18 or any successor thereto or in accordance with the Small Generator Metering Protocol or (y) for those states which require that a Third Party Meter Reader provide generation data and for those resources that are subject to Rule 2.5(j), by a Third Party Meter Reader in accordance with paragraph (j) of this Rule 2.5 or (z) for RSIP Generators, either as described above or by the Connecticut Green Bank using the RSIP Estimation Methodology as provided in Rule 2.1(e). Conservation data used in the development of Certificates for C&LM Resources shall be provided to the GIS Administrator by either the C&LM Resource or the applicable Fund Administrator representing such C&LM Resource. Generation data used in the development of Clean Peak Energy Certificates shall be provided to the GIS Administrator by the CPS Program Administrator. ISO’s Requested Billing Adjustment (“RBA”) data shall be available to Account Holders through their accounts, but such data shall not be used in the creation of Certificates.

* * * *

Rule 5.4 Publicly Available Reports

(e) The publicly available reports posted on the GIS Administrator's website shall include an aggregation and/or average, as appropriate, of the Certificate fields for all Certificates created during the quarterly or annual reporting period. Such reports shall aggregate data separately for NEPOOL Generators, Importing Account Holders, Non-NEPOOL Generators, Included Generators, C&LM Resources, BMG Resources, Class III Cogeneration Resources, DR Resources, MAPS CHP Resources, MAPS Useful Thermal Resources, NH Useful Thermal Resources, NH Biodiesel Producers, Maine Thermal Resources, Clean Peak Resources and Non-NEPOOL Generator Representatives and shall also include data aggregated for all GIS Generators and Importing Account Holders and data aggregated by originating control area (if other than ISO New England) and RPS or APS eligibility for all Imported Unit Energy. Those reports shall include the aggregate and/or average, as appropriate, of the Certificate fields for all Residual Mix Certificates, all Reserved Certificates, all Certificates assigned to state-specific subaccounts and all Certificates associated with Energy exported from the New England for the quarterly or annual reporting period as well. Those reports shall also include a listing of all Third Party Meter Readers for the time period covered by each such report ~~and the number of Certificates issued using the RSIP Estimation Methodology during the time period covered by each such report.~~ In addition, those reports shall be capable of being sorted by the state of origination and settlement, by eligibility for RPS and APS programs, and by fuel type for all such Certificates for the time period covered by each such report.

* * * *

Appendix 1.1

FUNCTIONAL REQUIREMENTS

2. Sources of Generation Information for GIS.

The ISO currently provides monthly settlement statements to all Market Participants that take part in the wholesale electricity markets administered by the ISO, through the MSS. Those monthly statements are based on hourly load and supply assignments for all market participants as produced by the ISO's markets software. The initial generation credits produced by the real-time dispatch of generation based on telemetered data are modified by revenue quality meter readings that are submitted within 48 hours of the close of each day's market. The MSS also produces hourly scheduled Energy flows of imports and exports over the external ties to and from the New England Control Area. Those tie-lines connect to New Brunswick (1), Quebec (2), and New York (8). Small wholesale generators that are not telemetered as part of the real-time wholesale market but that request inclusion in the MSS database are included in the overall MSS database based on revenue-quality meter readings. Those readings are submitted within 48 hours of the close of each day's market.

The basic MSS database maintained for financial settlement purposes will provide the initial set of inputs for hourly generation credits by resource for NEPOOL Generators in the GIS database. In addition, labor characteristics and possibly some other characteristics that are not kept in the MSS, as well as generation information for Non-NEPOOL Generators, Included Generators, C&LM Resources, BMG Resources, Non-NEPOOL Generator Representatives and Clean Peak Resources, may be provided directly to the GIS Administrator by the GIS Generators or by certain regulatory [or other governmental](#) agencies, Third Party Meter Readers or the CPS Program Administrator.

* * * *

5. Production of Certificates.

The GIS Administrator will produce Certificates based on the hourly generation information from the settlements database and/or from information provided by GIS Generators ~~or~~ Third Party Meter Readers [or governmental agencies](#). The certificates will be numbered and may or may not include additional information from the other fields in the GIS database. Each certificate will provide sufficient information (or access to information in the GIS database) so that a participating Person will be able to determine, in combination with other Certificates, its ability to comply with Attribute Laws.¹

The owner for each generator whose output is settled through the ISO wholesale Energy market will receive from the GIS Administrator a quarterly statement of the Certificates created by its quarterly generation. In addition, the GIS will reflect end-of-the-month adjustments to meter reads and Load Asset values effected by the ISO.

* * * *

Appendix 5.3

REGULATORY AGENCIES

State Renewable Funds

Rhode Island Office of Energy Resources

Connecticut ~~Clean Energy Finance and Investment Authority~~ [Green Bank](#)

Massachusetts Clean Energy Technology Center as Administrator of Massachusetts Renewable Energy Trust and CPS Program Administrator

Maine State Planning Office as Administrator of Maine Renewable Resource Fund

New Hampshire Renewable Energy Fund

¹ It is not intended that the GIS will impact the allocation of generation attributes under bilateral agreements.

MEMORANDUM

TO: NEPOOL Markets Committee

FROM: Paul Belval, NEPOOL Counsel

DATE: January 5, 2022

RE: NEPOOL Generation Information System Modifications
Energy Storage, Connecticut Green Bank Residential Rooftop Solar Metering and
Clarification of Dual Fuel Reporting

At its January 11/12, 2022 meeting, the NEPOOL Markets Committee will be asked to consider and vote on changes to the NEPOOL Generation Information System (“GIS”) and the GIS Operating Rules (the “Rules”) relating to (i) the treatment of energy storage resources in the Rules, (ii) metering for certain residential solar generating systems administered by the Connecticut Green Bank (“CGB”), and (iii) clarification of fuel split and emission entry submissions in the GIS. This memorandum describes each of the proposed changes, and the changes to the Rules are included in the attachments to this memorandum.

The Markets Committee referred each of these proposed changes to the NEPOOL GIS Operating Rules Working Group (the “Working Group”) at its October 14 meeting. The Working Group met by teleconference on October 29 to discuss the changes, and the proposed Rule changes were circulated to the Working Group after that teleconference. No member of the Working Group objected to the changes to the GIS or the Rules.

Energy Storage Facilities

Currently, energy storage facilities are addressed in the Rules to a limited extent, as follows:

- Energy storage systems that meet the qualifications of a Massachusetts Clean Peak Resource are eligible to receive Clean Peak Energy Certificates in the GIS;
- Flywheel storage systems may receive Massachusetts Alternative Portfolio Standard-eligible Certificates; and
- Pumped storage facilities are treated as neither generation nor load in the GIS; instead, there is a separate account in the name of the Administrator for the Certificates Obligation created by the difference between the energy used for pumping at those facilities and the energy generated at those facilities.

Other than those instances, energy storage is not explicitly addressed in the Rules.

The changes to the Rules proposed by APX, Inc., the GIS Administrator, which are included as Attachment 1, would handle energy storage in the same manner as pumped storage resources, as described above. Also, Appendix 2.4—*GIS Certificate Fields* of the Rules would

be revised to remove the asterisks on Energy Storage indicating eligibility for Renewable Certificates.

The GIS Agreement, as amended in October 2020, provides that APX will perform up to 500 hours of development work for enhancements to the GIS each year without additional cost. APX has stated that these changes will not require it to use any of the development time for 2022.

The following resolution could be used to adopt the changes to the Rules related to energy storage facilities:

RESOLVED, that the Markets Committee adopts the changes to the NEPOOL Generation Information System and the NEPOOL Generation Information System Operating Rules proposed and discussed at this meeting, which changes relate to the treatment of energy storage resources in the Rules [with such changes thereto as were discussed at this meeting and] with such non-material changes thereto as the Vice Chair of the Markets Committee may approve.

Residential Solar System Metering

CGB has proposed changes to the metering arrangements for certain residential solar generators in the Connecticut Residential Solar Investment Program (“RSIP”). For the generators in the RSIP, meter data is currently collected and aggregated using cellular telecommunications technology that is incorporated into each solar generating system. For certain of the systems installed prior to 2020, the telemetering technology uses 3G capability, and the major cellular carriers have announced plans to phase-out 3G technology by the end of 2022. CGB has plans to replace the telemetering equipment on roughly 5,000 homeowner-owned systems in its RSIP that are impacted by this change, but it expects to need several years to accomplish that switchover. CGB states that there are up to 30,000 third-party owned solar systems that have outdated 3G technology that will need to be replaced in order for the performance of the solar system to be communicated to CGB.

The proposed changes to the Rules included in Attachment 2 would allow CGB to use a predictive model using actual performance data to calculate the generation of the impacted RSIP systems for the purpose of creating Certificates in the GIS. The number of Certificates issued using this approach would be included in the publicly available reports in the GIS. Finally, the proposed changes would update the name of CGB from its prior name in Appendix 5.3 to the Rules. APX has stated that these changes will not require it to use any of the 500 hours of development time for 2022.

The following resolution could be used to adopt the changes to the Rules related to metering for RSIP systems:

RESOLVED, that the Markets Committee adopts the changes to the NEPOOL Generation Information System and the NEPOOL Generation Information System Operating Rules proposed and discussed at this meeting, which changes relate to the estimation of residential rooftop solar generation in the Connecticut Green Bank Residential Solar Investment Program [with such changes thereto as were discussed at

this meeting and] with such non-material changes thereto as the Vice Chair of the Markets Committee may approve.

Fuel Output and Emissions Reporting

Earlier this year, a NEPOOL Participant had requested a waiver of the Rules and the GIS Agreement in order to change incorrect information on its Certificates relating to the fuel sources used for a multi-fuel generating unit. While the waiver ultimately proved unnecessary, that NEPOOL Participant, Stored Solar J&WE, LLC, requested that the Working Group consider addressing the possibility of incorrect data entry in the creation of Certificates. At the Working Group's October 29 meeting, APX offered to propose some enhancements to the GIS to minimize confusion and provide additional confirmation details for the account holder when submitting and/or updating fuel output and emissions entries within the GIS. APX's proposed enhancements include:

- the change to Rule 2.5(d) included in Attachment 3 that would require an account holder to validate the output per fuel type or emissions data after that output or emissions data is initially submitted.
- automatically sending an email to the GIS account holder when fuel output and emissions data is submitted that includes the data that was submitted and reminding the account holder of the deadline to correct the data; and
- adding information to the account holder's "My Event Log" that will detail the fuel output and emissions data provided by an account holder.

APX, Inc. estimates that these changes will require 45 development hours to complete.

The following resolution could be used to adopt the changes to the Rules discussed above:

RESOLVED, that the Markets Committee adopts the changes to the NEPOOL Generation Information System and the NEPOOL Generation Information System Operating Rules proposed and discussed at this meeting, which changes relate to enhancements for fuel output and emission entries in the GIS [with such changes thereto as were discussed at this meeting and] with such non-material changes thereto as the Vice Chair of the Markets Committee may approve.

cc: NEPOOL GIS Operating Rules Working Group

**CHANGES TO NEPOOL GENERATION INFORMATION SYSTEM
OPERATING RULES RELATING TO ENERGY STORAGE RESOURCES**

Rule 4.3 Calculation of Certificates Obligation

(a) The GIS Administrator shall calculate on each Creation Date the Certificates Obligation of each Retail LSE for that Trading Period with MSS data for electrical load in the applicable calendar quarter obtained from the ISO, adjusted (subject to the last sentence of this Rule 4.3(a)) to account for any MMAs occurring prior to that Creation Date. The GIS Administrator shall determine a Retail LSE's Certificates Obligation by subtracting from such electrical load applicable to such Retail LSE that Retail LSE's entitlement or ownership share of Energy used for pumping at a pumped [storage facility or charging at a front-of-the-meter energy](#) storage facility owned by that Retail LSE or in which that Retail LSE has an Ownership Share during that calendar quarter (or the comparable figures for the transferor of that Retail LSE's Certificates Obligation), which shall be provided by the applicable Retail LSE at least five calendar days before the applicable Creation Date. Without limiting the generality of the foregoing, Forward Certificates will not satisfy a Certificate Obligation for any Trading Period prior to their Creation Date, APS Certificates and Clean Peak Energy Certificates will not satisfy a Certificates Obligation at any time, NH Class I Thermal Certificates and NH Biodiesel Producer Certificates will only satisfy a Certificates Obligation for a Retail LSE's New Hampshire Retail Subaccount, and Maine Thermal Certificates will only satisfy a Certificates Obligation for a Retail LSE's Maine Retail Subaccount. ISO's RBA data shall be available to Account Holders through their accounts, but such data shall not be used in the creation of Certificates Obligations.

* * * *

Rule 4.6 Energy Used for Pumped Storage [and Energy Storage](#)

In order to ensure a MWh-for-MWh match of Energy generated by GIS Generators and imported into the New England Control Area with Certificates created and assigned, a separate account (the "[Pumped Storage and Energy Storage Account](#)") will be created, with a separate Certificates Obligation for each calendar quarter equal to the excess of (x) Energy used for pumping at pumped storage facilities [and charging at front-of-the-meter energy storage facilities](#) in the New England Control Area during such calendar quarter over (y) Energy generated by such pumped storage [and energy storage](#) facilities during such calendar quarter. The GIS Administrator shall obtain figures for such amounts from the MSS. The Pumped [Storage and Energy](#) Storage Account shall not have an Account Holder associated with it. At the end of each Trading Period, Residual Mix Certificates shall be assigned to each MWh of Certificates Obligations in the Pumped Storage [and Energy Storage](#) Account.

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Appendix 1.1

FUNCTIONAL REQUIREMENTS

13. Pumped Storage and Energy Storage.

With respect to pumped storage and energy storage and generation, the real-time generation that runs the pumps or charges a front-of-the-meter energy storage resource will have certificates issued equal to the MWhs that the pumps or charges the energy storage resources, use. When the stored water at a pumped storage facility is released or the charged energy at a front of the meter energy storage facility is discharged, additional generation (~~about 30 percent less than the Energy that initially pumped the water~~) occurs that is sold into the wholesale market and ultimately to retail consumers.

In order to balance the total amount of Certificates assigned to retail loads with the total MWhs of generation, the losses associated with pumped storage (~~approximately 30 percent~~) and front-of-the-meter energy storage need to be addressed through the GIS Operating Rules.

While initially the emission reduction benefits of peak clipping from pumped storage and energy storage facilities and other load management programs will not be explicitly recognized in the GIS, the GIS Administrator will propose GIS Operating Rules to reflect the benefits they provide to the region after initial implementation.

* * * *

Appendix 2.4

GIS Certificate Fields¹

Part 1 – The following shall be the data field options for Fuel Sources⁶ (each GIS Generator and Importing Account Holder will select at least one) [bracketed references show state energy portfolio standard eligibility for the specific fuel type, subject in certain cases to additional requirements including without limitation size limits and in-service dates]: *

Energy storage system ~~that commenced~~

¹ Fields identified with an asterisk (*) will not change.

⁶ Fuel Sources identified with two asterisks (**) are eligible for Renewable Certificates, as described in Rule 3.5. Certificates created for a Zero Emissions Generator, as described in Rule 2.3, shall include a notation that such Certificates are “Emission Free-Generated Energy Certificates.”

Commenced commercial operation or provided incremental new capacity on or after January 1, 2019 that operates primarily to store and discharge renewable energy** [MA CPS]

Other

**CHANGES TO NEPOOL GENERATION INFORMATION SYSTEM
OPERATING RULES RELATING TO CONNECTICUT RESIDENTIAL SOLAR**

Rule 2.1 Creation of Certificates

(e) Meter data for Non-NEPOOL Generators, Included Generators, Non-NEPOOL Generator Representatives and BMG Resources shall either (x) meet the requirements of ISO New England Operating Procedure No. 18 or (y) satisfy either (i) the requirements of any applicable state regulations for metering standards or (ii) the following metering standards (the applicable state metering standards described in clause (y)(i) and the following metering standards are collectively referred to as the “Small Generator Metering Protocol”).

Minimum Meter Accuracy		
Meter Accuracy: Only "revenue grade" (also called "revenue quality") meters tested and certified to ANSI C-12 standards are allowed. Minimum accuracy and other requirements, based on nameplate capacity, are as follows:		
Nameplate Capacity	Minimum Meter Accuracy (all values are +/-)	Other Requirements
Up to 10 kW	2% (ANSI C-12.1-2008)	Electromechanical meters may be used. Refurbished meters, if retested and certified, may be used. Allowable configurations for meters are : <ul style="list-style-type: none"> • Single-phase 120 volt - Form 1S, Class 100 • Single-phase 240 volt - Form 2S, Class 200 • Three-phase 120 - 480 volt - Form 14- 16S, Class 200
		Meters used as part of a Data Acquisition System (“DAS”) must meet the "Greater than 10 kW and up to 1 MW" nameplate capacity requirements below.
Greater than 10 kW and up to 1 MW	1% (ANSI C12.16 or better)	Only new solid state meters are allowed. Current transformers (“CTs”) must conform to the 0.6% (ANSI/IEEE C57.13-2008) accuracy class, or the meter must be tested using the CT and certified to meet the minimum accuracy requirement.

Greater than 1 MW	0.5% (ANSI C12.20-2010)	Only new meters are allowed. CTs must conform to the 0.3% (ANSI/IEEE C57.13-2008) accuracy class.
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Notwithstanding the foregoing, until July 1, 2026, generation data for solar photovoltaic systems included in the Residential Solar Investment Program administered by the Connecticut Green Bank (“RSIP Generators”) may either be metered as described above or be provided to the GIS Administrator by the Connecticut Green Bank via a secure internet portal and using an estimation methodology approved the Connecticut Green Bank from time to time (the “RSIP Estimation Methodology”).

* * * *

Rule 2.5 Sources of Generation Data

(b) Generation and conservation data used in the development of Certificates for NEPOOL Generators and DR Resources, respectively, shall be obtained from the ISO and will be based upon the monthly settlement statements issued by the ISO, as adjusted (subject to the last sentence of this Rule 2.5(b)) to reflect meter reconciliation and data corrections (“MMAs”) under Section 6 (Data Reconciliation Accounting) of Manual M-28 or any successor thereto prior to the Creation Date for the applicable Certificates. Such Certificates will therefore reflect any unit output adjustments initially made by the ISO in such settlement statements prior to such Creation Date. Generation data used in the development of Certificates for Non-NEPOOL Generators, Included Generators, BMG Resources and Non-NEPOOL Generator Representatives shall be provided to the GIS Administrator by either (x) such Non-NEPOOL Generator, Included Generator, BMG Resource or Non-NEPOOL Generator Representative in accordance with the procedures established in ISO New England Operating Procedure No. 18 or any successor thereto or in accordance with the Small Generator Metering Protocol or (y) for those states which require that a Third Party Meter Reader provide generation data and for those resources that are subject to Rule 2.5(j), by a Third Party Meter Reader in accordance with paragraph (j) of this Rule 2.5 or (z) for RSIP Generators, either as described above or by the Connecticut Green Bank using the RSIP Estimation Methodology as provided in Rule 2.1(e). Conservation data used in the development of Certificates for C&LM Resources shall be provided to the GIS Administrator by either the C&LM Resource or the applicable Fund Administrator representing such C&LM Resource. Generation data used in the development of Clean Peak Energy Certificates shall be provided to the GIS Administrator by the CPS Program Administrator. ISO’s Requested Billing Adjustment (“RBA”) data shall be available to Account Holders through their accounts, but such data shall not be used in the creation of Certificates.

* * * *

Rule 5.4 Publicly Available Reports

(e) The publicly available reports posted on the GIS Administrator's website shall include an aggregation and/or average, as appropriate, of the Certificate fields for all Certificates created during the quarterly or annual reporting period. Such reports shall aggregate data separately for NEPOOL Generators, Importing Account Holders, Non-NEPOOL Generators, Included Generators, C&LM Resources, BMG Resources, Class III Cogeneration Resources, DR Resources, MAPS CHP Resources, MAPS Useful Thermal Resources, NH Useful Thermal Resources, NH Biodiesel Producers, Maine Thermal Resources, Clean Peak Resources and Non-NEPOOL Generator Representatives and shall also include data aggregated for all GIS Generators and Importing Account Holders and data aggregated by originating control area (if other than ISO New England) and RPS or APS eligibility for all Imported Unit Energy. Those reports shall include the aggregate and/or average, as appropriate, of the Certificate fields for all Residual Mix Certificates, all Reserved Certificates, all Certificates assigned to state-specific subaccounts and all Certificates associated with Energy exported from the New England for the quarterly or annual reporting period as well. Those reports shall also include a listing of all Third Party Meter Readers for the time period covered by each such report, and the number of Certificates issued using the RSIP Estimation Methodology during the time period covered by each such report. In addition, those reports shall be capable of being sorted by the state of origination and settlement, by eligibility for RPS and APS programs, and by fuel type for all such Certificates for the time period covered by each such report.

* * * *

Appendix 1.1

FUNCTIONAL REQUIREMENTS

2. Sources of Generation Information for GIS.

The ISO currently provides monthly settlement statements to all Market Participants that take part in the wholesale electricity markets administered by the ISO, through the MSS. Those monthly statements are based on hourly load and supply assignments for all market participants as produced by the ISO's markets software. The initial generation credits produced by the real-time dispatch of generation based on telemetered data are modified by revenue quality meter readings that are submitted within 48 hours of the close of each day's market. The MSS also produces hourly scheduled Energy flows of imports and exports over the external ties to and from the New England Control Area. Those tie-lines connect to New Brunswick (1), Quebec (2), and New York (8). Small wholesale generators that are not telemetered as part of the real-time wholesale market but that request inclusion in the MSS database are included in the overall MSS database based on revenue-quality meter readings. Those readings are submitted within 48 hours of the close of each day's market.

The basic MSS database maintained for financial settlement purposes will provide the initial set of inputs for hourly generation credits by resource for NEPOOL Generators in the GIS database. In addition, labor characteristics and possibly some other characteristics that are not kept in the MSS, as well as generation information for Non-NEPOOL Generators, Included Generators, C&LM Resources, BMG Resources, Non-NEPOOL Generator Representatives and Clean Peak Resources, may be provided directly to the GIS Administrator by the GIS Generators or by certain regulatory [or other governmental](#) agencies, Third Party Meter Readers or the CPS Program Administrator.

* * * *

5. Production of Certificates.

The GIS Administrator will produce Certificates based on the hourly generation information from the settlements database and/or from information provided by GIS Generators ~~or~~, Third Party Meter Readers [or governmental agencies](#). The certificates will be numbered and may or may not include additional information from the other fields in the GIS database. Each certificate will provide sufficient information (or access to information in the GIS database) so that a participating Person will be able to determine, in combination with other Certificates, its ability to comply with Attribute Laws.¹

The owner for each generator whose output is settled through the ISO wholesale Energy market will receive from the GIS Administrator a quarterly statement of the Certificates created by its quarterly generation. In addition, the GIS will reflect end-of-the-month adjustments to meter reads and Load Asset values effected by the ISO.

* * * *

Appendix 5.3

REGULATORY AGENCIES

State Renewable Funds

Rhode Island Office of Energy Resources

Connecticut ~~Clean Energy Finance and Investment Authority~~ [Green Bank](#)

Massachusetts Clean Energy Technology Center as Administrator of Massachusetts Renewable Energy Trust and CPS Program Administrator

Maine State Planning Office as Administrator of Maine Renewable Resource Fund

New Hampshire Renewable Energy Fund

¹ It is not intended that the GIS will impact the allocation of generation attributes under bilateral agreements.

**CHANGES TO NEPOOL GENERATION INFORMATION SYSTEM
OPERATING RULES RELATING TO MULTI-FUEL UNIT ENTRIES**

2.5 Sources of Generation

(d) With its initial registration and by the fifth calendar day preceding each Creation Date thereafter, each GIS Generator and Importing Account Holder that has registered a generating unit with multi-fuel capability will submit and validate to in the GIS ~~Administrator~~ information reflecting the proportion of output per fuel type, by MWh, generated by the unit during each month in the applicable calendar quarter to which such Creation Date relates, using available sources of information. Such information shall be used to allocate Certificates for such multi-fuel generating units for each month for which it was supplied.



STATE OF CONNECTICUT
PUBLIC UTILITIES REGULATORY AUTHORITY

Connecticut Launches Statewide Battery Storage Program with Green Bank and Utilities to Jointly Administer Incentives to Improve Resilience and Benefit Ratepayers

Customer Incentives Now Available, Additional Incentives for Underserved Communities and Customers Hardest Hit by Severe Weather

(New Britain, CT – Jan. 18, 2022) – Connecticut’s Public Utilities Regulatory Authority (PURA) launches [Energy Storage Solutions](#), a statewide electric storage program for all Eversource and United Illuminating (UI) residential, commercial, and industrial customers in an effort to foster a more reliable and resilient electric distribution system, especially for vulnerable communities.

Energy Storage Solutions will be administered by the [Connecticut Green Bank](#), along with [Eversource](#) and [UI](#). The nine-year program officially launched on January 1, 2022, and will continue through at least December 31, 2030.

Average upfront incentives for residential customers will initially be around \$200 per kilowatt-hour (kWh), with a maximum per project incentive of \$7,500. Commercial and industrial customers will also be eligible for upfront incentives, with a maximum incentive of 50% of the project cost. Residential, commercial, and industrial customers will all be eligible for performance incentive payments based on the average power an electric storage project contributes to the grid during critical periods.

Additional incentives will be available for those who would most benefit from increased resilience measures, such as low-income customers, customers in underserved communities, small businesses, and customers who historically experience the most frequent and longest duration storm-related outages.

“We are combatting the climate crisis and building our economy by making investments that promote environmental justice, healthier communities, affordable energy, and expanded jobs and opportunity. Adding a statewide electric storage program to our toolkit will play a vital role in these efforts and I thank the entire PURA team and our legislative partners for their leadership on this initiative,” said **Governor Ned Lamont**.

Development of the Energy Storage Solutions was informed by objectives outlined in Public Act (PA) 21-53, which establishes a statewide goal of deploying 1,000 megawatts (MW) of energy storage by year- end 2030. Governor Ned Lamont signed the unanimously bipartisan-supported legislation into law in June, making Connecticut the eighth U.S. state to issue an energy storage deployment target.

“Public Act 21-53 put Connecticut on the map as a potential leader in realizing the benefits of energy storage. The launch of Energy Storage Solutions builds on that vision by establishing a statewide comprehensive program that not only incorporates different applications and types of electric storage, but ensures the state is on a path to achieving 1,000 MW by 2030,” said **PURA Chairman Marissa P. Gillett**. “The Green Bank, working in collaboration with the utilities, will help ensure that our families and businesses, especially those within vulnerable communities, access the important benefits that electric storage provides in terms of resilience and modernizing the grid.”

“The strategic deployment of energy storage is a critical element in our planned transition to a more renewable energy future,” said **Senate Chair of the Energy & Technology Committee Norm Needleman (D-Essex)**. “I am very pleased that the launch of the Energy Storage Solutions program capitalizes on the momentum generated by last year’s bipartisan legislation and I look forward to the resilience benefits it will bring to our communities.”

“The launch of this program is a step forward to achieving the long-term goal of strengthening our grid reliability and greenhouse gas reduction targets,” said **House Chair of the Energy & Technology Committee David Arconti (D-Danbury)**. “When there is more energy storage powered by renewables, fewer fossil fuel units will be needed for grid reliability, and that certainly is a great start.”

The Green Bank, Eversource Energy, and United Illuminating are partnering to bring customers Energy Storage Solutions overseen by PURA and paid for by electric ratepayers. Customers interested in learning more should visit www.energystoragect.com.

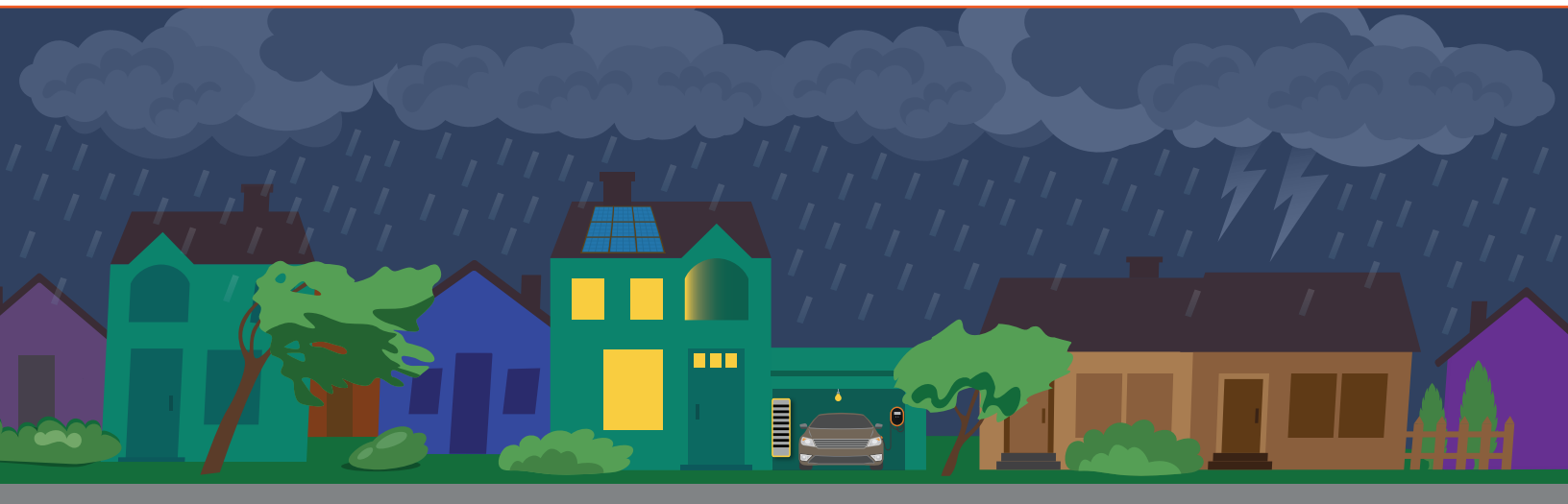
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Introducing Energy Storage Solutions

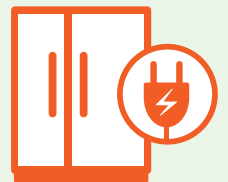
Energy Storage Solutions is a new incentive program designed to help Eversource and United Illuminating customers install energy storage for their home. Installing a battery in your home can help you be prepared when extreme weather events are on the horizon. Batteries can provide backup power when the electricity goes out to keep your lights, small appliances, and medical equipment running without the need to run an onsite generator. Plus, batteries work even better when you add them to an existing solar PV system or pair them with a new one, allowing batteries to recharge with the sun's energy.

Battery Benefits

Cleaner / Quieter: Unlike generators that run on fossil fuels, batteries are a cleaner, quieter option for powering your home during an outage.



Resilient: With battery storage, you're always ready for a storm without needing to buy or store fossil fuels. Keep your lights on and your refrigerator running without the stress and hassle.



Affordable: With Energy Storage Solutions, it's more affordable than ever to purchase a battery system. Upfront and performance-based incentives allow you to save money at the time of purchase and over the life of your system. Residential customers could receive up to \$7,500 upfront per installation with additional incentives as your system contributes to the utility grid. Visit <https://energystoragect.com/>.

How Do I Get Started?

Talk to an eligible contractor who will help you size a battery system based on what you want to power, how long you want to power it, and where you have suitable space to install a battery system.

1 What do you want to power in an outage?

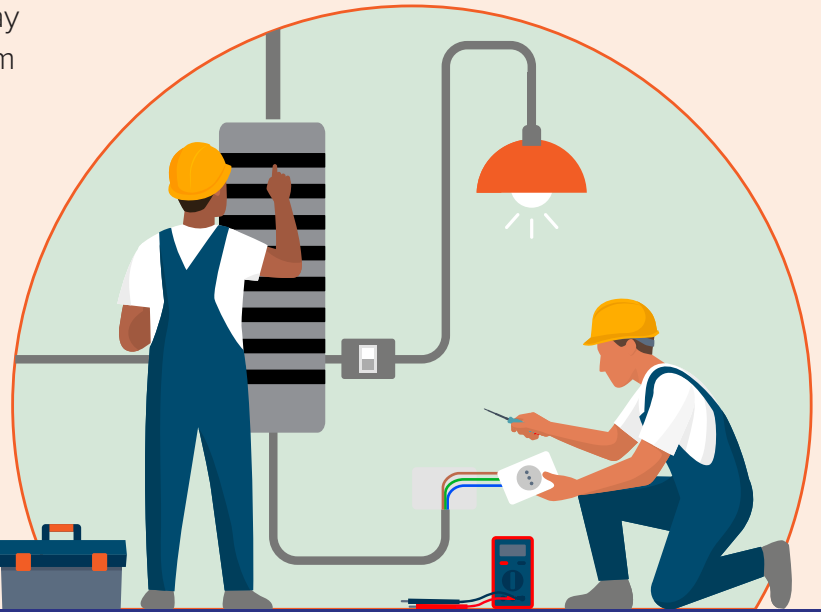
Your contractor will look at the appliances, lighting, or priority equipment you want to power in an outage to determine how much power you'll need during a power outage.

2 Where is there suitable space to install batteries?

Depending on the type, batteries may need to be located inside or outside. Your contractor may need to adjust the size of your battery system to accommodate your available space.

3 How long can the battery run without being re-charged?

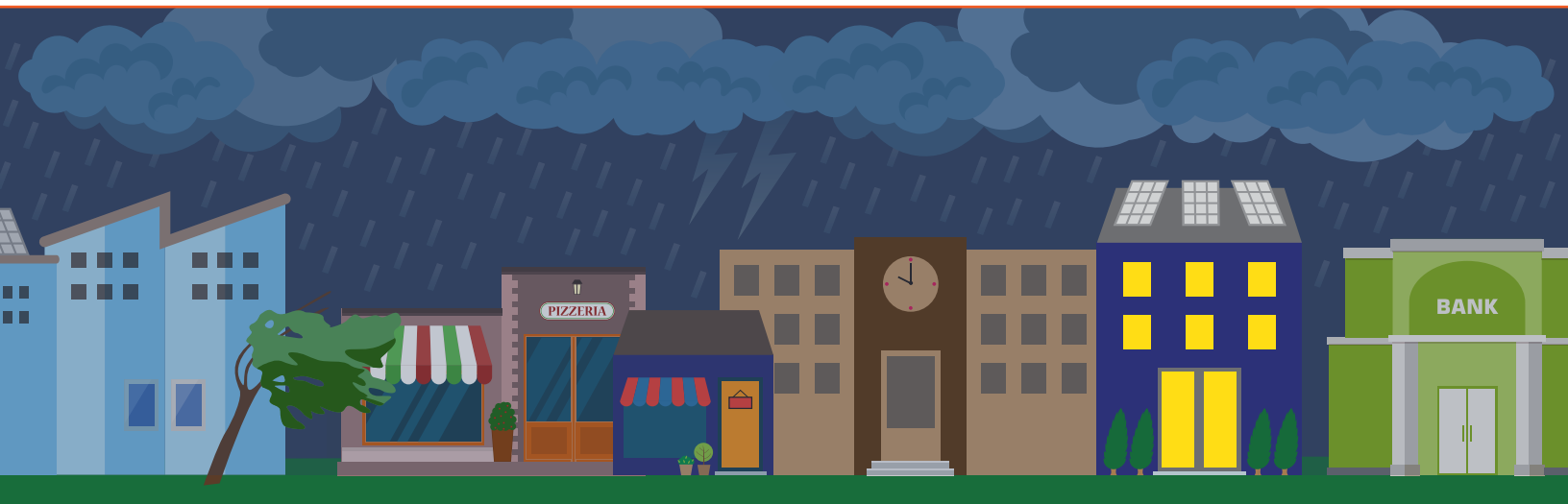
The larger the battery, the longer it will be able to power your appliances and lights without being re-charged by solar PV or your homes power supply. Your contractor will help you decide on a battery size that works for the goals of your household.



To learn more about Energy Storage Solutions or get started with an eligible contractor, visit <https://energystoragect.com/>



This program is overseen by the Public Utilities Regulatory Authority (PURA), is paid for by ratepayers, and is administered by the Green Bank, Eversource, and UI.



Introducing Energy Storage Solutions

Energy Storage Solutions is a new incentive program designed to help Eversource and United Illuminating customers install energy storage for their commercial, industrial and institutional properties. Installing a battery for your business, nonprofit or government facility can help you lower your building's peak demand to reduce energy costs. Batteries can also provide backup power when the electricity goes out to keep your lights on and your facility running without interruption. Upfront and performance-based incentives are available to reduce the cost of an energy storage system. **Additional value may be available for customers on the grid edge, critical facilities, facilities replacing fossil fuel generators, and small businesses.**

Energy Storage Solutions Benefits

Affordable: With Energy Storage Solutions, there has never been a better business case for purchasing a battery system. Upfront and performance-based incentives allow you to save money at the time of purchase and earn over the life of your system. You could receive up to 50% off the installation price with additional performance incentive payments based on the average power your battery system contributes during critical periods. Visit <https://energystoragect.com/> for details.



Resilient: With battery storage, you're always ready for a storm. Keep your business or facility running so that you can continue to serve the needs of your customers or members.



Cleaner & Quieter: Unlike generators that run on fossil fuels, batteries are a cleaner, quieter option for powering your business during an outage. They're better for the environment and friendlier for your customers, members or constituents. Battery systems tied to new or existing solar PV systems can charge during an outage.



How Do I Get Started?

Talk to an Eligible Contractor who will help you size and identify the best location for your battery system based on your facility’s needs or the core function of your business. Your contractor will help you decide on a battery size that works for the goals of your facility.

Commercial and Industrial End-Use Customer Upfront Declining Incentive Block Structure (2022-2024)



	Effective Upfront Incentive (\$/kWh)		
	Small Commercial	Medium Commercial	Large Commercial
Peak Demand	<200 kW	200 kW – 500 kW	>500 kW
Incentive for first 50 MW of Commercial Storage Projects	\$200	\$175	\$100

Commercial and Industrial End-Use Customer Annual Performance-Based Incentive (2022-2024)



	Years 1-5		Years 6-10	
	Summer	Winter	Summer	Winter
Season Incentive (\$/kW)	\$200	\$25	\$115	\$15

To learn more about Energy Storage Solutions or get started with an eligible contractor, visit <https://energystoragect.com/>



This program is overseen by the Public Utilities Regulatory Authority (PURA), is paid for by ratepayers, and is administered by the Green Bank, Eversource, and UI.



Memo

To: Connecticut Green Bank Board of Directors

From: Mariana Trief, Consultant, Clean Energy Finance and Bert Hunter, EVP & CIO

CC: Bryan Garcia, President and CEO; Brian Farnen, General Counsel and CLO; Jane Murphy, EVP Finance and Administration

Date: January 14, 2022

Re: Canton Hydro Update on Construction & Request for Approval to Extend Facility

Background and Project Description

Connecticut Green Bank's ("Green Bank") Board of Directors ("Board") approved on October 26, 2018 a not-to-exceed \$1.2 million subordinate loan ("Loan") and \$500,000 limited guaranty from the Green Bank to finance through construction and operation a 1 MW hydroelectric facility located at the Upper Collinsville Dam ("Dam"), on the Farmington River, in Canton, Connecticut (the "Project"). The Loan closed on May 17, 2019 and was leveraged by a \$4.7 million senior loan from The Provident Bank ("Provident"), a \$300,000 in-kind contribution from equipment supplier and turnkey provider WWS Wasserkraft GmbH ("Wasserkraft"), and \$675,000 in equity from Canton Hydro LLC, the project's developers (the "Developer").

On June 26, 2020, the Board approved restructuring interest payments during construction to allow for interest forbearance during construction given delays associated with COVID travel restrictions which prevented personnel traveling from Wasserkraft, an Austrian company acting as the turnkey solution provider. However, while the project has substantially completed construction and commenced the production of electricity, the Project has faced additional delays and costs than originally anticipated due to additional requirements to the fish ladder from FERC and having to change the main subcontractor as the one originally chosen by the turnkey provider was not producing satisfactory work. The new contractor has been performing as expected and as noted the project is substantially complete and producing clean energy.

At the time the Board approved the COVID restructuring, the Board also approved a \$100,000 increase in the loan facility due to expenses associated with COVID delays, such as insurance and accounting for the potential for additional expenses during the longer construction period. The Developer did not end up using the additional loan funding approved by Green Bank and instead approved a \$650,000 bridge loan from Wasserkraft that can convert to equity as there were additional expenses associated with the longer construction and additional FERC delays.

Project Update

The Project successfully obtained approval to energize from Eversource on March 15, 2021. This triggered two separate refunds to the Developer: i) performance assurance payments associated with the ZREC (approximately \$140,000), and ii) the Virtual Net Metering ("VNM") program fee

(approximately \$500,000). Both refunds were used to: i) pay down principal on the Green Bank loan, as had been originally anticipated; and ii) make interest payments due to the Green Bank given the forbearance accommodations that had been approved by the Board in June 2020. While the system was electrically interconnected in March 2021, additional work to finalize construction has been ongoing.

In mid-December 2021, the project was substantially completed to the point of allowing water to flow through the turbine to generate electricity. However, construction cannot be completed until crest gates are installed, which will allow the flow of the water to be directed in such a way that will improve the efficiency and output of the turbine by 10-20%. To complete this work, river flow levels need to be low and weather temperatures need to be warmer. While there is a chance that the work can be completed this winter, the Developer has requested the senior lender (Provident Bank) and the Green Bank (the subordinate lender in the financing) to extend the construction period until the fall of 2022 in case work cannot be completed until the summer. Green Bank staff has evaluated that request and is recommending the borrower's request to the Board for formal approval. Provident has already approved the extension until October 31, 2022. In the meantime, as noted, the Project is generating electricity and the Borrower has continued to make interest only payments to the lenders. Through the VNM program, electricity generated by the Project is benefitting State of Connecticut owned buildings through the Department of Energy and Environmental Protection ("DEEP"). Once final construction is complete, Green Bank, along with stakeholders will have a ribbon cutting, appropriate signage and media coverage to share and publicize the success of the Project.

From a repayment perspective, based on the annual average expected production figures¹ and using the current expected term interest rate for the Provident loan (4.25%), Provident Bank's debt would be repaid in year 11. Once Provident Bank's loan is repaid, unused funds in the Reserve account would be used to be pay back Green Bank, which we expect would retire the Loan by the end of year 13, with an average debt service coverage ratio ("DSCR") of 3.57x. The financial model has been stressed under worst case scenario (that is, using the worst series of water flow years) and debt service is met with the debt also repaid by year 13. This is consistent with the projections shared in June 2020. The original and revised cash flow projections, along with DSCR are provided in Exhibit A.

From a risk perspective, the transaction holds a lower risk as when it was originally approved (risks identified have been included in Exhibit B) as the Project's construction has basically been completed with only the work in the crest gates pending completion.

Given the foregoing, staff recommends approval by the Board to extend the Project's final completion date to October 31, 2022.

¹ Average annual, net (after turbine, generator, speed increaser, transformer efficiencies and 5 days downtime) electrical energy production is based on a power production analysis from a third-party independent engineer based on river flow data from 1997 to 2017.

Resolutions

WHEREAS, Canton Hydro, LLC (“Developer”) was awarded exclusivity by the Town of Canton to redevelop a 1 MW hydroelectric facility located at the Upper Collinsville Dam (“Dam”), on the Farmington River, in Canton, Connecticut (the “Project”) and the Connecticut Green Bank (“Green Bank”) Board approved approve subordinate debt financing in an amount to exceed \$1,200,000 (the “Loan”) along with an unfunded guaranty, in an amount not to exceed \$500,000 to support the Project;

WHEREAS, Developer has requested to extend the Project’s completion of construction date until October 31, 2022;

NOW, therefore be it:

RESOLVED, that the Green Bank Board of Directors hereby authorize staff to execute amend the Loan agreement materially based on the terms and conditions set forth in this board memo dated January 14, 2022 to extend the Project’s construction completion date to October 31, 2022;

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

Submitted by: Bryan Garcia, President and CEO; Bert Hunter, EVP and CIO.

Exhibit A – Original and Revised Cash Flow, Assumptions and Debt Service Coverage Ratio

Revised Cash Flow, Assumption and DSCR –

Assumptions							CGB Financing	
Lender	Loan Amt.	Amort. (years)	Pricing (Index & Margin)	Int Rate after amort period	CMLTD (P&I)	Excess Cash flow Sweep	Average DSCR	Repayment Year
Provident Term	\$2,770,318	25	N/A		\$182,050	75%	3.57	
Provident Time Note	\$1,939,221	25	N/A		\$127,435		2.38	
CT Green Bank Mezz Debt	\$704,827	15		10.00%	\$82,345			13
CGB Guaranty	\$500,000	15						
ZREC	\$80	13.0						
VNMC	100%	30.0						
*VNMC Assumptions based on current rates and expected increases/step down per VNMC program								

Year	Electricity Production in KWH	VNM Revenue	ZREC Income	Total Revenue (VNM, ZREC & Capacity Payments)	Expenses	NOI	TPB Debt Service (P&I)	TPB Debt Service (I)	TPB Debt Service (P)	TPB Debt Service from excess cash flow	TPB Debt Service from Reserves	TPB Loan balance	SBA Debt Service (P&I)	SBA Debt Service (I)	SBA Debt Service (P)	SBA Loan balance	NOI post senior lender	Senior Lender DSCR	CGB Debt Service (P&I) Actual	CGB Debt Service (I)	Additional CGB Interest Payment	CGB Debt Service (P)	CGB Past Due P&I Payments	CGB Loan from Reserve	CGB Loan balance	CGB DSCR	Excess / (Shortfall) Cash flow	
0							\$182,050	\$117,739	\$64,312	\$0	\$2,706,006		\$127,435	\$82,417	\$45,018	\$1,894,203	383,343	2.24	\$82,345	\$56,386	\$0	\$25,958	-	\$0	\$678,869	4.66	300,999	
1	4,282,966	625,613	324,692	950,304	257,476	692,828	\$182,050	\$115,005	\$67,045	\$0	\$2,638,962		\$127,435	\$80,504	\$46,931	\$1,847,272	316,571	2.02	\$82,345	\$54,309	\$0	\$28,035	-	\$0	\$650,833	3.84	234,226	
2	4,282,966	572,812	324,692	897,504	271,448	626,056	\$182,050	\$112,156	\$69,894	\$0	\$2,569,067		\$127,435	\$78,509	\$48,926	\$1,798,346	264,353	1.85	\$82,345	\$52,067	\$0	\$30,278	-	\$0	\$620,555	3.21	182,008	
3	4,282,966	520,051	324,692	844,743	270,905	573,838	\$182,050	\$109,185	\$72,865	\$0	\$2,496,203		\$127,435	\$76,430	\$51,005	\$1,747,340	278,801	1.90	\$82,345	\$49,644	\$0	\$32,700	-	\$0	\$587,855	3.39	196,456	
4	4,282,966	524,112	324,692	848,803	260,517	588,286	\$182,050	\$106,089	\$75,962	\$0	\$2,420,241		\$127,435	\$74,262	\$53,173	\$1,694,167	280,807	1.91	\$82,345	\$47,028	\$0	\$35,316	-	\$0	\$552,539	3.41	198,462	
5	4,282,966	521,754	324,692	846,446	256,154	590,292	\$182,050	\$102,860	\$79,190	\$84,113	\$0	\$2,256,938		\$127,435	\$72,002	\$55,433	\$1,638,734	287,580	1.93	\$82,345	\$44,203	\$0	\$38,141	-	\$0	\$514,398	3.49	205,235
6	4,282,966	529,263	324,692	853,955	256,890	597,065	\$182,050	\$95,920	\$86,130	\$153,926	\$0	\$2,016,881		\$127,435	\$69,646	\$57,789	\$1,580,946	285,882	1.92	\$82,345	\$41,152	\$0	\$41,193	-	\$0	\$473,205	3.47	203,538
7	4,282,966	533,376	324,692	858,067	262,700	595,367	\$182,050	\$85,717	\$96,333	\$152,653	\$0	\$1,767,895		\$127,435	\$67,190	\$60,245	\$1,520,701	293,274	1.95	\$82,345	\$37,856	\$0	\$44,488	-	\$0	\$428,717	3.56	210,929
8	4,282,966	537,529	324,692	869,956	261,257	608,699	\$182,050	\$75,136	\$106,915	\$158,197	\$0	\$1,502,784		\$127,435	\$64,630	\$62,805	\$1,457,896	299,214	1.97	\$82,345	\$34,297	\$0	\$48,047	-	\$0	\$380,669	3.63	216,870
9	4,282,966	545,265	324,692	878,473	259,462	602,759	\$182,050	\$63,868	\$118,182	\$162,652	\$0	\$1,221,950		\$127,435	\$61,961	\$65,474	\$1,392,421	272,641	1.88	\$82,345	\$30,454	\$0	\$51,891	-	\$0	\$328,778	3.31	190,297
10	4,282,966	553,781	324,692	878,473	273,271	605,202	\$182,050	\$51,933	\$130,117	\$142,723	\$0	\$949,110		\$127,435	\$59,178	\$68,257	\$1,324,164	195,717	1.63	\$82,345	\$26,302	\$0	\$56,042	-	\$0	\$272,736	2.38	113,372
11	4,282,966	561,750	324,692	886,442	279,000	607,442	\$182,050	\$40,337	\$141,713	\$85,029	\$722,368	\$0	\$127,435	\$56,277	\$71,158	\$1,253,006	197,957	1.64	\$82,345	\$21,819	\$0	\$60,526	-	\$0	\$212,210	2.40	115,612	
12	4,282,966	566,116	324,692	890,807	298,044	592,763	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$53,253	\$74,182	\$1,178,824	465,328	4.65	\$82,345	\$16,977	\$0	\$65,368	-	\$146,842	\$0	5.65	382,984	
13	4,282,966	570,525	0	570,525	304,005	266,520	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$50,100	\$77,335	\$1,101,489	139,085	2.09	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	139,085	
14	4,282,966	578,734	0	578,734	310,085	268,649	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$46,813	\$80,622	\$1,020,867	141,214	2.11	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	141,214	
15	4,282,966	583,232	0	583,232	316,287	266,945	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$43,387	\$84,048	\$936,819	139,510	2.09	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	139,510	
16	4,282,966	587,775	0	587,775	322,613	265,162	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$39,815	\$87,620	\$849,199	137,727	2.08	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	137,727	
17	4,282,966	596,232	0	596,232	329,065	267,167	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$36,091	\$91,344	\$757,855	137,732	2.10	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	137,732	
18	4,282,966	600,866	0	600,866	335,646	265,220	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$32,209	\$95,226	\$662,629	137,785	2.08	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	137,785	
19	4,282,966	605,546	0	605,546	342,359	263,187	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$28,162	\$99,273	\$563,356	135,752	2.07	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	135,752	
20	4,282,966	610,273	0	610,273	349,207	261,066	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$23,943	\$103,492	\$459,863	133,631	2.05	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	133,631	
21	4,282,966	615,048	0	615,048	356,191	258,857	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$19,544	\$107,891	\$351,972	131,422	2.03	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	131,422	
22	4,282,966	619,870	0	619,870	363,315	256,555	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$14,959	\$112,476	\$239,496	129,120	2.01	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	129,120	
23	4,282,966	624,741	0	624,741	370,581	254,160	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$10,179	\$117,256	\$122,240	126,725	1.99	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	126,725	
24	4,282,966	629,660	0	629,660	377,992	251,668	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$5,195	\$122,240	\$0	124,233	1.97	\$0	\$0	\$0	\$0	-	\$0	\$0	\$0	124,233	

Revised Cash Flow, Assumption and DSCR – June 2020

Assumptions						
Lender	Loan Amt.	Amort. (years)	Pricing (Index & Margin)	Int. Rate	Int Rate after amort period	Cash CMLTD (P&I)
Provident Term	\$2,770,318	25	N/A	4.25%		\$182,050
Provident Time Note	\$1,939,221	25	N/A	4.25%		\$127,435
CT Green Bank Mezz Debt	\$704,827	15		8.00%	10.00%	\$82,345
CGB Guaranty	\$500,000	15				
	Amount	Years				
ZREC	\$80	13.0				
VNMC	100%	30.0				

*VNMC Assumptions based on current rates and expected increases/step down per VNMC program

CGB Financing	
Average DSCR	3.57
Minimum DSCR	2.38
Repayment Year	13

Year	Electricity Production in KWH	Total Revenue (VNM, ZREC & Capacity Payments)	Expenses	NOI	TPB Debt Service (P&I)	TPB Debt Service (I)	TPB Debt Service (P)	TPB Debt Service from excess cash flow	TPB Debt Service from Reserves	TPB Loan balance	SBA Debt Service (P&I)	SBA Debt Service (I)	SBA Debt Service (P)	SBA Loan balance	NOI post senior lender	Senior Lender DSCR	CGB Debt Service (P&I) Actual	CGB Debt Service (I)	Additional CGB Interest Payment	CGB Debt Service (P)	CGB Past Due P&I Payments	CGB Loan from Reserve	CGB Loan balance	CGB DSCR	Excess / (Shortfall) Cash flow
0																									
1	4,282,966	950,304	257,476	692,828	\$182,050	\$117,739	\$64,312	\$0	\$0	\$2,706,006	\$127,435	\$82,417	\$45,018	\$1,894,203	383,343	2.24	\$82,345	\$56,386	\$0	\$25,958	\$0	\$0	\$678,869	4.66	\$30,999
2	4,282,966	897,504	271,448	626,056	\$182,050	\$115,005	\$67,045	\$0	\$0	\$2,638,962	\$127,435	\$80,504	\$46,931	\$1,847,272	316,571	2.02	\$82,345	\$54,309	\$0	\$28,035	\$0	\$0	\$650,833	3.84	\$24,226
3	4,282,966	844,743	270,905	573,838	\$182,050	\$112,156	\$69,894	\$0	\$0	\$2,569,067	\$127,435	\$78,509	\$48,926	\$1,798,346	264,353	1.85	\$82,345	\$52,067	\$0	\$30,278	\$0	\$0	\$620,555	3.21	\$18,208
4	4,282,966	848,803	260,517	588,286	\$182,050	\$109,185	\$72,865	\$0	\$0	\$2,496,203	\$127,435	\$76,430	\$51,005	\$1,747,340	278,801	1.90	\$82,345	\$49,644	\$0	\$32,700	\$0	\$0	\$587,855	3.39	\$19,456
5	4,282,966	846,446	256,154	590,292	\$182,050	\$106,089	\$75,962	\$0	\$0	\$2,420,241	\$127,435	\$74,262	\$53,173	\$1,694,167	280,807	1.91	\$82,345	\$47,028	\$0	\$35,316	\$0	\$0	\$552,539	3.41	\$19,462
6	4,282,966	853,955	256,890	597,065	\$182,050	\$102,860	\$79,190	\$84,113	\$0	\$2,256,938	\$127,435	\$72,002	\$55,433	\$1,638,734	287,580	1.93	\$82,345	\$44,203	\$0	\$38,141	\$0	\$0	\$514,398	3.49	\$20,525
7	4,282,966	858,067	262,700	595,367	\$182,050	\$95,920	\$86,130	\$153,926	\$0	\$2,016,881	\$127,435	\$69,646	\$57,789	\$1,580,946	285,882	1.92	\$82,345	\$41,152	\$0	\$41,193	\$0	\$0	\$473,205	3.47	\$20,538
8	4,282,966	862,221	259,462	602,759	\$182,050	\$85,717	\$96,333	\$152,653	\$0	\$1,767,895	\$127,435	\$67,190	\$60,245	\$1,520,701	293,274	1.95	\$82,345	\$37,856	\$0	\$44,488	\$0	\$0	\$428,717	3.56	\$210,929
9	4,282,966	869,956	261,257	608,699	\$182,050	\$75,136	\$106,915	\$158,197	\$0	\$1,502,784	\$127,435	\$64,630	\$62,805	\$1,457,896	299,214	1.97	\$82,345	\$34,297	\$0	\$48,047	\$0	\$0	\$380,669	3.63	\$216,870
10	4,282,966	874,194	292,067	582,127	\$182,050	\$63,868	\$118,182	\$162,652	\$0	\$1,221,950	\$127,435	\$61,961	\$65,474	\$1,392,421	272,641	1.88	\$82,345	\$30,454	\$0	\$51,891	\$0	\$0	\$328,778	3.31	\$190,297
11	4,282,966	878,473	373,271	505,202	\$182,050	\$51,933	\$130,117	\$142,723	\$0	\$949,110	\$127,435	\$59,178	\$68,257	\$1,324,164	195,717	1.63	\$82,345	\$26,302	\$0	\$56,042	\$0	\$0	\$272,736	2.38	\$113,372
12	4,282,966	886,442	379,000	507,442	\$182,050	\$40,337	\$141,713	\$85,029	\$722,368	\$0	\$127,435	\$56,277	\$71,158	\$1,253,006	197,957	1.64	\$82,345	\$21,819	\$0	\$60,526	\$0	\$0	\$212,210	2.40	\$115,612
13	4,282,966	890,807	298,044	592,763	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$53,253	\$74,182	\$1,178,824	465,328	4.65	\$82,345	\$16,977	\$0	\$65,368	\$0	\$146,842	\$0	5.65	\$82,984
14	4,282,966	570,525	304,005	266,520	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$50,100	\$77,335	\$1,101,489	139,085	2.09	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$139,085
15	4,282,966	578,734	310,085	268,649	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$46,813	\$80,622	\$1,020,867	141,214	2.11	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$141,214
16	4,282,966	583,232	316,287	266,945	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$43,387	\$84,048	\$936,819	139,510	2.09	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$139,510
17	4,282,966	587,775	322,613	265,162	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$39,815	\$87,620	\$849,199	137,727	2.08	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$137,727
18	4,282,966	596,232	329,065	267,167	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$36,091	\$91,344	\$757,855	139,732	2.10	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$139,732
19	4,282,966	600,866	335,646	265,220	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$32,209	\$95,226	\$662,629	137,785	2.08	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$137,785
20	4,282,966	605,546	342,359	263,187	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$28,162	\$99,273	\$563,356	135,752	2.07	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$135,752
21	4,282,966	610,273	349,207	261,066	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$23,943	\$103,492	\$459,863	133,631	2.05	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$133,631
22	4,282,966	615,048	356,191	258,857	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$19,544	\$107,891	\$351,972	131,422	2.03	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$131,422
23	4,282,966	619,870	363,315	256,555	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$14,959	\$112,476	\$239,496	129,120	2.01	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$129,120
24	4,282,966	624,741	370,581	254,160	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$10,179	\$117,256	\$122,240	126,725	1.99	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$126,725
25	4,282,966	629,660	377,992	251,668	\$0	\$0	\$0	\$0	\$0	\$0	\$127,435	\$5,195	\$122,240	\$0	124,233	1.97	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$124,233

Original Cash Flow, Assumption and DSCR (October 2018)

Assumptions					Excess Cash
Lender	Loan Amt.	Term (Amort)	Int. Rate	Annual P&I	flow Sweep
Provident - Term	\$2,770,318	25	6.23%	\$221,472	75%
Provident Time Note	\$1,939,221	25	6.00%	\$151,699	
CT Green Bank Mezz Debt	\$800,000	15	8.00%	\$93,464	
CGB Guaranty	\$500,000	15			
	Amount	Years			
ZREC	\$80	15			
VNMC	100%	30			

CGB Financing	
Average DSCR	2.63
Minimum DSCR	1.59
Repayment Year	15

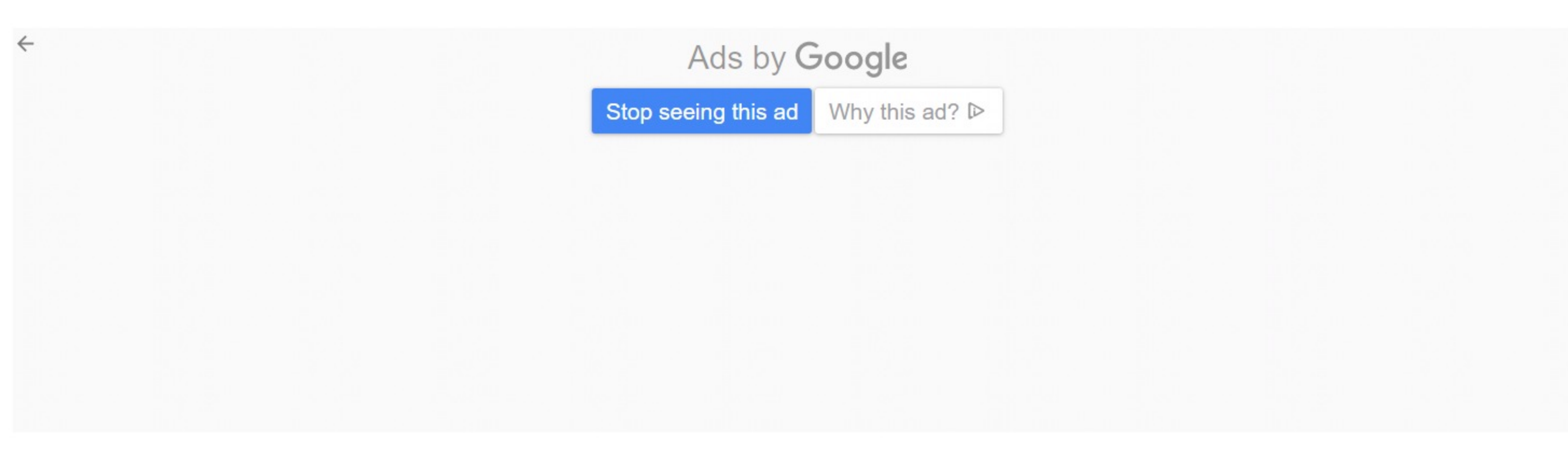
*VNMC assumptions based on current credit rates and expected increases/step down per VNMC Program

Year	Electricity Production in KWH	Total Revenue (VNM, ZREC)	Expenses	NOI	TPB Debt Service (P&I)	TPB Debt Service (I)	TPB Debt Service (P)	TPB Debt Service from excess cash flow	TPB Debt Service from Reserves	TPB Loan balance	SBA Debt Service (P&I)	SBA Debt Service (I)	SBA Debt Service (P)	SBA Loan balance	NOI post senior lender	Senior Lender DSCR	CGB Debt Service (P&I) Actual	CGB Debt Service (I)	Additional CGB Interest Payment	CGB Debt Service (P)	CGB Loan balance	CGB DSCR	Cumulative Reserve
1	4,282,966	950,304	257,476	\$692,828	\$221,472	\$172,591	\$48,881	\$0	\$0	\$2,721,437	\$151,699	\$116,353	\$35,346	1,903,875	319,658	1.86	\$82,345	\$56,386	-	\$25,958	678,869	3.88	237,313
2	4,282,966	897,504	271,448	\$626,056	\$221,472	\$169,546	\$51,926	\$0	\$0	\$2,669,511	\$151,699	\$114,233	\$37,466	1,866,409	252,885	1.68	\$82,345	\$54,309	-	\$28,035	650,833	3.07	407,854
3	4,282,966	844,743	270,905	\$573,838	\$221,472	\$166,311	\$55,161	\$0	\$0	\$2,614,350	\$151,699	\$111,985	\$39,714	1,826,695	200,667	1.54	\$82,345	\$52,067	-	\$30,278	620,555	2.44	526,176
4	4,282,966	848,803	260,517	\$588,286	\$221,472	\$162,874	\$58,598	\$0	\$0	\$2,555,752	\$151,699	\$109,602	\$42,097	1,784,597	215,116	1.58	\$82,345	\$49,644	-	\$32,700	587,855	2.61	658,947
5	4,282,966	852,904	256,154	\$596,750	\$221,472	\$159,223	\$62,248	\$0	\$0	\$2,493,504	\$151,699	\$107,076	\$44,623	1,739,974	223,580	1.60	\$82,345	\$47,028	-	\$35,316	552,539	2.72	800,183
6	4,282,966	857,047	256,890	\$600,157	\$221,472	\$155,345	\$66,126	\$0	\$0	\$2,427,378	\$151,699	\$104,398	\$47,300	1,692,674	226,986	1.61	\$82,345	\$44,203	-	\$38,141	514,398	2.76	944,824
7	4,282,966	861,230	262,700	\$598,530	\$221,472	\$151,226	\$70,246	\$0	\$0	\$2,357,132	\$151,699	\$101,560	\$50,138	1,642,535	225,360	1.60	\$82,345	\$41,152	-	\$41,193	473,205	2.74	1,000,000
8	4,282,966	865,456	259,462	\$605,994	\$221,472	\$146,849	\$74,622	\$65,879	\$0	\$2,216,630	\$151,699	\$98,552	\$53,147	1,589,389	232,823	1.62	\$82,345	\$37,856	-	\$44,488	428,717	2.83	1,000,000
9	4,282,966	869,723	261,257	\$608,466	\$221,472	\$138,096	\$83,376	\$112,859	\$0	\$2,020,395	\$151,699	\$95,363	\$56,336	1,533,053	235,296	1.63	\$82,345	\$34,297	-	\$48,047	380,669	2.86	1,000,000
10	4,282,966	874,034	292,067	\$581,967	\$221,472	\$125,871	\$95,601	\$114,713	\$0	\$1,810,081	\$151,699	\$91,983	\$59,716	1,473,337	208,796	1.56	\$82,345	\$30,454	-	\$51,891	328,778	2.54	1,000,000
11	4,282,966	878,387	373,271	\$505,116	\$221,472	\$112,768	\$108,704	\$94,839	\$0	\$1,606,539	\$151,699	\$88,400	\$63,299	1,410,039	131,946	1.35	\$82,345	\$26,302	-	\$56,042	272,736	1.60	1,000,000
12	4,282,966	882,784	379,000	\$503,784	\$221,472	\$100,087	\$121,384	\$37,201	\$0	\$1,447,953	\$151,699	\$84,602	\$67,097	1,342,942	130,614	1.35	\$82,345	\$21,819	-	\$60,526	212,210	1.59	1,000,000
13	4,282,966	887,225	298,044	\$589,181	\$221,472	\$99,207	\$131,264	\$36,202	\$0	\$1,280,487	\$151,699	\$80,577	\$71,122	1,271,820	216,011	1.58	\$82,345	\$16,977	-	\$65,368	146,842	2.62	1,000,000
14	4,282,966	891,711	304,005	\$587,706	\$221,472	\$79,774	\$141,697	\$100,250	\$0	\$1,038,540	\$151,699	\$76,309	\$75,390	1,196,430	214,535	1.57	\$82,345	\$11,747	-	\$70,597	76,245	2.61	1,000,000
15	4,282,966	896,241	310,085	\$586,156	\$221,472	\$64,701	\$156,771	\$99,143	\$0	\$782,627	\$151,699	\$71,786	\$79,913	1,116,517	212,986	1.57	\$82,345	\$6,100	-	\$76,245	-	2.59	1,000,000
16	4,282,966	576,125	316,287	\$259,838	\$221,472	\$48,758	\$172,714	\$97,981	\$511,932	\$0	\$151,699	\$66,991	\$84,708	1,031,809	(113,332)	0.70	\$0	\$0	-	\$0	-	0.00	886,668
17	4,282,966	580,746	322,613	\$258,133	\$0	\$0	\$0	\$0	\$0	\$0	\$151,699	\$61,909	\$89,790	942,019	106,435	1.70	\$0	\$0	-	\$0	-	0.00	481,170
18	4,282,966	585,414	329,065	\$256,349	\$0	\$0	\$0	\$0	\$0	\$0	\$151,699	\$56,521	\$95,178	846,841	104,650	1.69	\$0	\$0	-	\$0	-	0.00	585,820
19	4,282,966	590,128	335,646	\$254,482	\$0	\$0	\$0	\$0	\$0	\$0	\$151,699	\$50,810	\$100,888	745,953	102,783	1.68	\$0	\$0	-	\$0	-	0.00	688,604
20	4,282,966	594,890	342,359	\$252,531	\$0	\$0	\$0	\$0	\$0	\$0	\$151,699	\$44,757	\$106,942	639,011	100,832	1.66	\$0	\$0	-	\$0	-	0.00	789,435
21	4,282,966	599,699	349,207	\$250,492	\$0	\$0	\$0	\$0	\$0	\$0	\$151,699	\$38,341	\$113,358	525,653	98,793	1.65	\$0	\$0	-	\$0	-	0.00	888,228
22	4,282,966	604,556	356,191	\$248,365	\$0	\$0	\$0	\$0	\$0	\$0	\$151,699	\$31,539	\$120,160	405,493	96,666	1.64	\$0	\$0	-	\$0	-	0.00	984,894
23	4,282,966	609,461	363,315	\$246,146	\$0	\$0	\$0	\$0	\$0	\$0	\$151,699	\$24,330	\$127,369	278,124	94,447	1.62	\$0	\$0	-	\$0	-	0.00	1,000,000
24	4,282,966	614,416	370,581	\$243,835	\$0	\$0	\$0	\$0	\$0	\$0	\$151,699	\$16,687	\$135,011	143,112	92,136	1.61	\$0	\$0	-	\$0	-	0.00	1,000,000

Exhibit B – Risks and Mitigants

As presented in the October 26, 2018 memo approved by the Board

Risk	Risk Level	Mitigating Factor
Construction and Performance Risk	Medium	As described in greater detail in the “Project Partners” section, the parties involved in the Project include accomplished engineers, developers, project managers and owners of hydro facilities who, between them, have experience with hydro projects locally and internationally.
Operational Risk	Medium	The Developer will have a long-term operations and maintenance contract with Wasserkraft, which has already been negotiated. It includes daily remote inspection, weekly onsite supervision, trash rake cleaning and annual service. Green Bank will also require Developers to have appropriate property, commercial liability and umbrella insurance.
Generation Risk	Low	Generation estimates used in the financial model are based on 31 years of water flow data at the Farmington River. The financial model has been stressed under worst case scenario (that is, using the worst series of water flow years) and debt service coverage is still met. Under the ZREC and VNMCA contracts, the Developer does not have any obligations or penalties if there is a shortfall in the amount of electricity generated.
Offtaker risk	Low	The Project’s off-taker is the State of Connecticut under the VNMCA and Eversource under the ZREC, both investment grade entities.
Change in VNM Regulations	Low	The VNMCA includes provisions so that if there were to be a change in VNM regulations, which staff believes a low risk, especially for existing projects, the parties will agree to use best efforts to restore the economic benefits of the VNMCA as originally intended.
Equipment Malfunction	Medium	Wasserkraft is providing a 5-year warranty on the equipment and a 2-year workmanship warranty. Spare parts for items that have most wear and tear will be stored locally in Collinsville near the plant.



CONNECTICUT

Connecticut Green Bank unit crowdfunds first green notes

For the first time, a municipal issuer is [crowdfunding](#) a designated municipal green bond offering.

CGB Green Liberty Notes LLC, a subsidiary of the Connecticut Green Bank, will allow retail investors to place orders for as little as \$100 for up to \$250,000 of taxable Green Liberty Notes. The one-year notes will carry a 1% interest rate and close Friday.

Bert Hunter, chief investment officer of the Connecticut Green Bank, said the notes build off the bank's Green Liberty Bond [issue](#) that was offered in [\\$1,000 increments](#).



The notes let anyone participate in the green economy, says Bert Hunter, Connecticut Green Bank CIO.

Global Macro Outlook 2022-2023

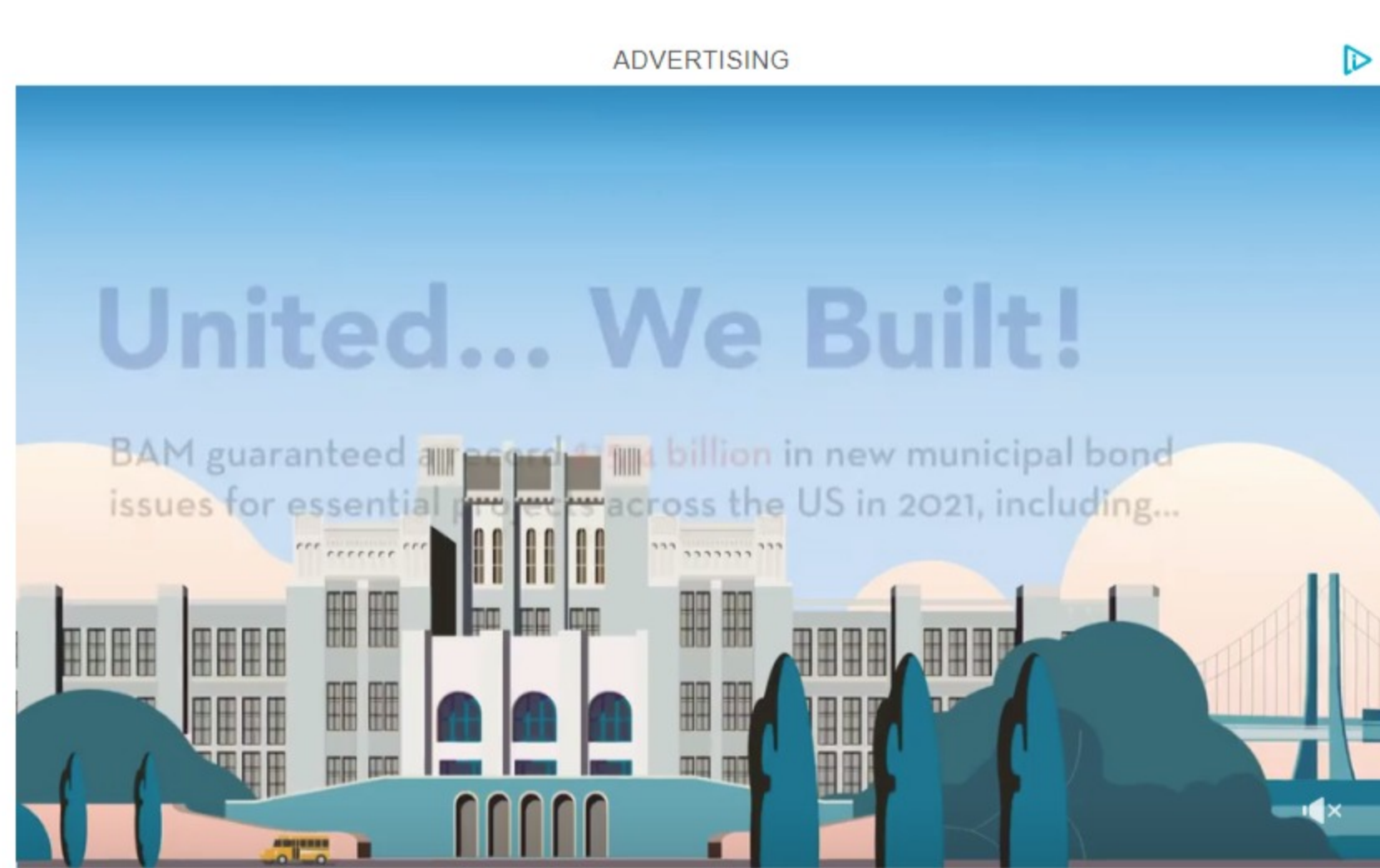
Economy will gain steadier footing although supply troubles, inflation pose risks

[SOURCE](#) [RSS](#) [FEED](#)

"We've designed our Green Liberty Notes so with as little as \$100 practically everyone can participate in Connecticut's green economy," Hunter said in a [YouTube](#) presentation. "Also Green Liberty Notes mature much more quickly than Green Liberty Bonds."

Since its formation in 2011 as the first [green bank](#) in the United States, the Connecticut Green Bank has raised more than \$2.1 billion for the state's clean energy economy, according to the bank.

CGB Green Liberty Notes LLC was organized last year as a special purpose domestic limited liability company and is a wholly owned subsidiary of CEFIA Holdings LLC. The new company was created to enable access to crowdfunded investments.



"In terms of investor engagement, the Connecticut Green Bank is one of the more sophisticated issuers in the entire muni bond market," Colin MacNaught, CEO and co-founder of BondLink, told The Bond Buyer. "By engaging investors digitally, the Green Bank is also opening up channels of communication so that it can hear from investors as to the preferred structures that the market wants, the types of green projects investors want their investments funding, etc."

Proceeds of this deal will fund the state's Small Business Energy Advantage (SBEA) program, which provides interest-free loans to local governments and businesses who undertake energy efficiency projects. It aims to help offices, shops, restaurants, factories and non-profits become more energy efficient and reduce their energy costs.

The notes are designated green bonds by Kestrel Verifiers, which is accredited by the Climate Bonds Initiative. The issue conforms to the four core components of the International Capital Market Association's green bond principles: use of proceeds; process for project evaluation and selection; management of proceeds; and reporting.



The Green Bank is opening up channels of communication with investors, says Colin MacNaught of BondLink.

CGB has strong [financials](#) and expects a debt service coverage ratio of over 2.0 times during the life of the notes.

The Connecticut Green Bank's aim is to leverage public resources and to use private capital investment; to strengthen the state's vulnerable communities by making the benefits of a green economy inclusive and accessible to all individuals, families and businesses; and to follow investment strategies that advance market transformation in green investing while supporting the pursuit of financial sustainability, according to the offering [document](#).

"In a very strategic, deliberate, manner over the last few years, it has been building its own distribution channels to both institutional as well as non-traditional investors, including local investors in their home state and individual investors," MacNaught said. "That's incredibly valuable over the long-term, as it can now activate that distribution any time it is funding its capital program."

While Connecticut has made strides against the COVID-19 virus with 71.9% of state residents vaccinated as of Dec. 1, 2021, the pandemic has had an effect on the SBEA loan pipeline, according to the document. There were only \$4.75 million of loans purchased in 2020 compared to \$14.83 million in 2020.

"However, the program has already shown signs of recovery with \$11.2 million of loans purchased as of Dec. 1, 2021. The company expects the SBEA program to grow, allowing for more Green Liberty Notes issuances in 2022 and beyond," the document said.

Correction: *The issuer is planning to sell up to \$250,000 of notes, and interest will be taxable. The amount and tax status was incorrect in the original version of the story.*

Chip Barnett Market Reporter, The Bond Buyer [in](#) [t](#) [f](#)



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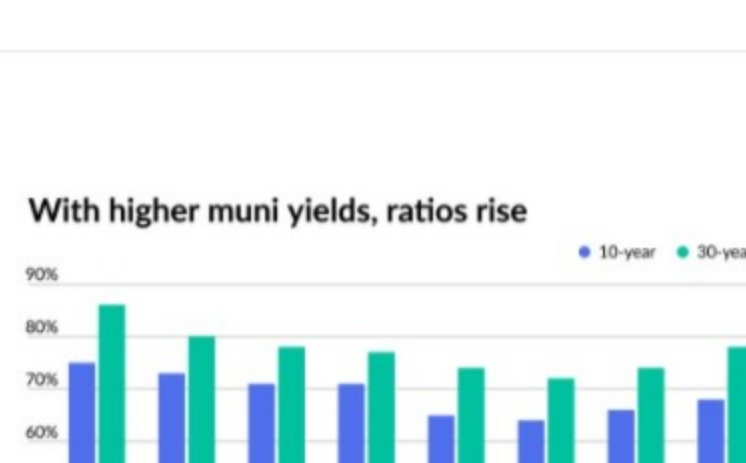
SECONDARY BOND MARKET

Munis off to rocky start to week, with returns in the red

Pressures from inflation concerns and broader rising rates weigh on munis in the second week of 2022.

By Lynne Funk

40m ago



CALIFORNIA

Pandemic overshadows California's \$26.6 billion surplus as budget topic

Gov. Gavin Newsom listed homelessness, wildfire prevention, climate change and continuing efforts to reduce pension liabilities as budget priorities.

By Keeley Webster

46m ago



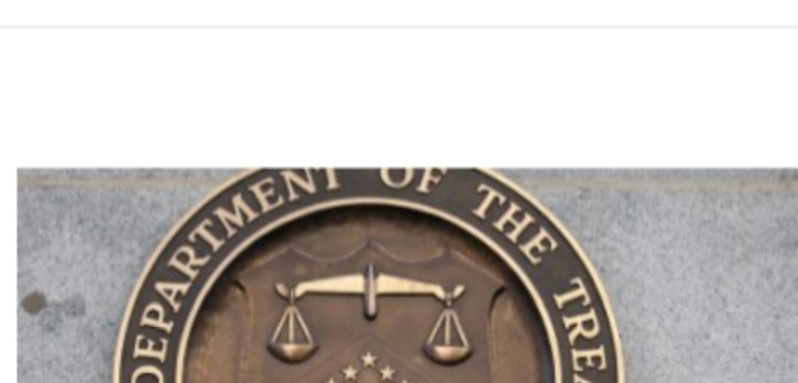
WASHINGTON DC

Treasury final ruling expands spending on water, sewage, broadband

Treasury's final rule on the State and Local Coronavirus Fiscal Recovery Fund allows counties to use up to \$10 million for general public services and expands the list of eligible water, sewer, and broadband infrastructure projects.

By Connor Hussey

3h ago



CONNECTICUT

Connecticut Green Bank unit crowdfunds first green notes

Building on the success of its Green Liberty Bonds, a subsidiary of the Connecticut Green Bank will allow mom and pop investors to place orders for as little as \$100 for Green Liberty Notes until Friday.

By Chip Barnett

3h ago



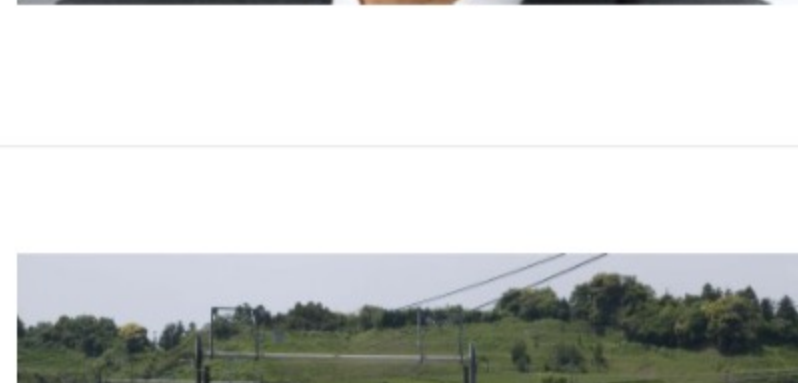
INFRASTRUCTURE

Texas bullet train path forward depends on state Supreme Court ruling

If it clears the legal hurdle, the company that owns the \$30 billion project may seek a \$12 billion Railroad Rehabilitation and Improvement Financing loan.

By Caitlin Devitt

4h ago



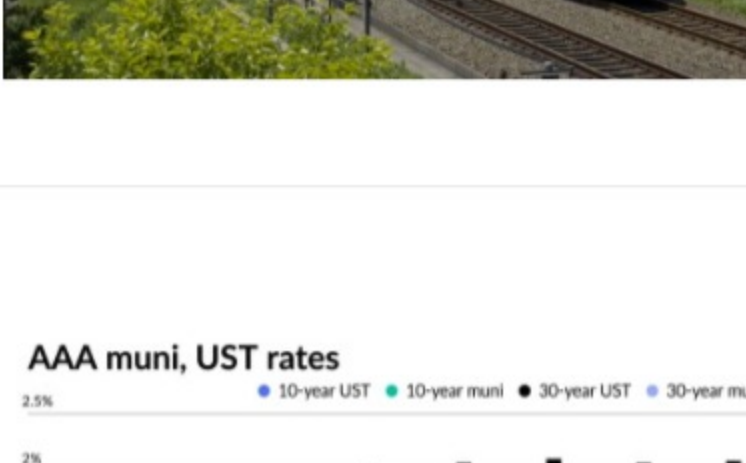
PRIMARY BOND MARKET

Muni yields climb double digit bps in first week of 2022

Munis followed UST weaker while stocks sold off after the employment report, which offered many messages. Analysts believe the bottom line is the Fed will liftoff in March.

By Jessica Lerner

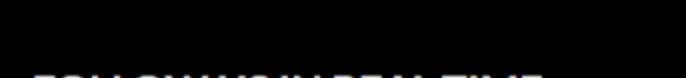
January 7



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