



CLEAN ENERGY
FINANCE AND INVESTMENT AUTHORITY

February 2, 2012

Deployment Committee Members:

We are looking forward to seeing you all next week.

Since this is the first meeting of the committee, we will take a quick look at the Bylaws and discuss the committee goals and objectives at the outset.

We will focus a large part of our agenda on the Residential Solar Investment Program that the Board requested the committee to review and recommend for approval. We subsequently met with each member of the Deployment Committee – we still have one more member to meet with – to discuss the program and made several substantive changes to the Program Plan. As we are processing those changes over the weekend, we will provide them to you immediately next week in advance of the meeting.

I would also like to discuss establishing a generic financing standard that meets commercially reasonable business practices so that we can move forward aggressively with our financing programs. Attached is a memo from Latham & Watkins that provides an overview of the statutory authority and opportunities for developing new financing programs.

We are also seeking a request for a time extension on a Financial Assistance Agreement on two commercial solar PV projects that are part of our on-site distributed generation program. Projects for the Smith Elementary School and Whole Foods Distribution Warehouse will be discussed for project extension.

Our meeting is scheduled for Thursday, January 9, 2012 at 8:30 a.m. at our offices located at 865 Brook Street Rocky Hill, CT.

To prepare you for the meeting, we have provided you with all of the necessary background information that will be covered on the agenda and the associated proposals and resolutions.

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

We look forward to the meeting next week.

Sincerely,

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

Bryan Garcia
President and CEO



CLEAN ENERGY

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AGENDA

Deployment Committee of the
Clean Energy Finance and Investment Authority
865 Brook Street, Rocky Hill, CT 06067

Thursday, February 9, 2012 – Special Meeting
8:30 to 9:30 a.m.

Staff Invited: Jocelyn Anastasiou, Christin Cifaldi, Brian Farnen, Bryan Garcia, David Goldberg, Dale Hedman and Bob Wall

1. Call to order
2. Public Comments – 5 minutes
3. Introductions and discussions of goals and objectives – 5 minutes
4. Review and approval of the Residential Solar Investment program** – 40 minutes
5. Financing standards** – 5 minutes
6. Financial assistance agreement extensions for Smith Elementary School and Whole Foods* – 5 minutes
7. Adjourn

*Denotes item requiring Committee action

** Denotes item requiring Committee action and recommendation to the Board for approval

Call-in information: 1-877-885-3221

Access code: 8446562

Next Meeting: Friday, May 18, 2012

Clean Energy Finance and Investment Authority, 865 Brook Street, Rocky Hill, CT



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RESOLUTIONS

Deployment Committee of the
Clean Energy Finance and Investment Authority
865 Brook Street, Rocky Hill, CT 06067

Thursday, February 9, 2012 – Special Meeting
8:30 to 9:30 a.m.

Staff Invited: Jocelyn Anastasiou, Christin Cifaldi, Brian Farnen, Bryan Garcia, David Goldberg, Dale Hedman and Bob Wall

1. Call to order
2. Public Comments – 5 minutes
3. Introductions and discussions of goals and objectives – 5 minutes
4. Review and approval of the Residential Solar Investment program** – 40 minutes

WHEREAS, Section 106 of Public Act 11-80 “An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut’s Energy Future” (the Act) requires CEFIA to design and implement a Residential Solar Photovoltaic Investment Program (Program Plan) that results in a minimum of thirty (30) megawatts of new residential PV installation in Connecticut before December 31, 2022.

WHEREAS, pursuant to Section 106 of the Act, CEFIA has prepared this Program Plan to identify barriers to the development of a permanent Connecticut-based solar workforce and support comprehensive training and accreditation and certification programs.

WHEREAS, pursuant to Section 106 of the Act, CEFIA has prepared this Program Plan to offer direct financial incentives, in the form of performance-based incentives or expected performance-based buydowns, for the purchase or lease of qualifying residential solar photovoltaic systems.

WHEREAS, CEFIA has prepared a declining incentive block schedule (“Schedule”) that: (1) provides for a series of solar capacity blocks the combined total of which shall be a minimum of thirty megawatts and projected incentive levels for each such block; (2) provides incentives that are sufficient to meet reasonable payback expectations of the residential consumer; (3) provides incentives that decline over time and will foster the sustained, orderly development of a state-based solar industry; (4) automatically adjusts to the next block; and (5) provides comparable economic incentives for the purchase or lease of qualifying residential solar photovoltaic systems.

NOW, therefore be it:

RESOLVED, that the Deployment Committee hereby recommends to the Board for approval of the Program Plan and Schedule as presented by the CEFIA staff.

RESOLVED, that the Deployment Committee recommends to the Board the allocation of \$23,675,000 for the Program Plan fiscal years 2012 through 2014.

RESOLVED, that this recommendation by the Deployment Committee is consistent with Section 106 of the Act and the Bylaws of CEFIA.

5. Financing standards – 10 minutes

WHEREAS, Section 99 of Public Act 11-80 “An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut’s Energy Future” (the Act) requires CEFIA to develop standards to govern the administration of CEFIA through rules, policies and procedures that specify borrower eligibility, and terms of support before making any loan, loan guarantee, or such other form of financing support or risk management for clean energy projects.

WHEREAS, CEFIA plans on partnering with financial institutions (i.e. banks, insurers and third party administrators) for financing support and risk management for all clean energy projects.

NOW, therefore be it:

RESOLVED, that the Deployment Committee hereby recommends to the Board for approval that CEFIA adopt, as minimum standards, the commercially reasonable lending and risk management standards established by the financial institutions that CEFIA partners with in the development and management of financing and risk management for clean energy projects.

6. Financial assistance agreement extensions for Smith Elementary School and Whole Foods* – 5 minutes

Smith Elementary School

WHEREAS, a Standard Grant Agreement (“Agreement”) was executed between CEFIA and Sunedison Origination³, LLC (Sunedison) on August 16, 2010, (“Effective Date”), for a solar photovoltaic (“PV”) system to be located at the Smith Elementary School located at 64 Saint James Street in West Hartford.

WHEREAS, the PV system was to be installed, tested and accepted by Sunedison within one year from the Effective Date of the Agreement (“Commissioning Date”).

WHEREAS, Sunedison has requested and CEFIA has agreed to an extension to April 30, 2012 for the Commissioning Date.

NOW, therefore be it:

RESOLVED, the Commissioning Date for the Agreement between CEFIA and Sunedison is revised from August 16, 2011 to April 30, 2012; and

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

Whole Foods Distribution Warehouse

WHEREAS, a Standard Grant Agreement (“Agreement”) was executed between CEFIA and Sunedison Origination1, LLC (“Sunedison”) on August 16, 2010, (“Effective Date”), for a solar photovoltaic (“PV”) system to be located at the Whole Foods Distribution Warehouse located at 400 East Johnson Avenue, Cheshire, Connecticut 06410.

WHEREAS, the PV system was to be installed, tested and accepted by Sunedison within one year from the Effective Date of the Agreement (“Commissioning Date”).

WHEREAS, Sunedison has requested and CEFIA has agreed to an extension to April 30, 2012 for the Commissioning Date.

NOW, therefore be it:

RESOLVED, the Commissioning Date for the Agreement between CEFIA and Sunedison is revised from August 16, 2011 to April 30, 2012; and

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

7. Adjourn

*Denotes item requiring Committee action

** Denotes item requiring Committee action and recommendation to the Board for approval

Call-in information: 1-877-885-3221

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Next Meeting: Friday, May 18, 2012

Clean Energy Finance and Investment Authority, 865 Brook Street, Rocky Hill, CT



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Residential Solar Investment Program Deployment Committee Review and Approval

Goals for the Meeting



1. **Frame the Problem and the Feedback** – provide an overview of the problem we are trying to solve and discuss the feedback the Deployment Committee has provided;
2. **Reach Consensus** – reach agreement on the proposed revisions to the Program Plan and recommend approval to the Board of Directors; and
3. **Discuss Innovative Financing Concept** – initiating an effort to develop an approach that would payback ratepayers for the subsidies they are providing to participating residential homeowners.

Framing the Problem

Statutory Requirements



1. **Deployment** – install at least 30 MW of new residential solar PV system installations by the end of 2022;
2. **Incentives** – offer direct financial incentives that decline over time that are sufficient to meet reasonable payback expectations of residential customers; and
3. **Workforce** – identify barriers to the development of a permanent Connecticut-based solar workforce and make provision for comprehensive training, accreditation and certification programs through institutions and individuals accredited and certified to national standards.

Deployment – Incentives – Workforce

Framing the Problem

Economics of Residential Solar PV



Controllable Payback Drivers

Economic Variables



Installed Cost ($\$/kW_{STC}$)

System Size (kW_{STC})

System Cost



Ratepayer Subsidies

Cost post Ratepayer Subsidies

Federal ITC

Cost post EPBB and ITC

Debt Interest

Avoided Annual Costs

Payback Period

Internal Rate of Return

**Can't make
the market
work (yet)
without a
subsidy!**

REFERENCES

$\$2,450/kW_{PTC}$ incentive from CEFA in start state and $\$2,100/kW_{PTC}$ incentive in future state, 14% capacity factor, 0.5% degradation rate on solar PV panels, 2% inflation rate on electricity price, $\$0.1826/kWh$, 4% discount rate

Framing the Problem

Subsidy vs. Installed Cost

	<u>Payback 10-Year</u>	<u>Payback 7-Year</u>	<u>Payback 5-Year</u>	<u>CEFIA Current</u>
Subsidy (\$/kW _{PTC})	\$2.66	\$3.49	\$4.05	\$2.45
Installed Cost (\$/kW _{STC})	\$4.81	\$4.08	\$3.58	\$5.00

The lower and more reasonable the payback expectation is for the residential customer, the:

1. Higher the level of subsidy required – non-starter
2. Lower the installation costs need to be – key focus

REFERENCES

Subsidy assumes an initial installed cost of \$5,000/kW_{STC}
Installed cost assumes an initial subsidy of \$2,450/kW_{PTC}

Feedback

Deployment Committee



1. **Payback Period** – target 7 to 10 years in the near-term (e.g. next 5 years) and 5 to 7 years over the long-term (e.g. next decade)
2. **Subsidy**
 - Determine whether or not an increase in the level of subsidy is necessary to achieve the payback period targets
 - Decrease the budget allocations for the first couple of steps in the schedule of incentives to be conservative
 - Understand how we can achieve a pure financing outcome (i.e. ratepayer payback)
3. **Cost Reduction**
 - Increase the focus on strategies that lead to a reduction in installed costs
4. **Financing** – provide low-interest long-term financing
5. **Energy Efficiency**
 - Remove energy efficiency from the economic analysis of solar PV
 - Increase the focus on strategies that lead to installers including energy efficiency as part of marketing solar PV economics

Feedback

Economics of Residential Solar PV



Controllable Payback Drivers	<u>Economic Variables</u>	No Subsidy State
☒☒☒	Installed Cost (\$/kW _{STC})	(\$5,000)
	System Size (kW _{STC})	5.0
	System Cost	(\$25,000)
☒☒	Ratepayer Subsidies	<u>\$0</u>
	Cost post Ratepayer Subsidies	(\$25,000)
	Federal ITC	<u>\$7,500</u>
	Cost post EPBB and ITC	(\$17,500)
	Debt Interest	
	Avoided Annual Costs	\$1,244
	Payback Period	19.0
	Internal Rate of Return	(3.4%)

REFERENCES

\$2,450/kW_{PTC} incentive from CEFIA in start state and \$2,100/kW_{PTC} incentive in future state, 14% capacity factor, 0.5% degradation rate on solar PV panels, 2% inflation rate on electricity price, \$0.1826/kWh, 4% discount rate

Towards Consensus

Program Plan Revisions



1. **Step Adjustments** – reduced the funding allocations within each step (e.g. from \$5.50 million to \$2.50 million in Step 1) and acknowledge the ability to adjust a step (e.g. at Step 3 if necessary) in the Schedule of Incentives;
2. **Budget Adjustment** – removed FY 2014 budget request (e.g. \$7,475,000 reduction) so that we can proceed conservatively and evaluate progress over time;
3. **Payback Period** – focused on installed cost reduction (e.g. 20 to 40 percent reduction) strategies as opposed to increasing subsidies to lower the payback period from 10 years to 7 years;
4. **Program Focus** – need to develop strong marketing, financing, and workforce development programs to achieve the goals of deployment, low to no subsidies, lower installed costs, and a 5 to 7 year payback over the long-term; and
5. **Ratepayer Payback** – pilot innovation element to utilize the new tools of the “Green Bank” to provide low-interest long-term financing that would result in a ratepayer payback of the subsidy (i.e. in principal and/or interest) provided to the homeowner

Towards Consensus

Proposed Schedule of Incentives

Step	EPBB Incentive ≤ 5 kW (\$/W)	EPBB Incentive > 5 kW and ≤ 10 kW (\$/W)	PBI Incentive ≤ 10 kW (\$/kWh)	EPBB and PBI Budget (\$MM)	Estimated Installed Capacity (kW)
1	2.45	\$1.25	\$0.300	\$2.50	1,261
2	2.10	\$0.90	\$0.243	\$5.00	3,036
3	1.75	\$0.55	\$0.209	\$6.00	4,296
4	1.40	\$0.20	\$0.198	\$7.00	5,728
5	1.05	\$0.00	\$0.137	\$8.00	9,102
6	0.75	\$0.00	\$0.107	\$8.00	12,165
7	0.55	\$0.00	\$0.087	\$8.00	15,764
Total				\$44.50	51,353

CEFIA can modify the approved incentive schedule...and reports back to E&T on progress made by January 1, 2014

Towards Consensus

Proposed FY 2012 and 2013 Budget



	FY 2012	FY 2013	Total	% Budget
Incentives	\$3,250,000	\$6,500,000	\$9,750,000	60%
Financing	\$500,000	\$3,000,000	\$3,500,000	22%
Marketing	\$600,000	\$600,000	\$1,200,000	7%
Legal	\$50,000	\$100,000	\$150,000	1%
Workforce Development	\$150,000	\$700,000	\$850,000	5%
Technology	\$100,000	\$200,000	\$300,000	2%
EM&V	\$100,000	\$200,000	\$300,000	2%
Miscellaneous	\$50,000	\$100,000	\$150,000	1%
Total	\$4,800,000	\$11,400,000	\$16,200,000	

REFERENCES

Miscellaneous includes project inspections

Note, the CCEF Board of Directors approved \$10,475,000 in funds per its Comprehensive Plan, the following budgets through FY 2012: \$5,500,000 incentives, \$3,500,000 revolving loan fund, and \$1,475,000 in workforce development programs

Innovative Financing Concept

Ratepayer Payback



- ▶ **Concept** – develop a program that leads to the repayment of the incentive to CEFIA (i.e. ratepayer payback) – operate more like a bank that gets repaid over time (i.e. in principal and/or interest) versus a typical government grant provider
- ▶ **Stakeholders** – the following stakeholders are receiving value in the project – understanding what that value currently is and how that can be shared or redistributed through low-cost long-term financing from CEFIA
 - ▶ Homeowner – lower electricity price, payback, return on investment, etc.
 - ▶ Installer – job, ongoing work, other revenues, etc.
 - ▶ Financier – tax credits, accelerated depreciation, financing, etc.
 - ▶ Ratepayer (i.e. CEFIA) – ratepayer payback, RECs, asset, etc.

Ratepayer Payback

Schematic of 5.0 kW System



Example 1 – \$5,000/kW installed cost; 30% ITC (0.8% IRR); 0% debt



TIME	0	1	2	...	10	...	15	...	20	...	25
COST	(\$25,000)										
BENEFIT		\$8,620	\$1,125		\$1,171		\$1,200		\$1,230		\$1,261
CUMUL		(\$16,380)	(\$15,255)		(\$6,050)		(\$110)		\$5,979		\$12,220

Ratepayer Payback

How do we find an equilibrium point



1. **Model It** – conduct interviews with homeowners and installers to understand value – payback, installed costs, duration, profit – to develop a theoretical equilibrium
2. **Try It** – get started with X number of homes in a community where we identify an installer(s) that gets the work and we track all key data points to identify a practical equilibrium
3. **Dutch Auction** – let qualified installers bid, and allow lowest bidder(s) (i.e. those who payback the quickest) access to funding



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Appendices

Program Goals

18 Months



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- ▶ **Payback Period** – demonstrate a payback period of no more than 9.0 years for solar PV only
- ▶ **Subsidy** – reach Step 3 in the schedule of incentives for the the EPBB (e.g. \$1.75/kWPTC) and PBI (e.g. \$0.209/kWh)
- ▶ **Cost Reductions** – demonstrate up to a 20 percent reduction in installed costs with a target of \$4.00/W_{STC}
 - ▶ Successfully implement SunShot Initiative Round 1 grant (e.g. \$480,000) and reach Round 2 grant (e.g. \$1,600,000) – focus on Solarize campaign
- ▶ **Financing** – launch a low-interest residential clean energy financing program
- ▶ **Energy Efficiency** – demonstrate the economic case for the inclusion of energy efficiency into a solar PV project
- ▶ **Workforce Development** – provide support for programs that help installers market solar PV, financing, and energy efficiency

Sensitivity Analysis on NPV and Payback Period

Key Economic Drivers to the Customer



	Launch State (Step 1)	Subsidy	Cost Reduction	Low Interest Financing
Increase/(Decrease)		20%	(20%)	(20%)
Net Present Value (NPV)	\$1,018	\$2,896	\$5,325	\$2,305
% Change in NPV	0%	184%	423%	126%
Payback Period	10.7	9.0	6.7	10.2
% Change in Payback	0%	16%	37%	5%

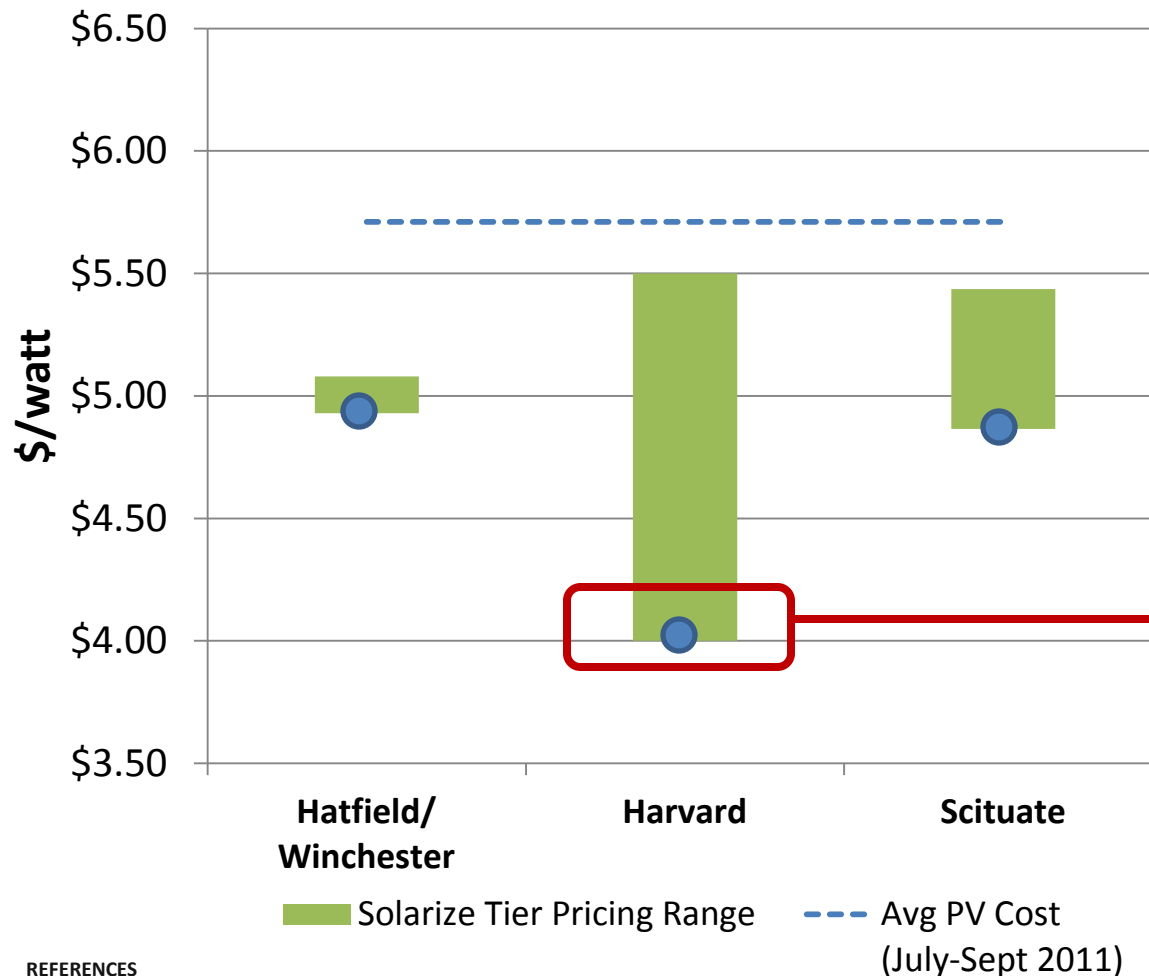
Key economic driver for reducing the payback period is reducing the upfront installed cost of the solar PV system

SunShot Initiative and Solarize Campaign

Cost Reductions through Aggregation



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Reduced installed cost by 30% (from \$5.75/W to \$4.00/W) through local community-based aggregation strategy

REFERENCES

Graphic provided by the Massachusetts Clean Energy Center. (MassCEC)

CEFIA is currently in discussions with the MassCEC on launching joint Solarize campaigns.

CEFIA is currently in conversations with regional foundations (i.e. John Merck Fund) regarding a marketing campaign led by SmartPower that would match dollar-for-dollar ratepayer vs. foundation funds.

Direct Financial Incentives

EPBB and PBI



EPBB

- ▶ Upfront incentive
- ▶ Supports local installers
- ▶ Ownership model – avoided cost of energy
- ▶ CEFIA incentive and federal tax credit to the household

PBI

- ▶ Paid out over time (i.e. 6 years)
- ▶ Supports investors
- ▶ Lease/PPA model – paying lower electricity cost for set period of time (i.e. 10 to 15 years)
- ▶ CEFIA incentive, federal tax credit and accelerated depreciation to the investor

- ▶ The Clean Energy Finance and Investment Authority established pursuant to section 16-245n of the general statutes, as amended by this act, **shall structure and implement a residential solar investment program** established pursuant to this section, which **shall result in a minimum of thirty megawatts** of new residential solar photovoltaic installations located in this state **on or before December 31, 2022**, the annual procurement of which shall be determined by the authority and the **cost of which shall not exceed one-third of the total surcharge collected annually** pursuant to said section 16-245n.



Direct Financial Incentives

Section 106



- ▶ The Clean Energy Finance and Investment Authority **shall offer direct financial incentives**, in the form of **performance-based incentives** or **expected performance-based buydowns**, for the **purchase or lease** of qualifying residential solar photovoltaic systems. For the purposes of this section, **"performance-based incentives" means incentives paid out on a per kilowatt-hour basis**, and **"expected performance-based buydowns" means incentives paid out as a one-time upfront incentive based on expected system performance.**



- ▶ (g) The Clean Energy Finance and Investment Authority **shall identify barriers to the development of a permanent Connecticut-based solar workforce** and **shall make provision for comprehensive training, accreditation and certification programs** through institutions and individuals accredited and certified to national standards.



ARTICLE V COMMITTEES

- 5.1. **Delegation Generally.** The Board may delegate any and all things necessary or convenient to carry out the purposes of the Authority to three (3) or more Directors, provided that at least one (1) of which shall not be a State employee, and, to the extent of powers, duties, or functions not by law reserved to the Board, to any officer or employee of the Authority as the Board in its discretion shall deem appropriate.
- 5.2. **Appointments; Quorum; Transaction of Business; Recordkeeping.**
- 5.2.1. **Appointments.** The Chairperson shall appoint all Committee Chairs. The Committee Chair need not be a Director on the Deployment Committee, the Technology Innovation Committee, any *ad hoc* committee, or an advisory committee.
- 5.2.2. **Quorum.** If necessary to achieve a quorum at any meeting of a Committee other than an advisory committee, then the Chairperson or the Vice Chairperson may sit, participate, and vote as an alternate member of such committee at such meeting.
- 5.2.3. **Report of Committee Actions.** Each Committee shall report to the Board on such Committee's actions and activities at the regular Board meeting next following each Committee meeting.
- 5.2.4. **Recordkeeping.** Committee recordkeeping shall be in accordance with Article IV, Section 4.5.2 hereof.
- 5.3. **Standing Committees.** The Authority shall have four (4) Standing Committees of the Board consisting of an Audit, Compliance, and Governance Committee, a Budget and Operations Committee, a Deployment Committee, and a Technology Innovation

Committee. Each Standing Committee may form subcommittees in its discretion, but no such subcommittee shall exercise powers of the Board unless authorized by the Board to do so.

5.3.1. Audit, Compliance, and Governance Committee. The Audit, Compliance, and Governance Committee shall consist of no less than three (3) Directors appointed by the Chairperson on a biennial basis, at least one (1) of which shall not be a State employee. The principal functions, responsibilities, and areas of cognizance of the Audit, Compliance, and Governance Committee shall be as follows:

(i) recommendation to the Board as to the selection of auditors; (ii) meetings with the auditors to review the annual audit and formulation of an appropriate report and recommendations to the Board with respect to the approval of the audit report; (iii) review of the audit and compliance findings of the Auditors of Public Accounts, and meetings with the staff auditors there as appropriate; (iv) review with the auditors, President, and senior finance staff of the adequacy of internal accounting policies, procedures and controls; (v) review of the sufficiency of financial and compliance reports required by statute; (vi) recommendation to the Board as to the selection of the Authority's ethics liaison and ethics compliance officer(s); (vii) review of the adequacy of employee education and training on ethics and related legal requirements; (viii) review and approval of, and in its discretion recommendations to the Board regarding, all governance and administrative matters affecting the Authority, including but not limited to matters of corporate governance, corporate governance policies, committee structure and membership, management qualifications and evaluation, and Board and Standing Committee self-evaluation;

(ix) oversight of the Authority's legal compliance programs, including but not limited to compliance with state contracting and ethics requirements; (x) management succession planning; (xi) oversight of any Director conflict of interest matters; (xii) as-needed review of any staff recommendations to the Board regarding the Authority's regulatory or policy initiatives including but not limited to the Comprehensive Plan and other clean energy regulatory or policy evidentiary matters before the Public Utilities Regulatory Authority and other state and federal commissions and tribunals that may affect clean energy development and/or the Authority's statutory mandate; (xiii) acting as a resource to the appointing authorities with respect to the identification and recruitment of qualified and interested private sector Director candidates; and (vi) the exercise of such authority as may from time to time be delegated by the Board to the Audit, Compliance, and Governance Committee within its areas of cognizance.

5.3.2. Budget and Operations Committee. The Budget and Operations Committee shall consist of no less than three (3) Directors appointed by the Chairperson on a biennial basis, at least one (1) of which shall not be a State employee. Additionally, the Chairperson or the Vice Chairperson shall be a non-voting *ex officio* member of the committee, subject to the provisions of Article V, Section 5.2.2 hereof. The principal functions, responsibilities, and areas of cognizance of the Budget and Operations Committee shall be as follows: (i) to recommend and monitor compliance with prudent fiscal policies, procedures, and practices to assure that the Authority has the financial resources and financial strategy necessary to carry out its statutory responsibilities and mission, including oversight of the Authority's budget

process, asset and liability management, asset risk management, insurance and loss prevention, and performance measurement; (ii) recommendation to the Board as to approval of the annual operating budget and plan of operation; (iii) oversight of space planning and office leases, systems, and equipment, and procedures and practices with respect to purchasing; (iv) to recommend and monitor compliance with policies, programs, procedures, and practices to assure optimal organizational development, establishment of policies, programs, procedures and practices to assure optimal organizational development, the recruitment and retention of qualified personnel and the just and fair treatment of all employees of the Authority, including employment policies and practices, employee training, development, evaluation and advancement, employee compensation and benefits, and matters of employee separation and severance; (v) review and approval of the Authority staffing plan as developed by the President; (vi) with respect to reallocation of amounts between approved budget line items in excess of ten thousand dollars (\$10,000) but not exceeding seventy-five thousand dollars (\$75,000) in total, approval of such reallocation; (vii) with respect to increases to the operating budget or unbudgeted disbursements in amounts in excess of ten thousand (\$10,000) but not exceeding seventy-five thousand (\$75,000), approval of such increases; and (viii) the exercise of such authority as may from time to time be delegated by the Board to the Budget and Operations Committee within its areas of cognizance.

5.3.3. Deployment Committee. The Deployment Committee shall consist of no more than six (6) members total, consisting of no less than three (3) Directors and up to three (3) non-Directors, all appointed by the Chairperson on a biennial basis, and at

least one (1) of the Director-members shall not be a State employee. Additionally, the State Treasurer, or her or his designee, shall be a voting *ex officio* member of the committee. Additionally, the Chairperson or the Vice Chairperson shall be a non-voting *ex officio* member of the committee, subject to the provisions of Article V, Section 5.2.2 hereof. The non-Director members of the Deployment Committee shall each have expertise in such areas as: project finance, levelized cost of clean energy, investment banking, commercial lending, tax-exempt or tax-advantaged financing or municipal banking, or clean energy policy. The principal functions, responsibilities, and areas of cognizance of the Deployment Committee shall be as follows: (i) to recommend and monitor compliance with program, project, and investment guidelines, criteria, policies, and practices supporting the Authority's statutory mission and management of such by the Authority's professional staff; (ii) with respect to debt, debt-like, grants, equity and near-equity funding requests, including but not limited to the On-Site Renewable Distributed Generation Program, the Residential Solar program, the Combined Heat and Power pilot program, the Anaerobic Digestion pilot program, and the Condominium Renewable Energy grant program, between three hundred thousand dollars (\$300,000) and two million five hundred thousand dollars (\$2,500,000), evaluation and approval of such requests on behalf of the Board; (iii) with respect to debt, debt-like, grants, equity and near-equity funding requests which exceed two million five hundred thousand dollars (\$2,500,000), evaluation of such requests and recommendation to the Board regarding such requests; (iv) oversight of policies and practices relating to the evaluation and recommendation of initial investments, follow-on investments,

investment modifications and restructurings, and the sale or other disposition of investments by the Authority's professional investment staff; (v) oversight of policies and practices relating to investment management by the Authority's professional investment staff, including implementation of investment exit strategies; (vi) except to the extent of any investment powers expressly reserved to the Board itself in any resolution of the Board, to approve on behalf of the Board investments, follow-on investments, investment modifications and restructurings, and the sale or other disposition of investments; (vii) to review and recommend to the Board the issuance of bonds, notes or other obligations of the Authority, and upon such approval, to sell, issue and deliver such bonds, notes or obligations on behalf of the Authority; and (viii) the exercise of such other authority as may from time to time be delegated by the Board to the Deployment Committee within its areas of cognizance. Notwithstanding the foregoing, the Deployment Committee shall have no responsibility or authority with respect to funding or investment requests regarding projects or programs within the area of cognizance of the Technology Innovation Committee, as set forth in Article V, Section 5.3.4 hereof.

5.3.4. **Technology Innovation Committee.** The Technology Innovation Committee shall consist of no more than six (6) members total, consisting of no less than three (3) Directors and up to three (3) non-Directors, all appointed by the Chairperson on a biennial basis, and at least one (1) of the Director-members shall not be a State employee. Additionally, the State Treasurer, or her or his designee, shall be a voting *ex officio* member of the committee. Additionally, the Chairperson or the Vice Chairperson shall be a non-voting *ex officio* member of the Committee, subject to

the provisions of Article V, Section 5.2.2 hereof. The non-Director members of the Technology Innovation Committee shall each have expertise in areas such as: domain technology knowledge, clean technology venture capital, or clean energy entrepreneurial operating experience. The principal functions, responsibilities, and areas of cognizance of the Technology Innovation Committee shall be as follows: (i) with respect to debt, debt-like, grants, equity, and near-equity funding requests below one million five hundred thousand dollars (\$1,500,000), evaluation and approval of such requests and investments on behalf of the Board; (ii) with respect to debt, debt-like, grants, equity, and near-equity funding requests which exceed one million five hundred thousand dollars (\$1,500,000), evaluation and recommendation to the Board regarding approval of such requests and investments; (iii) to recommend and monitor compliance with investment guidelines, criteria, policies, and practices supporting the Authority's statutory mission; (iv) oversight of policies and practices relating to the evaluation and recommendation of initial investments, follow-on investments, investment modifications and restructurings, and the sale or other disposition of investments by the Authority's professional investment staff; (v) oversight of policies and practices relating to investment management by the Authority's professional investment staff, including implementation of investment exit strategies; (vi) except to the extent of any investment powers expressly reserved to the Board itself in any resolution of the Board, to approve on behalf of the Board investments, follow-on investments, investment modifications and restructurings, and the sale or other disposition of investments; and (vii) the exercise of such authority as may from time to time be delegated by the Board to the Technology

Innovation Committee within its areas of cognizance. The projects and programs within the Technology Innovation Committee area of cognizance include but are not limited to pre-alpha projects, alpha projects, operational demonstration projects, equity or near-equity investments in companies, and other emerging technology initiatives.

5.3.5. Additional Standing Committees or *ad hoc* committees of the Board may be formed by the Board at its discretion by resolution setting forth the purposes and responsibilities of such additional Standing Committee or *ad hoc* committee. Each additional Standing Committee or *ad hoc* committee shall have at least three (3) members who are Directors, at least one (1) of which shall not be a State employee.

5.4. **Advisory Committees.**

5.4.1. The Board may form such advisory committees as the Board in its discretion may determine to be appropriate to advise and assist the Board, any Standing Committee of the Board, or management of the Authority in the performance of its statutory responsibilities. Such advisory committees may include as members such individuals as may be knowledgeable in the subject matter whether or not Directors or employees of the Authority.

5.4.2. Members of an advisory committee who are not Directors or employees of the Authority shall be considered "members of an advisory board" for purposes of the Connecticut Code of Ethics for Public Officials.

5.4.3. Public confidence in the recommendations and other actions of an advisory committee requires that advisory committee members avoid both actual conflicts of interest and situations that might give the appearance of a conflict of interest. It is to

be expected, however, that many advisory committee members will have outside business or professional interests relating to the Authority's statutory mission. It is not intended that such outside business or professional interests be considered a conflict of interest, provided that an advisory committee member shall not participate in any deliberation or vote, and shall not take any other affirmative action as an advisory committee member, with respect to a matter in which such member has an interest which is in substantial conflict with the proper discharge of the duties and responsibilities of membership on the advisory committee. For this purpose, the determination of whether an advisory committee member has an interest which is in substantial conflict with the duties and responsibilities of membership on the advisory committee shall be made in the same manner as provided in Section 1-85 of the Connecticut General Statutes for conflicting interests of public officials. In addition to disclosures required by law, the existence and nature of any such substantial conflict shall be promptly disclosed to the Committee Chair.



Residential Solar Investment Program

**DEPLOYMENT COMMITTEE MEMBER
FEEDBACK**

Program Comment Area	Description	Mark Cirilli	Reed Hundt	Don Kirshbaum¹	Matt Ranelli	Pat Wrice	Program Adjustment	Program Result
Cost Reduction	Develop programs and initiatives focused on reducing installed costs to drive down the payback period	x		x	x		Focus on customer aggregation and acquisition strategies (i.e. Solarize) to reduce installed costs	Decreases the payback period
Energy Efficiency	Include energy efficiency as an adder or incorporate into a later step	x			x		Focus on workforce development and marketing to ensure that energy efficiency is incorporated	Decreases the payback period
Energy Efficiency	Economic analysis should not include energy efficiency - solar PV must stand on its own	x					Removes energy efficiency from the analysis	Increases the payback period
Financing	Provide low interest financing with on bill repayment	x		x	x		Focus on developing a low interest financing product	Decreases the payback period

¹ Also included feedback from Jonathan Harris who was unable to attend the January 20, 2012 Board of Directors meeting of CEFA

Program Comment Area	Description	Mark Cirilli	Reed Hundt	Don Kirshbaum	Matt Ranelli	Pat Wrice	Program Adjustment	Program Result
Payback Period	Target payback period of between 5 to 7 years - market acceptance target	x		x			No change - included analysis in the revised Program Plan to show sensitivity with increase in subsidy and decrease in installed cost on the payback period	Requires an increase in the level of subsidy to achieve a shorter payback period.
Payback Period	Target payback period of less than 10 years	x		x	x		Focus on customer aggregation and acquisition strategies (i.e. Solarize) to reduce installed costs	Requires an increase in the level of cost reductions to achieve a shorter payback period.
Payback Period	Conduct sensitivity analysis of payback by adjusting the installed cost and subsidy	x					No change - included analysis in the revised Program Plan to show sensitivity with decrease in subsidy and decrease in installed cost on the payback period	Establishes long-term program goals and targets for cost reductions and subsidy levels for staff to achieve a 7 to 10 year payback.
Planning	Focus on the next 6-months and 18 months instead of 10-years		x	x			Decreases budget request from 30 months to 18 months	Establishes near-term program goals and targets for staff to achieve - more realistic and conservative.
Subsidy	Reduce budget allocations in the schedule of incentives		x				Decreases the amount of subsidy available in Steps 1 and 2 by nearly 40 percent	Increases the pace to reach a lower subsidy level and reduces the level of incentives available over 10 years from \$50 million to \$45 million - a 10% reduction
Overall Program	Generally satisfied with the design of the overall program as long as it addresses the areas of feedback	x	x	x	x	x		



CLEAN ENERGY
FINANCE AND INVESTMENT AUTHORITY

Memo

To: Deployment Committee, Clean Energy Finance and Investment Authority
From: Bryan Garcia and Dale Hedman
Date: February 6, 2012
Re: Update on the Residential Solar Investment Program

[NOTE – THE RESOLUTION AND PROGRAM PLAN HAVE BEEN REVISED BASED ON THE DEPLOYMENT COMMITTEE’S FEEDBACK.]

BACKGROUND

As a follow-up to the January 20, 2012 meeting of the Board of Directors (BOD), the proposed Residential Solar Investment Program was referred to the Deployment Committee for further review and recommendation for BOD approval. CEFIA staff met with each member of the Deployment Committee individually the week of January 30th to discuss the program and solicit their feedback. The Deployment Committee meets on February 9th to consider the revised program.

Feedback from the Deployment Committee centered around the following key areas:

- **Payback Period** – target between a 7 to 10-year payback for the first 5 years and a 5 to 7-year payback over the next decade.

As a result of this feedback, staff ran sensitivity analyses on the key economic drivers of a solar PV project (i.e. subsidy, installed cost, low interest financing) and identified that reducing installed cost is the key variable to a reduced payback period. As a result of this finding staff are prioritizing pilot measures for cost reduction (i.e. SunShot Initiative and Solarize) as a major component of the revised program.

- **Cost Reductions** – reducing the installed cost of a solar PV system will have a significant effect in terms of reducing the system payback.

As a result of this feedback, staff are prioritizing pilot measures for cost reduction (i.e. SunShot Initiative and Solarize) as a major component of the revised program.

- **Subsidy** – increasing the level of subsidy also has an effect in terms of reducing the system payback period. However, CEFIA’s new mission is to move away from subsidies and replace those subsidies with long-term low-cost financing as a substitute.

To that end, CEFIA has developed a declining schedule of incentives and will be developing a pilot measure to explore how subsidies provided through the program can be repaid back to CEFIA as soon as is practical.

- **Financing** – providing low cost financing is an important priority for CEFIA’s Residential Solar Investment Program.

CEFIA is developing a low cost financing program that will serve as a substitute for expensive subsidies. Additionally, staff is exploring power purchase agreement models as a means to repay Connecticut ratepayers over time for supporting residential solar PV projects upfront.

- **Energy Efficiency** – there was broad recognition that energy efficiency is important for homeowners to reduce their energy costs, however, it was not included in the payback analysis so that the Solar PV analysis stands on its own.
- **Planning** – focusing on the next 6 to 18 months will be critical to the success of the program. Determining near-term program goals and targets will focus the staff’s efforts on an achievable pathway to lower subsidies, lower installed costs, and a quicker payback period.

Based on this feedback CEFIA revised the Program Plan – see specifically Section 1 and Section 4 of the Revised Program Plan for the modifications.

PROPOSAL

The proposed program seeks to achieve the goal of installing at least 30 MW by the end of 2022 at an incentive level of approximately half of the allowable incentives of the Act while ensuring a reasonable payback to the residential customer. The program funding request includes incentives, financing, marketing, legal, workforce development, technology, and evaluation measurement and verification components (see Table 1).

Of the \$16,200,000 requested for the Program, \$10,475,000 was approved by the Clean Energy Fund Board of Directors as part of the FY 2011 and FY 2012 comprehensive plan. The revised budget has removed the FY 2014 budget request – a reduction of \$7,475,000.

Table 1. Revised Funding Request for the Residential Solar Investment Program

	FY 2012	FY 2013	Total	% Budget
Incentives ¹	\$3,250,000	\$6,500,000	\$9,750,000	60%
Financing ²	\$500,000	\$3,000,000	\$3,500,000	22%
Marketing	\$600,000	\$600,000	\$1,200,000	7%
Legal	\$50,000	\$100,000	\$150,000	1%
Workforce Development ³	\$150,000	\$700,000	\$850,000	5%
Technology	\$100,000	\$200,000	\$300,000	2%
EM&V	\$100,000	\$200,000	\$300,000	2%
Miscellaneous	\$50,000	\$100,000	\$150,000	1%
Total	\$7,800,000	\$8,400,000	\$16,200,000	

The proposed revised Schedule of Incentives is the following (see Table 2).

Table 2. Proposed Revised Schedule of Incentives

Step	EPBB Incentive ≤5 kW (\$/W)	EPBB Incentive >5 kW and ≤10 kW (\$/W)	PBI Incentive ≤10 kW (\$/kWh)	Budget per Step (\$MM)
1	2.45	\$1.25	\$0.300	2.50
2	2.10	\$0.90	\$0.243	5.00
3	1.75	\$0.55	\$0.209	6.00
4	1.40	\$0.20	\$0.198	7.00
5	1.05	\$0.00	\$0.137	8.00
6	0.75	\$0.00	\$0.107	8.00
7	0.55	\$0.00	\$0.087	8.00
				\$44.50

CEFIA staff is requesting that the Deployment Committee approve the Step 1 and Step 2 budget in the amount of \$7.50 million – of which \$5.50 million has been already approved by the Clean Energy Fund Board of Directors.

It should be noted that per Section 106 of P.A. 11-80 that the proposed Schedule of Incentives can be changed.

Nothing in this subsection shall restrict the authority from modifying the approved incentive schedule before the issuance of its next comprehensive plan to account for changes in federal or state law or regulation or developments in the solar market when

¹ \$5,500,000 of the incentives budget allocation from the Connecticut Clean Energy Fund's FY 2011 and FY 2012 Comprehensive Plan.

² \$3,500,000 of revolving loan fund budget allocation from the Connecticut Clean Energy Fund's FY 2011 and FY 2012 Comprehensive Plan.

³ \$1,475,000 of the workforce development fund budget allocation from the Connecticut Clean Energy Fund's FY 2011 and FY 2012 Comprehensive Plan.

such changes would affect the expected return on investment for a typical residential solar photovoltaic system by twenty per cent or more.

If CEFIA determines that a modification is necessary to the Schedule of Incentives, then it will provide installers with an advanced notification of 8 weeks prior to instituting the change.

As part of the revised program, the following pilot programs will be pursued:

- **Solarize Campaign** – when communities run their own volume purchasing programs as part of a solarize campaign, they reduce costs associated with a traditional solar installation. By choosing only one or two contractors, and conducting their own sales and marketing campaign, the project can hand deliver the contractors warm leads in a small geographic area in a constricted period of time. Job grouping, a constricted time period, and community led sales can contribute to a saving of an additional 15-30 percent of the installed cost of a system based on similar programs in Oregon and Massachusetts.

Purpose of the pilot – demonstrate large-scale customer acquisition and the reduction in the installed cost of a solar PV system resulting in a faster payback period for the customer.

- **Energy Efficiency Challenge** – building on the lessons learned from the Neighbor to Neighbor Energy Challenge, a pilot program that includes cost effective energy efficiency measures as part of a solar PV project will be pursued. A competitive RFP will be issued to identify a contractor(s) that will “prove the case” that including energy efficiency with a solar PV project reduces the payback period for the project.

Purpose of the pilot – demonstrate the energy savings value from energy efficiency in conjunction with the installation of a solar PV system resulting in a faster payback period for the customer.

- **Ratepayer Payback** – incentives provided by electric ratepayers to residential customers have led to over 2,000 solar PV installations in homes across the state. These incentives are at considerable costs to all ratepayers and benefit a limited participating few. In order to scale-up the deployment of renewable energy systems in the state, new and innovative models will need to be explored to leverage the limited resources provided by the ratepayers. As installed costs for solar PV systems continue to decline, there will be new opportunities for financing these systems through instruments such as power purchase agreements that would cover the costs of systems upfront and be paid back over time through clean electricity sales to the customer.

Purpose of the pilot – to develop a program that would payback the electric ratepayers for providing incentives to residential customers installing solar PV systems.

REVISED RESOLUTION

WHEREAS, Section 106 of Public Act 11-80 “An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut’s Energy Future” (the Act) requires CEFIA to design and implement a Residential Solar Photovoltaic Investment Program (Program Plan) that results in a minimum of thirty (30) megawatts of new residential PV installation in Connecticut before December 31, 2022.

WHEREAS, pursuant to Section 106 of the Act, CEFIA has prepared this Program Plan to identify barriers to the development of a permanent Connecticut-based solar workforce and support comprehensive training and accreditation and certification programs.

WHEREAS, pursuant to Section 106 of the Act, CEFIA has prepared this Program Plan to offer direct financial incentives, in the form of performance-based incentives or expected performance-based buydowns, for the purchase or lease of qualifying residential solar photovoltaic systems.

WHEREAS, CEFIA has prepared a declining incentive block schedule (“Schedule”) that: (1) provides for a series of solar capacity blocks the combined total of which shall be a minimum of thirty megawatts and projected incentive levels for each such block; (2) provides incentives that are sufficient to meet reasonable payback expectations of the residential consumer; (3) provides incentives that decline over time and will foster the sustained, orderly development of a state-based solar industry; (4) automatically adjusts to the next block; and (5) provides comparable economic incentives for the purchase or lease of qualifying residential solar photovoltaic systems.

NOW, therefore be it:

RESOLVED, that the Board hereby approves the Program Plan and Schedule.

RESOLVED, the Board directs CEFIA to submit the proposed Schedule to the Commissioner of the Department of Energy and Environmental Protection for approval as required by Section 106 of the Act.

RESOLVED, that the Board approves the allocation of \$16,200,000 for the Program Plan fiscal years 2012 through 2013.

RESOLVED, that this Board action is consistent with Section 106 of the Act.

RESOLVED, that the proper CEFIA officers are authorized and empowered to do all other acts and execute and deliver all other documents as they shall deem necessary and desirable to effect this Resolution.



Residential Solar Photovoltaic Investment Program

Revised Program Plan

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Section 1 - Program Summary

1.1. Executive Summary and Funding Request

Per Section 106 of Public Act 11-80 (the Act), the Clean Energy Finance and Investment Authority (CEFIA) is required to design and implement a residential solar photovoltaic investment program (the Program). The Act requires that the Program result in a minimum of thirty (30) megawatts (MW) of new residential solar photovoltaic (PV) installations in Connecticut on or before December 31, 2022. Based on the Act, the Program is to be funded by no more than one-third of the total surcharge collected annually from the Clean Energy Fund (CEF).

Key components of the Program include:

- **Incentives** – direct financial incentives that decrease over time in the form of expected performance-based buy-down incentives (EPBB) and performance-based incentives (PBI) for the purchase and/or lease of qualifying residential PV systems.
- **Financing** – residential clean energy (i.e. energy efficiency and renewable energy) financing from repurposed American Recovery and Reinvestment Act (ARRA) State Energy Program (SEP) funds and new power purchase agreement programs.
- **Marketing** – community-based social-marketing campaigns and technical support offerings through solar ambassadors and coaches to acquire residential customers through innovative techniques and community-based customer acquisition strategies to lower upfront costs.
- **Legal** – integration of local, state, and federal policies and regulations to support consumers, contractors, and program administrators.
- **Workforce Development** – identification of the barriers to the development of a permanent Connecticut-based solar workforce and support for comprehensive training, accreditation and certification programs including marketing, financing, and energy efficiency.
- **Technology** – inclusion of metering and monitoring equipment, software, and online tools that are developed to provide households, contractors, program administrators and stakeholders readily accessible information.
- **Evaluation, Measurement and Verification (EM&V)** – determination of the causal effects and impacts of the Program on achieving the intentions of the Act.

The proposed program seeks to achieve the goal of at least 30 MW by the end of 2022 at an incentive level of half of the maximum level of incentives allowable by the Act (i.e. \$50 million) allthe while delivering a reasonable payback for residential customers.

To support the Program, the following funds are being requested for FY 2012-2014 (see Table 1):

Table 1. Funding Request for the Residential Solar PV Investment Program

	FY 2012	FY 2013	Total	% Budget
Incentives ¹	\$3,250,000	\$6,500,000	<u>\$9,750,000</u>	60%
Financing ²³	<u>\$3,500,000</u>	<u>\$3,000,000</u>	\$3,500,000	22%
Marketing	\$600,000	\$600,000	\$1,200,000	7%
Legal	\$50,000	\$100,000	\$150,000	1%
Workforce Development ⁴	\$150,000	\$700,000	\$850,000	5%
Technology	\$100,000	\$200,000	\$300,000	2%
EM&V ⁵	\$100,000	\$200,000	\$300,000	2%
Miscellaneous	\$50,000	\$100,000	\$150,000	1%
Total	\$7,800,000	\$8,400,000	\$16,200,000	

Of the ~~\$23,675,000~~ 16,200,000 requested for the Program, \$10,475,000 was approved by the Clean Energy Fund Board of Directors as part of the FY 2011 and FY 2012 comprehensive plan.

1.2. Policy and Project Goals

CEFIA's goal for the policy is to design a declining incentive structure that exceeds the 30 MW goal, at half of the allowable costs under the statute, by the end of the year 2022, and delivering a reasonable payback for residential customers.

Here are the key short-term targets over the next year:

- Payback Period – demonstrate a payback period of no more than 9.0 years for solar PV only;
- Subsidy – reach Step 3 in the schedule of incentives for both the EPBB and the PBI;

¹ \$5,500,000 of the incentives budget allocation from the Connecticut Clean Energy Fund's FY 2011 and FY 2012 Comprehensive Plan.

² ARRA SEP grant repurposing of \$8,250,000 from grants towards financing is currently in process. Funds will be used as credit enhancements to attract private capital into a residential clean energy finance program.

³ \$3,500,000 of revolving loan fund budget allocation from the Connecticut Clean Energy Fund's FY 2011 and FY 2012 Comprehensive Plan.

⁴ \$1,475,000 of the workforce development fund budget allocation from the Connecticut Clean Energy Fund's FY 2011 and FY 2012 Comprehensive Plan.

⁵ \$200,000 of the EM&V budget allocation from the Connecticut Clean Energy Fund's FY 2011 and FY 2012 Comprehensive Plan.

- **Cost Reductions** – demonstrate up to a 20 percent reduction in the installed costs of a system with a target of \$4.00/W_{STC};
- **Financing** – launch a low-interest residential clean energy financing program;
- **Energy Efficiency** – demonstrate the economic case for the inclusion of energy efficiency into a solar PV project; and
- **Workforce Development** – provide support for programs that help installers market solar PV, financing, and energy efficiency.

Here are the key long-term targets over the next decade:

- Achieve at least 50 MW of new residential solar PV systems, nearly 70 percent more than the statutory goal;
- Provide approximately \$50 million in incentives, as opposed to \$100 million allowable by the statute;
- Reach between a 5 to 7 year payback period for residential solar PV systems (see Table 2); and
- Develop a new model for residential solar PV financing that would not require the need for a subsidy, or would at least cover the cost of a subsidy over the useful life of a project.

Table 2. Estimate of the Subsidy (\$/kW_{PTC}) Required to Achieve 10, 7, and 5 Year Payback Period vs. Range of Installed Cost (\$/kW_{STC})

Payback Period	Range of Installed Cost (\$/kW _{STC})						
	\$5.00	\$4.38	\$3.94	\$3.51	\$3.08	\$2.81	\$2.63
10-Years	\$2.66	\$1.96	\$1.47	\$0.99	\$0.50	\$0.20	\$0.00
7-Years	\$3.49	\$2.79	\$2.30	\$1.81	\$1.33	\$1.03	\$0.82
5-Years	\$4.05	\$3.35	\$2.86	\$2.37	\$1.89	\$1.59	\$1.38
	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
CEFIA	\$2.45	\$2.10	\$1.75	\$1.40	\$1.05	\$0.75	\$0.55

To achieve these goals over time, CEFIA will focus on three (3) key economic drivers for a project:

1. **Subsidy** – providing EPBB and PBI incentives that decline over time;

2. **Cost Reductions** – lower the hardware and non-hardware related costs for solar PV systems through customer aggregation and other strategies; and
3. **Low-Interest Financing** – provide a low-interest product to finance the system with the possibility of repayment occurring on the bill and subsidies being repaid over time.

Although energy efficiency is an important tool to improving the economic performance of a solar PV system, it was not included in the payback analysis. Cost-effective energy efficiency measures like an energy audit, duct sealing, air sealing, and insulation, that have quick payback periods (e.g. 3 to 5 years in most cases), can improve the economics of a solar PV system, but were not included in the payback analysis.

The following table demonstrates the short-term pathway to reducing the payback period for residential customers in Connecticut from the initial launch state to a future one-year state (see Table 3).⁶

- **No Subsidy** – the no subsidy state reflects the economics of a solar PV system at an installed cost of \$5.00/W_{STC}, no subsidy for the solar PV system, and a discount rate of 4.0 percent. It should be noted that without a subsidy, residential solar PV currently is uneconomic for mostly all residential customers.
- **Launch State** – the launch state reflects the economics of a solar PV system at an installed cost of \$5.00/W_{STC}, Step 1 subsidy of \$2.45/W_{PTC} for the solar PV system, and a discount rate of 4.0 percent.
- **Future State** – the future state demonstrates a 20 percent reduction in the installed cost (e.g. \$4.00/W_{STC}), Step 2 subsidy for the solar PV system (e.g. \$2.10/W_{PTC}), and a discount rate of 4.0 percent. It should be noted that Massachusetts was able to achieve an installed cost of \$4.00/W_{STC} through a community-based customer aggregation strategy called Solarize.

Table 3. Pathway to Sustained Orderly Development of the Residential Solar PV Industry in Connecticut

	No Subsidy State	Launch State (Step 1)	Future State (Step 2)
Installed Cost (\$/kW _{STC})	(\$5,000)	(\$5,000)	(\$4,000)
System Size (kW _{STC})	5.0	5.0	5.0
System Cost (\$)	(\$25,000)	(\$25,000)	(\$20,000)
Ratepayer Subsidies	\$0	\$10,903	\$9,345
Installed Cost Post Ratepayer Subsidies	(\$25,000)	(\$14,097)	(\$10,665)
Federal Tax Credits	\$7,500	\$4,229	\$3,197
Installed Cost Post Subsidies and Tax Credits	(\$17,500)	(\$9,868)	(\$7,459)

⁶ Assumes 14% capacity factor and 0.5% degradation rate on the solar PV system, 2% inflation rate on electricity price starting at \$0.1826/kWh, and a 15-year financing term. Note the useful life of the solar PV system is 20 to 25 years.

<u>Debt Interest</u>		<u>(\$3,445)</u>	<u>(\$2,604)</u>
<u>Avoided Annual Energy Costs</u>	<u>\$1,244</u>	<u>\$1,244</u>	<u>\$1,244</u>
<u>Payback</u>	<u>≥20.0</u>	<u>10.7</u>	<u>8.0</u>
<u>IRR</u>	<u>(3.36%)</u>	<u>5.3%</u>	<u>10.4%</u>
<u>NPV</u>	<u>(\$3,373)</u>	<u>\$1,018</u>	<u>\$3,983</u>

If CEFIA is able to successfully implement a Solarize campaign in several cities and towns, then it can demonstrate a pathway towards lower payback periods for residential customers by reducing the upfront installed costs of solar PV systems while continuing to reduce subsidies.

Sensitivity analyses show that the key driver for lowering the payback period is through cost reductions of the solar PV system. To reduce the installed cost of the solar PV system, CEFIA will be implementing customer aggregation strategies that have demonstrated in other markets (i.e. Oregon and Massachusetts) significant cost reductions. Workforce development training, accreditation, and certification programs will provide support for achieving these goals by helping contractors market solar PV, sell financing, and include energy efficiency.

4.2.1.3. Background

The Connecticut Clean Energy Fund (CCEF) implemented a multi-year residential solar PV program that was launched in 2005. Since the inception of the program it has gone through several iterations and revisions (see Table 24). This program provided households with the opportunity to own solar PV systems.

Table 33332. CCEF Residential Solar PV Rebate Program (2005-2011)

# of Months	Incentive Level (\$/kW)	# of Systems	Installed Capacity (kW)	Installed Cost (\$/kW)	Average Incentive Paid per Month
31	1 st 5 kW = \$5.00/W 2 nd 5 kW = \$0.00/W	180	622	\$10,993	\$115,000
21	1 st 5 kW = \$5.00/W 2 nd 5 kW = \$4.30/W	559	2,674	\$10,847	\$675,000
1	1 st 5 kW = \$4.00/W 2 nd 5 kW = \$2.50/W	123	636	\$10,391	\$2,300,000
30	1 st 5 kW = \$1.75/W 2 nd 5 kW = \$1.25/W	363	1,920	\$7,624	\$130,000
Total		1,225	5,851	\$9,756	\$300,000

In 2008, the CCEF launched a first-of-its-kind solar lease program, which achieved extraordinary success (see Table 35). This program provided households with an opportunity to lease solar PV systems and pay less on their monthly electric bill.

Table 435. CCEF Residential Solar PV Lease Program (2009-2011)

# of Months	Incentive Level (\$/kW)	# of Systems	Installed Capacity (kW)	Installed Cost (\$/kW)	Average Incentive Paid per Month
17	1 st 5 kW = \$5.00/W 2 nd 5 kW = \$4.30/W	369	2,053	\$9,995	\$640,000
4	1 st 5 kW = \$4.40/W 2 nd 5 kW = \$3.30/W	246	1,451	\$8,579	\$1,700,000
13	1 st 5 kW = \$2.68/W 2 nd 5 kW = \$2.18/W	194	1,127	\$7,425	\$290,000
Total		809	4,632	\$8,926	\$630,000

For Connecticut's residential rooftop solar PV sector, total installed costs have dropped by nearly 40 percent over a five-year period from \$11,235 to \$6,911 per installed kilowatt. In general, the installed cost of a residential solar PV system is 70% for hardware related costs – 60% panels and 10% inverter – and 30% from non-hardware related costs like labor, permitting, etc. (see Table 46)

Table 46. Residential Sector Average Solar PV Hardware and Non-Hardware Costs (2007-2011)

Year	Average System Size (kW)	Hardware Costs		Non-Hardware Costs	% of Costs Non-Hardware Costs	\$ Installed kW
		Average Module Costs	Average Inverter Costs			
2007	4.39	\$28,669	\$4,285	\$16,266	33%	\$11,235
2008	5.07	\$33,853	\$4,633	\$15,098	28%	\$10,566
2009	5.54	\$34,514	\$4,309	\$15,345	28%	\$9,783
2010	5.63	\$27,885	\$4,771	\$12,855	28%	\$8,083
2011	5.59	\$22,278	\$4,822	\$11,516	30%	\$6,911

Given the high level of incentives, increase in customer demand, and the lack of the availability of incentive funds, the Connecticut market for residential solar PV deployment experienced some challenging times beginning in 2010. The CCEF was running out of incentive funds and dropped its incentive levels resulting in a significant decrease in customer demand, a departure of local contractors to neighboring states, and contractors going out of business.

It is because of this unfortunate circumstance of too much demand in combination with high incentives and limited incentive funds that the Act now seeks to achieve the goal of sustained orderly development of the residential solar PV industry in Connecticut to develop stable and well-planned growth instead of ebbs-and-flows. The Program being proposed is designed to better manage the growth and development of the residential

solar PV industry in Connecticut, while seeking to encourage competition and cleaner and cheaper energy in the marketplace.

4.3.1.4. Stakeholders

The people and organizations that will be impacted by the implementation of this program are:

- **Customers** – residential ratepayers of Connecticut Light and Power (CL&P) and The United Illuminating Company (UI) seeking to have solar PV systems installed on their homes
- **Users** – electricians and home improvement contractors working in Connecticut seeking to do the installation work for solar PV systems as well as energy efficiency
- **Partners** – financial institutions, including community, state and national banks, policy-makers (i.e. DEEP) and regulators (i.e. PURA), and companies providing 3rd party financing, and community-based and non-profit organizations assisting in acquiring customers

The staff members at CEFIA that will be actively involved in the implementation of the program include (see Table 57):

Table 57. CEFIA Staff FTE's in the Program

Position	FTE Equivalent
Director, Renewable Energy Deployment	0.15
Director, Energy Efficiency Deployment	0.10
Director, External and Government Affairs	0.10
Director, Marketing and Outreach	0.25
Senior Manager(s), Marketing and Outreach	0.50
Manager, Clean Energy Deployment	0.80
Manager, EM&V	0.30
Associate, Clean Energy Deployment	0.80
Associate, Marketing and Outreach	0.50
Assistant, Clean Energy Deployment	1.00
Total	4.50

4.4.1.5. Program Goals

Per Section 106 of the Act, CEFIA's goals with the Program are:

- Deploy at least 30 MW by the end of 2022 at half of the allowable incentives
- Attain stable and well planned growth of the solar PV industry (e.g. sustained orderly development)

- Achieve cleaner and cheaper energy for Connecticut by working towards a zero-subsidy model for solar PV deployment
- Reach a payback period to the customer of between 7 to 10 years over a 5-year period and 5 to 7 years over the next decade by reducing the current installed cost of solar PV systems
- Develop a low interest financing product that is competitive and sustainable and would eliminate the need for subsidies.
- Be transparent with our incentives, processes, and performance
- Create a vibrant market for clean energy innovation

4.5.1.6. Organizational Goals

How does this Program meet the following organizational goals:

- **Attract and deploy capital to finance the clean energy goals for Connecticut** – the Program is designed to leverage limited ratepayer resources by decreasing incentives over time and transitioning towards finance. The Program also encourages third party financing models to enter Connecticut and offer lease financing.
- **Become the most energy efficient state in the nation** – the Program requires participation in the Home Energy Solutions (HES) program or an energy assessment conducted by a certified contractor. It is envisioned that the Program will provide financing whereby cost-effective energy efficiency will be required to improve the economics of the solar PV system.
- **Scale-up the deployment of renewable energy in the state** – the Program is focused on supporting the local in-state deployment of at least 30 MW of solar PV systems in the residential sector.
- **Support the infrastructure needed to lead the clean energy economy** – the Program identifies the barriers to the development of a permanent Connecticut-based solar workforce and provides support for the comprehensive training, accreditation, and certification programs.

4.6.1.7. Measures of Success

1. **Installed Capacity** – install at least 30 MW of residential solar PV systems by the end of 2022 at half of the allowable incentives (i.e. \$50 million)

2. **Incentives Leveraged** – deploy \$200 million of private capital leveraged by no more than \$50 million of ratepayer incentive funds to achieve a leverage ratio of at least 4:1
3. **Financing Leveraged** – launch a revolving clean energy financing program that uses credit enhancements to leverage private capital at a ratio of at least 4.5 to 1.0
4. **Customer Acquisition** – reach at least 7,500 households installing solar PV systems
5. **Model Communities** – demonstrate that 5% of households in a community can install solar PV systems.
6. **Cost Reductions** – reduce ~~non-hardware-related~~ costs by ~~at least~~between 20 to 45~~40 percent~~% by improving permitting, interconnection, and net metering processes and standards, and undertaking innovative community-based customer acquisition strategies to further lower these costs through aggregation
7. **Energy Efficiency Economics** – homeowners recognizing the importance of and then acting on cost-effective energy efficiency measures as part of a residential solar PV system
8. **Workforce** – increase the trained and employed workforce installing residential solar PV systems as well as selling financing products and undertaking energy efficiency measures
9. **Public Awareness** – Increase the knowledge and awareness of the benefits and availability of clean energy by households
10. **Accessibility** – demonstrate that solar PV systems are accessible by all income classes

4.7.1.8. Opportunity for Financial Innovation

Through the Connecticut Solar Lease program, CEFIA has been a national leader in the development of lease financing programs that require no upfront costs and provide a cheaper electricity solution for homeowners. This program has reached over 800 households and has had only two defaults.

CEFIA is developing a technology agnostic residential clean energy financing program that will take the financial innovation of the lease program for solar PV and turn it into a comprehensive program for renewable energy and energy efficiency. In collaboration with the Connecticut Energy Efficiency Fund (CEEF), CL&P and UI, CEFIA will provide financing support for a long-term loan and/or lease financing program(s) for clean energy installations. Through the use of credit enhancements and investments, a pool of capital will be raised from community banks, community development financial

institutions, credit unions, pension funds, impact investors (i.e. foundations, university endowments, etc.), and/or system benefit funds (i.e. CEFIA and/or CEEF) to provide low-cost financing for homeowners. A standard underwriting process and program guidelines will be pursued in order to develop a financial product that has the potential to be securitized and sold to institutional investors (i.e. pension funds).

CEFIA’s ownership of renewable energy credits (RECs) and other energy or environmental attributes coming from the residential solar PV projects (i.e. forward capacity market payments) will be monetized. If CEFIA can find a long-term purchaser of its RECs at a reasonable price, then there is the possibility of creating a Clean Energy Victory Bond that will provide capital upfront to invest in cost-effective energy efficiency measures or for interest rate buydowns of a loan as a component of the solar PV system.

4.8.1.9. Prior Programs

4.8.1.9.1. Similar or Related CEFIA Programs

Through ARRA SEP grant funding support, CEFIA administers residential solar thermal hot water and geothermal incentive programs. The programs offer incentives of \$275/MMBtu and \$1,050 to \$1,200/ton for solar thermal and geothermal projects respectively. These programs have reached nearly 1,000 households and created new markets for clean energy deployment.

(See also Section 1.2.3 – Background)

4.8.2.1.9.2. Benchmarking Leaders

Working with the National Renewable Energy Laboratory (NREL), CEFIA was able to benchmark leading residential solar PV programs across the country (see Table 68).⁷

Table 68. Comparative Analysis of Residential Solar PV Incentive Programs

	AZ	CA	CT	NJ	NY	MA
Electric Rates (\$/kWh)	\$0.1107	\$0.1521	\$0.1826	\$0.1628	\$0.1812	\$0.1475
Installed Cost (\$/W)	\$6.21	\$8.23	\$5.75	\$6.75	\$7.10	\$5.56

⁷ *Comparative Analysis of Residential Solar PV Incentive Programs* by Kim Peterson of the National Renewable Energy Laboratory for CEFIA (December 2011)

# of Residential Solar PV Systems	1,872	56,656	1,887	2,780	3,027	895
Installed Capacity (MW)	9.4	271.6	12.4	23.5	16.3	4.8
Average System Size (kW)	5.0	4.7	7.5	8.5	5.4	6.4
Incentives Budgets (CT Proposed)	\$14.4 MM (2011)	\$1.167B (2007-2016)	\$54.044.5 MM		\$144 MM (2010-2015)	\$8.0 MM
Current Incentive (CT Proposed)	\$0.75/W	\$0.25-\$0.65/W EPBB; \$0.03/kWh PBI	\$2.45/W ≤5kW and \$1.25 >5kW and ≤10 kW EPBB; \$0.3430 /kWh PBI	\$0.40/kWh	\$1.75/W	\$0.66/W + \$0.30-\$0.55/kWh
Cap	20 kW	10 kW	10 kW	100% of on-site load	7 kW	No cap, but rebates up to 5 kW
Energy Efficiency	No requirement	Self EE audit	EE audit	No requirement	EE audit encourage but not required	No requirement
REC Ownership	Utility	System Owner	CEFIA	System Owner	NYSERDA then System Owner	System Owner

1.10. Pilot Payback Programs

To support the implementation of the program, the following pilot payback programs will be pursued:

- Solarize Campaign – when communities run their own volume purchasing programs they reduce costs associated with a traditional solar installation. By choosing only one or two contractors, and conducting their own sales and marketing campaign, the project can hand deliver the contractors warm leads in a small geographic area in a constricted period of time. Job grouping, a

constricted time period, and community led sales can contribute to a saving of an additional 15-30 percent of the installed cost of a system based on similar programs in Oregon and Massachusetts.

Purpose of the pilot – demonstrate large-scale customer acquisition and the reduction in the installed cost of a solar PV system resulting in a faster payback period for the customer.

- **Energy Efficiency Challenge** – building on the lessons learned from the Neighbor to Neighbor Energy Challenge, a pilot program that includes cost effective energy efficiency measures as part of a solar PV project will be pursued. A competitive RFP will be issued to identify a contractor(s) that will “prove the case” that including energy efficiency with a solar PV project reduces the payback period for the project.

Purpose of the pilot – demonstrate the energy savings value from energy efficiency in conjunction with the installation of a solar PV system resulting in a faster payback period for the customer.

- **Ratepayer Payback** – incentives provided by electric ratepayers to residential customers have led to over 2,000 solar PV installations in homes across the state. These incentives are at considerable costs to all ratepayers and benefit a limited participating few. In order to scale-up the deployment of renewable energy systems in the state, new and innovative models will need to be explored to leverage the limited resources provided by the ratepayers. As installed costs for solar PV systems continue to decline, there will be new opportunities for financing these systems through instruments such as power purchase agreements that would cover the costs of systems upfront and be paid back over time through clean electricity sales to the customer.

Purpose of the pilot – to develop a program that would payback the electric ratepayers for providing incentives to residential customers installing solar PV systems.

Section 2 - Program Structure

2.1. Program Scope

Per Section 106 of the Act, CEFIA is required to design and implement a residential solar PV investment program. The Act requires that the Program result in a minimum of 30 MW of new residential solar PV installations in Connecticut on or before December 31, 2022. The Program is to be funded by no more than one-third of the total surcharge collected annually through the CEF – approximately \$9 to \$10 million a year or between \$90 to \$100 million over the life of the Program.

The Program serves customers seeking to install solar PV systems on their homes and contractors that are willing to provide the work to install the systems. The Program includes incentives, financing, marketing, legal, workforce development, technology, and evaluation measurement and verification components.

Incentives are a key component of the Program and are designed to:

- Decrease over time through a seven-step process; and
- Support homeowners that want to either own or lease a system.

Financing and marketing are also key components of the Program and are designed to:

- Provide access to low-cost capital to enable a homeowner to install a system;
- Reduce customer acquisition costs; and
- Scale-up the deployment of clean energy in Connecticut.

As a result of the successful implementation of the Program, Connecticut will not only have achieved the goal of installing at least 30 MW at half of the allowable incentives per the Act, but more importantly CEFIA will have developed a sustainable market for residential solar PV deployment that is not constrained by the need to provide incentives, but is instead driven-by market forces.

2.2. Program Objectives

The following are key objectives for the Program:

- Deploy at least 30 MW by the end of 2022 at half of the allowable incentives
- Attain stable and well planned growth of the solar PV industry (e.g. sustained orderly development)
- Achieve cleaner and cheaper energy for Connecticut by working towards a zero-subsidy model for solar PV deployment

- Reach a payback period to the customer of between 7 to 10 years over a 5-year period and 5 to 7 years over the next decade by reducing the current installed cost of solar PV systems
- Develop a low interest financing product that is competitive and sustainable and would eliminate the need for subsidies.
- Be transparent with our incentives, processes, and performance
- Create a vibrant market for clean energy innovation

2.3. Assumptions

The Program makes assumptions in a number of areas as it pertains to incentives, financing, marketing, legal, workforce development, technology, and evaluation measurement and verification. The two key areas are incentives and financing, which are taken up below.

2.3.1. Incentives

A large part of the Program is the schedule of incentives for the Expected Performance Based Buy-Down Incentives (EPBB) and the Performance-Based Incentives (PBI). To develop the incentives for the Program, the following assumptions were used ([see Table 9](#)):

Table 9. Assumptions Used in the Economic Analysis for the EPBB and the PBI

Assumption	EPBB	PBI
System Cost	\$5/W _{STC} declining by at a compound rate of 5% from each <u>over the 7 steps</u>	<u>\$5/W_{STC} declining at a compound rate of 5% over the 7 steps</u> \$5/W_{STC} declining by 5% from each step
Utility Avoided Cost	\$0.1826 per kWh increasing by 42% <u>42%</u> annually	\$0.1826 per kWh increasing by 42% <u>42%</u> annually
Incentive	Paid during and immediately after in-service date	Paid out on a quarterly basis based on performance over a 6-year period
Federal ITC Calculation	(Installed Cost – EPBB) * ITC	Installed Cost * ITC with PBI as taxable income
Debt Ratio	100%	35% (+ or -)
Debt Rate	64%	64%
Debt Term	15 years	15 years
Equity Rate	N/A	12%
Depreciation	N/A	5 years MACRS
Tax Rate	N/A	39.54%
Inflation Rate	N/A	2%

Source/Servicing Fee	N/A	4% outstanding debt
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It should be noted that the statute requires that CEFIA implement a schedule of incentives that provide for a reasonable payback expectation of the residential customer taking into consideration installed cost, value of avoided energy costs, state and federal incentives and tax credits, and renewable energy credits.

2.3.2. Financing

In order to achieve the goal of sustained orderly development, not only do incentives and installed costs have to decrease over time, but financing must be offered to customers interested in either owning or leasing solar PV systems. To support the Program, the following assumptions of the terms and conditions for the product are being considered for financing (see Table 10):

Table 10. Draft Underwriting Standards for a Residential Clean Energy Financing Program

Term	Description
Size of a loan	\$1,000 – \$25,000
Term of a loan	60, 120, or 180 months, according to the residential customer's choice – target is 10 years with solar PV and energy efficiency integration.
Expected average loan size	\$20,000
Target capital providers	Community banks, community development financial institutions (CDFIs), credit unions, pension funds, impact investors (i.e. foundations, university endowments, etc.) and/or system benefit funds (i.e. CEFIA and/or CEEF)
Interest rate charged to the customer	Seeking to establish a competitive market rate of 5.99%
Loan coverage to the customer	Up to and including 80% for renewable energy; up to and including 100% for energy efficiency ⁸
Measures ⁹	Lighting, duct sealing, air sealing, insulation, solar PV, solar thermal, geothermal, small wind, micro fuel cell, micro CHP, furnace replacement, boiler replacement, window replacements, AC systems, heat pumps, electric vehicle recharging station, all cost-effective energy efficiency measures, and measures with SIR≥1 within the terms of the loan
Loan repayment	On-bill or direct payment
Loan underwriter	Seeking to identify an underwriter and administrator with

⁸ Per Section 99(2)(D) of the Act. "The authority may provide financing support under this subsection if the authority determines that the amount to be financed by the authority and other non-equity financing sources do not exceed eighty percent of the cost to deploy a clean energy project or up to one hundred percent of the cost of financing an energy efficiency project.

⁹ Subject to change, however the focus of residential measures is on those that have or will receive categorical exclusions for NEPA and NHPA.

and administrator	experience servicing high volume and high performing residential energy efficiency and/or renewable energy loans. Identifying a rated servicing entity would be preferable.
Underwriting cost	Seeking to identify a competitively-priced underwriter and administrator.
Underwriting process	A competitive selection process is envisioned. Identifying a local entity would be preferable. ¹⁰
Underwriting criteria	FICO score of 640 if salaried, 680 if self-employed for at least 2 years, 720 if self-employed for less than 2 years, no bankruptcy in the last 7 years, debt to income or monthly obligations to monthly income of 50% for all FICO scores. ¹¹ Or, if on-bill repayment, then the underwriting criteria of CL&P and UI are appropriate.
Source of funds for interest rate buy-down	ARRA SEP
Source of loan loss reserve funds	ARRA SEP
Eligible customers	Residential electric, natural gas, heating oil, and propane customers. Customers must have also completed an energy assessment by an insured HES approved vendor or a Buildings Performance Institute (BPI) certified contractor, Certified Energy Manager (CEM), Professional Engineer (PE) on the job who is a registered home improvement contractor with the Connecticut Department of Consumer Protection. Vendors using the HEY or other approved customer interface tool to calculate the energy savings and payback for customer follow-on recommendations.
Eligible installers	Renewable Energy – insured, PV-1, E-1, ST-1 and STC-1 solar contractors. For PV installations at least one staff member must have achieved a passing score on the NABCEP entry level PV exam, or hold a full NABCEP certification. Energy Efficiency – insured HES approved program vendors or a BPI certified contractor, Certified Energy Manager (CEM), Professional Engineer (PE) on the job who is a registered home improvement contractor with the

¹⁰ Per the Operating Procedures of CEFIA, grants, loans or loan guarantees, debt and equity investments for clean energy projects are subject to a selection and award process including (1) competitive selection and award, (2) programmatic selection and award, and (3) strategic selection and award.

¹¹ Based on the underwriting criteria of the Connecticut Solar Lease program.

	Connecticut Department of Consumer Protection.
Evaluation, Measurement and Verification	<p>Renewable Energy – real-time advanced metering equipment (i.e. ANSI C12) with online performance data collection and analysis and inspections of all jobs by an independent contractor</p> <p>Energy Efficiency – use of the Home Energy Yardstick or other approved customer interface tool, Program Savings Document of the CEEF, ongoing utility bill analysis for electric and natural gas customers, or inspections of a random sample of jobs by an independent contractor</p> <p>Installation of any data acquisition system or meter may be required by CEFIA for performance measurement and verification. CEFIA will have access to and ownership of this data.</p>
Third party insurer	Seeking to identify a third party insurer of energy savings performance to ensure that month-to-month and/or annual savings cash flows match debt service.

[CEFIA has submitted a work program on a residential clean energy financing program into the U.S. Department of Energy's ARRA SEP grant. The program will provide credit enhancements to attract and deploy low cost capital for residential clean energy financing.](#)

2.4. Dependencies

There are several areas of dependency that the Program relies on, including:

- **Availability of Resources** – the Program requires a steady stream of resources to support the schedule of incentives. Creating an incentive system that achieves the goal of sustained orderly development is challenging – as running out of incentives as a result of an increase in customer demand requires careful attention. ~~CEFIA has planned it so that Steps 1-4 are achieved through the FY 2012 through FY 2014 budget request.~~
- **Systems** – to administer the expected increase in demand for residential solar PV systems, CEFIA will be developing a more streamlined and automated system for application processing. With the goal of expediting the process, reducing human resource requirements, and collecting and analyzing data, technology systems will need to be developed to handle intake.
- **Regulatory** – regulatory ruling that would allow for the long-term contracting for and purchasing by the electric distribution companies of renewable energy credits created, aggregated, and sold through the Program (see Section 3.4.2 – State Laws and/or Regulations below for Long-Term REC Contracts). If CEFIA can aggregate and sell a 15-year stream of RECs at a reasonable rate (no less

than \$40 per REC) from the projects supported through the Program, then CEFIA can issue bonds (i.e. Clean Energy Victory Bonds) to raise capital upfront to cover either an interest rate buydown if a homeowner wants to finance a project or to support additional cost-effective energy efficiency measures free of charge. Accessing the long-term value of REC payments today, can be used to reduce the payback period and increase the IRR and NPV of the project for the customer.

These are but a few of the dependencies that will have an effect on the overall success of the Program.

2.5. Constraints

As the Program proposes an innovative, comprehensive and new approach to residential solar PV deployment in Connecticut, there will be a number of constraints that will impact its development, including:

- **Financial Resources** – ensuring that we have funds to support the implementation of the Program.
- **Personnel** – equipping personnel with the systems and training to handle applications, respond to inquiries, and manage the Program.
- **Market Effects** – as the solar PV industry is undergoing dramatic change as a result of U.S.-China relations, there are a number of uncontrollable factors that could positively or negatively effect the Program.
- **Adaptability** – enabling CEFIA to be flexible, adaptable and responsive to changes in the marketplace.
- **Policies and Standards** – unforeseen policy and standard changes could beneficially or adversely impact the Program.

These are but a few of the constraints that will impact the Program.

Section 3 - Implementation Considerations

3.1. Target Market

CEFIA seeks to target residential customers in CL&P and UI service territory seeking to install solar PV systems on their homes.

3.2. Eligibility Criteria

List specific eligibility requirements for this program:

■ **PV Systems:**

- Must be installed on one (1) to four (4) family homes in CL&P or UI service territories.
- Must be new and grid-tied. Incentives are not available for used equipment or new PV systems that have been partially or completely installed prior to receiving written approval from CEFIA. CEFIA will consider the expansion of existing PV systems on a case-by-case basis.
- Must comply with applicable federal, state and local law, regulation, code, licensing, permit and inspection requirements, including the Connecticut Building Code and the National Electric Code (NEC).
- All applicable components must utilize commercially available PV technologies listed on the California Energy Commission (CEC) web site.
- All components must be UL listed (or equivalent) where applicable.
- The kW size limit is per address, not per Homeowner or meter.

■ **Homeowners** – must be CL&P or UI customers and agree to:

- Work with a contractor or third-party system owner approved by CEFIA.
- Complete an energy assessment through participation in CEEF's HES program, or performed by a BPI certified contractor, CEM or PE.
- Install a kWh monitoring device to track system performance.
- Install a revenue grade meter to verify system performance.

■ **Contractors** – must be approved by CEFIA to participate in the Program and meet the following criteria:

- At least one permanent employee or subcontractor must hold an E-1 license.

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- At least one permanent employee must hold the NABCEP Entry Level Passing Score Achievement Certificate, or full NABCEP certification.
- Carry at least \$1 million in general liability insurance.
- Provide verifiable evidence of financial solvency and health in the form of a bank letter of reference/credit.
- Provide a copy of standard contract or sales agreement.
- Provide a five year workmanship warranty to homeowners. The warranty must cover all components of the generating system against breakdown or degradation in electrical output of not more than 10% from the original rated electrical output, and full costs of labor and repair or replacement of defective components or systems.
- **Third-party system owners** – must be approved by CEFIA to participate in the Program and meet the following criteria:
 - [Use a PV contractor approved by CEFIA to install systems under the Program.](#)
 - Carry at least \$1 million in general liability insurance.
 - Provide verifiable evidence of financial solvency and health in the form of a bank letter of reference/credit.
 - [Provide a copy of standard contract or sales agreement for leases, Energy Services Agreements \(ESAs\) or Power Purchase Agreements \(PPAs\). Contracts must include warranty provisions, including energy production and workmanship.](#)

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3.3. Partners and Leverage

The partners for the Program include:

- **Financial Institutions** – including community, state and national banks that will provide capital for the Program as a result of credit enhancements offered by CEFIA;
- **Policy-Makers and Regulators** – that will make decisions effecting the Program;
- **3rd Party Financiers** – companies that will enter Connecticut as a result of the Program that will provide 3rd party financing for homeowners to lease systems; and

- **Non-Profit Organizations** – community-based organizations that will assist the Program in acquiring customers.

3.4. Law and Regulations

There are several local, state and federal laws and regulations that provide support for residential clean energy deployment.

3.4.1. Local Laws and/or Regulations

Connecticut has passed several local laws that support clean energy deployment, including:

- **Building Permit Fee Waivers for Renewable Energy Projects** – As of July 2011, Connecticut authorizes municipalities to pass a local ordinance to exempt "Class I" renewable energy projects from paying building permit fees. Class I renewable energy projects include energy derived from solar power, wind power, fuel cells (using renewable or non-renewable fuels), methane gas from landfills, ocean thermal power, wave or tidal power, low-emission advanced renewable energy conversion technologies, certain newer run-of-the-river hydropower facilities not exceeding five megawatts (MW) in capacity, and sustainable biomass facilities. (Emissions limits apply to electricity generated by sustainable biomass facilities.) ([Act Section 14](#))
- **Property Tax Exemption for Renewable Energy Systems** – Connecticut provides a property tax exemption for "Class I" renewable energy systems and hydropower facilities that generate electricity for private residential use. The exemption is available for systems installed on or after October 1, 2007, that serve farms, single-family homes or multi-family dwellings limited to four units. ([Conn. Gen. Stat. § 12-81 \(57\)](#))

3.4.2. State Laws and/or Regulations

Connecticut has passed several state laws that support clean energy deployment, including:

- **Green Loan Guaranty Fund** – Act Section 124 transfers the Green Loan Guaranty Fund to CEFIA from the Connecticut Health and Educational Facilities Authority (CHEFA) to identify eligible energy efficiency and renewable energy projects for residential, non-profit and small businesses (i.e. less than 50 employees).
- **Heating Equipment Replacement Program** – Act Section 116 requires DEEP to establish a residential heating equipment program, allowing customers to finance (via on-bill financing or other mechanism) the installation of energy efficient natural gas or heating oil burners, boilers and furnaces to replace electric heating systems, or burners boilers and furnaces that are not less than 7 years old with an efficiency rating of not more than 75%.

- **Installation of Metering Equipment** – Public Act 07-242 Section 39 (now codified at [Conn. Gen. Stat. § 16-243h](#)) states that the electric distribution companies (EDCs), at the request of a residential customer, **shall** provide for the installation of metering equipment that measures electricity consumed by such customer, deducts from the measurement the amount of electricity produced by the customer and not consumed by the customer, and registers, for each billing period, the net amount of electricity produced by the customer.
- **Interconnections Standards** – In December 2007, the Connecticut Department of Public Utility Control (DPUC) approved new interconnection guidelines for distributed energy systems up to 20 megawatts (MW) in capacity. Connecticut's interconnection guidelines apply to the state's two investor-owned utilities -- CL&P and UI -- and are modeled on the Federal Energy Regulatory Commission's (FERC) interconnection standards for small generators. ([Conn. Gen. Stat. § 16-243a](#))

Connecticut's interconnection guidelines, like FERC's standards, include provisions for three levels of systems:

- Certified, inverter-based systems no larger than 10 kilowatts (kW) in capacity (application fees: \$100);
- Certified systems no larger than 2 megawatts (MW) in capacity (application fees: \$500); and
- All other systems no larger than 20 MW in capacity. Note that the guidelines include "additional process steps" for generators greater than 5 MW (application fees: \$1000, study fees will also apply).

Connecticut's guidelines include a standard interconnection agreement and application fees that vary by system type. However, Connecticut's guidelines are stricter than FERC's standards, differing from the federal standards in several significant ways:

- Customers are required to install an external disconnect switch and an interconnection transformer.
- Customers must indemnify their utility against "all causes of action," including personal injury or property damage to third parties.
- Customers are required to maintain liability insurance in specified amounts based on the system's capacity.
- In addition, the utilities were required to collaboratively submit to the DPUC a status report on the research and development of area network

interconnection standards. This report was completed in December 2009, and the DPUC has reached a final decision ([03-01-15RE02](#)) on the docket. The DPUC has determined that the utilities can interconnect inverter-based generators (up to 50 kW) on area networks. They also determined that once the IEEE 1547.6 standards are developed (which will address this issue on a national level), they will review the standards for area networks.

- **Locally Manufactured or Assembled and Distressed Municipalities** – Act Section 109 allows the Public Utility Regulatory Authority (PURA) to authorize additional incentives for residential PV projects using system components manufactured or assembled in Connecticut, and additional incentives if manufactured or assembled in distressed municipalities or a targeted investment community.
- **Long-Term REC Contracts** – Public Act 07-242 Section 71 allows EDCs to procure renewable energy certificates (RECs) from Class I, Class II and Class III renewable energy sources through long-term contract mechanisms. The EDCs **may** enter into long-term contracts for not more than 15 years to procure such RECs.
- **Net Metering** - Connecticut's two investor-owned utilities -- CL&P and UI -- are required to provide net metering to customers that generate electricity using "Class I" renewable-energy resources, which include solar, wind, landfill gas, fuel cells, sustainable biomass, ocean-thermal power, wave or tidal power, low-emission advanced renewable-energy conversion technologies, and hydropower facilities up to two megawatts (MW) in capacity. Legislation enacted in June 2007 ([Public Act 07-242](#), Section 39) raised the individual system capacity limit to 2 MW and extended net metering to all customer classes. These changes took effect October 1, 2007. ([Conn. Gen. Stat. § 16-243h](#))

There is no stated limit on the aggregate capacity of net-metered systems in a utility's service territory. Any customer net excess generation (NEG) during a monthly billing period is carried over to the following month as a kilowatt-hour (kWh) credit. At the end of an annualized period, the utility pays the customer for any remaining NEG at the utility's avoided-cost rate. In January 2008, the DPUC ordered CL&P to calculate the reimbursement for PV systems, for any NEG at the end of an annualized period, on a time-of-use/generation basis. This significantly increases the financial benefits of net metering for PV system owners.

Net-metered customers with systems greater than 10 kilowatts (kW) are assessed for the state's competitive transition assessment and the state's systems benefits charge, based on the amount of energy consumed by the customer from the facilities of the utility without netting any electricity produced

by the customer.

- **Residential Solar PV Investment Program** – Act Section 106 requires CEFIA to design and implement a residential PV investment program. The program must result in a minimum of thirty (30) megawatts (MW) of new residential PV installations in Connecticut on or before December 31, 2022. This Program will be funded by no more than one-third of the total surcharge collected annually through the Clean Energy Fund.
- **Sales and Use Taxes for Items Used in Renewable Energy Industries** – Connecticut enacted legislation in May 2010 (H.B. 5435) that established a sales and use tax exemption for equipment, machinery and fuels used to manufacture solar thermal (active or passive) systems, solar electric systems, wind-power electric systems, or geothermal resource systems. ([Conn. Gen. Stat. §12-412\(117\)\(B\)](#))
- **Sales and Use Tax Exemption for Energy Efficient Products** – In Connecticut, *residential* weatherization products *for residential use only* are exempt from the state's sales and use tax. Eligible residential weatherization products include CFLs, programmable thermostats, window film, caulking, window and door weather strips, insulation, water heater blankets, water heaters, natural gas and propane furnaces and boilers that meet the federal Energy Star standard, windows and doors that meet the federal Energy Star standard, oil furnaces and boilers that are not less than 84% efficient and ground-source heat pumps that meet the minimum federal energy efficiency rating. Exemption only applies to in-store sales. ([Conn. Gen. Stat. § 12-412k](#))
- **Sales and Use Tax Exemption for Solar and Geothermal Systems** – Connecticut enacted legislation in June 2007 (H.B. 7432) that established a sales and use tax exemption for solar energy equipment and geothermal resource systems. H.B. 7432 added passive and active solar water-heating systems, passive and active solar space-heating systems, and solar-electric systems to the list of exempt technologies. The sales and use exemption covers both the equipment related to eligible systems, and labor (services) relating to the installation of eligible systems. The exemption has no expiration date. ([Conn. Gen. Stat. § 12-412](#))
- **Solar and Wind Contractor Licensing** - The Connecticut Department of Consumer Protection (DCP) is authorized to issue licenses for solar-thermal work, solar-electric work and wind-electric work. Solar electricity work is defined as "the installation, erection, repair, replacement, alteration, or maintenance of solar PV or wind generation equipment used to distribute or store ambient energy for heat, light, power or other purposes to a point immediately inside any structure or adjacent to an end use." The DPC has adopted regulations governing the following types of licenses:

- A person who holds a PV-1 Limited Solar Electric Contractor license may perform only work limited to solar-electric systems (and wind-energy systems). The requirements to qualify for this license examination are two years (4,000 work hours) as a solar journeyman (apprentice) and 144 hours of school/year or equivalent experience and training.
- A person who holds a PV-2 Limited Solar Electric Journeyman license may perform solar-electric work (including wind-energy work) only while in the employ of a licensed electrical contractor. The requirements to qualify for this license examination are the completion of a registered apprenticeship program or one year equivalent experience and training.

It should be noted that an individual licensed as "E-1" or "E-2," (electrical licenses) does not require an additional PV license. That said, the individuals with E-1 or E-2 licenses are not exempt from the additional insurance requirements required under CEFIA's program and, for purposes of the rebate, they must still be experienced or qualified to site and install PV systems (as detailed in legislation, [Public Act 10-80](#)). ([Conn. Gen. Stat. § 20-330 et seq.](#))

- **Weatherization** – Public Act 07-242 Section 33 directs annual Conservation and Load Management (C&LM) plans to include an assessment of steps to achieve 80% residential weatherization by 2030.

3.4.3. Federal Laws and/or Regulations

The federal government has passed several laws that support clean energy deployment in Connecticut, including:

- **Energy Efficient Mortgages** – Homeowners can take advantage of energy efficient mortgages (EEM) to either finance energy efficiency improvements to existing homes, including renewable energy technologies, or to increase their home buying power with the purchase of a new energy efficient home. The U.S. federal government supports these loans by insuring them through Federal Housing Authority (FHA) or Veterans Affairs (VA) programs. This allows borrowers who might otherwise be denied loans to pursue energy efficiency, and it secures lenders against loan default.
- **Modified Accelerated Cost-Recovery System (MACRS) + Bonus Depreciation (2008-2012)** – Under the federal Modified Accelerated Cost-Recovery System (MACRS), businesses may recover investments in certain property through depreciation deductions. The MACRS establishes a set of class lives for various types of property, ranging from three to 50 years, over which the property may be depreciated. A number of renewable energy technologies are classified as five-year property (26 USC § 168(e)(3)(B)(vi)) under the MACRS, which refers to 26 USC § 48(a)(3)(A), often known as the energy investment tax credit or ITC to define eligible property. Such property includes solar electric technologies. ([26 USC § 48](#))

The federal *Economic Stimulus Act of 2008*, enacted in February 2008, included a 50% first-year bonus depreciation (26 USC § 168(k)) provision for eligible renewable-energy systems acquired and placed in service in 2008. This provision was extended (retroactively for the entire 2009 tax year) under the same terms by *The American Recovery and Reinvestment Act of 2009*, enacted in February 2009. Bonus depreciation was renewed again in September 2010 (retroactively for the entire 2010 tax year) by the *Small Business Jobs Act of 2010* (H.R. 5297).

In December 2010 the provision for bonus depreciation was amended and extended yet again by *The Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010* (H.R. 4853). Under these amendments, eligible property placed in service after September 8, 2010 and before January 1, 2012 qualifies for 100% first-year bonus depreciation. For 2012, bonus depreciation is still available, but the allowable deduction reverts from 100% to 50% of the eligible basis.

To qualify for bonus depreciation, a project must satisfy these criteria:

- the property must have a recovery period of 20 years or less under normal federal tax depreciation rules;
- the original use of the property must commence with the taxpayer claiming the deduction;
- the property generally must have been acquired during the period from 2008 - 2012; and
- the property must have been placed in service during the period from 2008 - 2012.

If property meets these requirements, the owner is entitled to deduct a significant portion of the adjusted basis of the property during the tax year the property is first placed in service. As noted above, for property acquired and placed in service after September 8, 2010 and before January 1, 2012, the allowable first year deduction is 100% of the adjusted basis (i.e., the property is fully depreciated and additional deductions under MACRS cannot be claimed). For property placed in service from 2008 - 2012, for which the placed in service date does not fall within this window, the allowable first-year deduction is 50% of the adjusted basis. In the case of a 50% first year deduction, the remaining 50% of the adjusted basis of the property is depreciated over the ordinary MACRS depreciation schedule. The bonus depreciation rules do not override the depreciation limit applicable to projects qualifying for the federal business energy tax credit. Before calculating depreciation for such a project, including any bonus

depreciation, the adjusted basis of the project must be reduced by one-half of the amount of the energy credit for which the project qualifies.

- **Residential Energy Conservation Subsidy Exclusion** – According to Section 136 of the U.S. Code, energy conservation subsidies provided to customers by public utilities, either directly or indirectly, are non-taxable. This exclusion does *not* apply to electricity-generating systems registered as "qualifying facilities" under the Public Utility Regulatory Policies Act of 1978. If a taxpayer claims federal tax credits or deductions for the energy conservation property, the investment basis for the purpose of claiming the deduction or tax credit must be reduced by the value of the energy conservation subsidy (i.e., a taxpayer may not claim a tax credit for an expense that the taxpayer ultimately did not pay). ([26 USC § 136](#))

The term "energy conservation measure" includes installations or modifications primarily designed to reduce consumption of electricity or natural gas, or to improve the management of energy demand. Eligible dwelling units include houses, apartments, condominiums, mobile homes, boats and similar properties. If a building or structure contains both dwelling units and other units, any subsidy must be properly allocated.

The definition of "energy conservation measure" implies that utility rebates for residential solar-thermal projects and solar-electric systems may be non-taxable. However, the IRS has not ruled definitively on this issue. Taxpayers considering using this provision for a renewable energy system should discuss the details of the project with a tax professional.

Other types of utility subsidies that may come in the form of credits or reduced rates might also be non-taxable, according to IRS Publication 525. This publication states: "If you are a customer of an electric utility company and you participate in the utility's energy conservation program, you may receive on your monthly electric bill either: a reduction in the purchase price of electricity furnished to you (rate reduction), or a nonrefundable credit against the purchase price of the electricity. The amount of the rate reduction or nonrefundable credit is not included in your income."

- **Residential Renewable Energy Tax Credit** – Established by the *Energy Policy Act of 2005*, the federal tax credit for residential energy property initially applied to solar-electric systems, solar water heating systems and fuel cells. [The Energy Improvement and Extension Act of 2008](#) (H.R. 1424) extended the tax credit to small wind-energy systems and geothermal heat pumps, effective January 1, 2008. Other key revisions included an eight-year extension of the credit to December 31, 2016; the ability to take the credit against the alternative minimum tax; and the removal of the \$2,000 credit limit for solar-electric systems beginning in 2009. The credit was further enhanced in February 2009 by [The American Recovery and Reinvestment Act of 2009](#) (H.R. 1: Div. B, Sec. 1122, p. 46), which

removed the maximum credit amount for all eligible technologies (except fuel cells) placed in service after 2008.

A taxpayer may claim a credit of 30% of qualified expenditures for a system that serves a dwelling unit located in the United States and used as a residence by the taxpayer. Expenditures with respect to the equipment are treated as made when the installation is completed. If the installation is at a new home, the "placed in service" date is the date of occupancy by the homeowner. Expenditures include labor costs for on-site preparation, assembly or original system installation, and for piping or wiring to interconnect a system to the home. If the federal tax credit exceeds tax liability, the excess amount may be carried forward to the succeeding taxable year. The excess credit may be carried forward until 2016, but it is unclear whether the unused tax credit can be carried forward after then. The maximum allowable credit, equipment requirements and other details vary by technology, as outlined below. ([26 USC § 25D](#))

3.5. Marketing and Outreach

Historically, customer participation in Connecticut residential solar programs has been driven by rebates and "no money down" financing options and was supported by limited, conventional marketing strategies such as collateral, event exhibits and workshops. As we now seek to scale up solar deployment, introduce innovative financing options and move beyond the "early adopter" customer audience, it is imperative that the Marketing and Outreach for the program also transition to think and act like retailers.

Drawing upon best practices identified by Lawrence Berkeley National Laboratory, National Renewable Energy Laboratory (NREL) and the Clean Energy Group, we will develop a Marketing Plan that will drive demand for residential solar systems.

Specifically, the Plan will:

- Identify community-based customer aggregation strategies that result in not only an increase in customer demand, but also the reduction of the installed costs of solar PV systems.
- Improve the technology's value proposition by creating messages about the affordability of solar, the availability of new financing mechanisms, the opportunity to reduce electric bills, the enhancement of property values and the security of the investment.
- Reinforce the reliability of solar technology through highly visible solar installations, positive testimonials from businesses, institutions and residents that have installed solar power, participation in solar home tours and educational seminars for specific targeted segments.
- Reduce the complexity of the solar decision-making process by simplifying the application process, reducing time for permitting, planning and zoning and

interconnection processes and providing trusted advisors to assist prospective customers during the decision-making process.

- Overcome customer inertia by strong calls for action, promotional incentives and activities and raising awareness as to the program's declining incentive program.

3.5.1. Research

The Marketing Plan will be further guided by an analysis of customer motivations and attitudes toward solar power from a variety of sources including existing market research on solar programs, customer research developed through the statewide energy marketing campaign that will be conducted jointly by the Connecticut Department of Energy and Environmental Protection, the CEEF and CEFIA, and Connecticut-specific surveys of solar customers, "inerts" (customers that are interested in solar but have not yet acted), contractors and financing agents.

3.5.2. Promotion

Promoting the Program through various strategies over time will ensure the program's success by helping households understand the economic and environmental value of clean energy. Various strategies will be pursued, including, but not limited to:

- **Program Brand** – developing a program brand and identity in order to ensure the success of the Program.
- **Program Launch** – organizing a launch event to bring public attention to the Program and help galvanize customers and contractors.
- **Web Page** – creating an innovative and informative web page that provides households with information to act including online leader billboards, "Top 10" and "Worst 10" lists, testimonials, social media pages, etc.
- **Paid Media** – accessing paid media advertising through television, radio and web ads for target markets.
- **Earned Media** – seeking out opportunities for local earned media stories in community papers and television through tactics like ribbon-cutting ceremonies, town events, etc.

Taking the lessons learned from the Neighbor to Neighbor Energy Challenge, a \$4.2 million DOE grant that CEFIA is administering in Connecticut, will provide the Program with key marketing insights.

3.5.3. Customer Acquisition

The Program will include a number of innovative and cost-effective customer acquisition strategies taken from national "best practices" including, but not limited to:

- **Program Campaign Brand** – creating a statewide “call to action” for homeowners to take action on energy efficiency and renewable energy. As part of the statewide campaign on energy that CEFIA is collaborating with DEEP and the CEEF on, a program brand will call attention to an action that homeowners can take to participate in the Program.
- **Clean Energy Communities Incentive** – providing performance-based rewards that drive local citizens to action can accelerate market demand and reduce customer acquisition costs.¹² Through the Clean Energy Communities program, cities and towns will receive rewards (i.e. solar PV systems, EV recharging stations, etc.) as more and more citizens, businesses and institutions lead Connecticut’s transition to a clean energy economy.
- **Clean Energy Communities Solarize Test Pilot Campaigns** – a volume-purchasing customer aggregation strategy that uses volunteer-driven community efforts to bring the benefits of solar PV and energy efficiency to homes. The program is anticipated to scale-up up the demand for solar PV deployment while also decreasing the installed cost of the systems. Portland, Oregon and Massachusetts have implemented such successful programs.
- **Energy Coach Program** – engaging households that have installed solar PV systems as “Ambassadors” and providing technical assistance through an expert “Coach” to households considering solar PV, will increase customer acquisition.
- **Better Business Bureau** – providing a mechanism to allow households that have participated in the Program to rate the product and service that they received from a contractor will provide information to advance marketplace trust between potential customers and contractors.
- **Clean Energy Loan Program** – providing households with a low-cost residential clean energy financing program that integrates renewable energy deployment with energy efficiency, will allow the market in Connecticut to move away from subsidies and towards finance – a more sustainable way to advance a market.

These are but a few of the customer acquisition strategies that will be deployed through the Program to scale-up the deployment of residential clean energy systems.

3.5.4. Other Programs

- **SunShot Initiative** – In December of 2011, CEFIA won a \$2.1 million grant through the DOE’s competitive SunShot Initiative. Round 1 of the \$480,000 project is to work with 12 Clean Energy Communities to reduce non-hardware

¹² *Climate Policy and Voluntary Initiatives: An Evaluation of the Connecticut Clean Energy Communities Program*, Matthew Kotchen: National Bureau of Economic Research (June 2010).

related costs for rooftop solar PV by 15 percent. The project will address permitting and interconnection processes that will result in a standardized online permitting application and an online database of local processes, net metering and interconnection standards, and planning and zoning that will result in a model ordinance for condominium associations and historical preservation. If successful in Round 1, then a \$1.6 million Round 2 project will ensure scaling up the effort to across Connecticut and into New England. As part of the project, CEFIA will implement Solarize campaigns in participating communities.

- **Neighbor to Neighbor Energy Challenge** – In August of 2010, the CCEF won a \$4.2 million 3-year grant through the DOE’s competitive Energy Efficiency Conservation Block Grant General Innovation Fund Program. The Neighbor to Neighbor Energy Challenge is a nonprofit community savings program that engages residents in 14 Clean Energy Communities to reduce their home’s energy use by 20%. As residents join and take actions to help their household, they earn points that can be redeemed for community rewards. The lessons learned from the challenge will be incorporated into the Program.

3.6. Operational Impacts

Given the comprehensive nature of the Program, there is a need to redirect staff-time to successfully administer various components of the Program, including incentives, marketing, legal, technology, and evaluation measurement and verification. It is planned that between 4.5 to 5.0 FTE’s will be required to successfully implement the Program. In order to better support human resources, technology systems will need to be developed to ensure quicker and more thorough processing of applications. It is expected that the financing aspects of the program (i.e. originating and servicing) will be subcontracted out.

3.7. Documentation Plan

In addition to the Program Plan, the Chief of Staff will work with the Director of Renewable Energy Deployment to develop a program manual. The program manual will be a document that changes over time as systems and processes change, but will be used as a guide to train anyone to step into and support the implementation of the Program.

The key documents for the Program include:

- Program Plan
- Program Manual
- Fact sheets and online documentation for customers and contractors
- RFP’s for services
- Contracts with subcontractors

These are but a few of the key documents for the Program.

3.8. Workforce Development Impact

3.8.1. Survey

Per Section 106 of the Act, CEFIA will identify barriers to the development of a permanent Connecticut-based workforce and shall make provision for comprehensive training, accreditation, and certification programs through institutions and individuals accredited and certified to national standards.

In December of 2011, CEFIA, in collaboration with the CBIA Education Foundation, conducted a survey of 128 residential solar PV installers, residential solar thermal installers, and HES contractors. 80% of those surveyed were CEFIA approved installers. The key survey findings and barriers to the development of a permanent Connecticut-based workforce are listed below.

Hiring plans:

- **93% of respondents have difficulty hiring workers**
- The top three most difficult positions employers have difficulty finding are
 - Construction (HVAC, general skilled laborers)
 - Technical sales
 - Installation, maintenance, repair
- 63% of the respondents agree that the Act will have positive impact on their businesses
- 49% of the respondents consider adding more workers for existing job titles based on the Act
- 45% of the respondents will be hiring one to two employees next year, 34% will be hiring three to five employees next year, and 17% of the respondents anticipate adding more than 20 workers in the next three and five years

Training requirements; certifications and licenses:

- **65% of respondents believe their current workforce will need to upgrade their skills to continue performing their jobs**
- Desired certifications and licenses include:
 - OSHA Safety Training
 - BPI
 - PV-1 / PV-2
 - ST-1 / ST-2

- E-1

Pre-employment testing:

- 56% of the respondents answered yes when asked whether the company conducts pre-employment testing
- 70% choose a basic knowledge test follows
- 60% use specific skills test such as communication, math, computer proficiency, safety, random problem solving, schematic reading, or NABCEP

Major barriers finding or retaining employees:

- **The major barrier companies faces in finding or retaining employees is applicants' lack job-specific skills and qualifications – 76% of the respondents face this challenge**

Average entry-level wage:

- 26% provide average hourly wages between \$10.01 and \$14.99
- 41% provide average hourly wages between \$15.00 and \$19.99
- 20% provide average hourly wages between \$20.00 and \$24.99
- 2% have entry-level employees with over \$40 average hourly wage.

Average age:

- 30% has workforces with an average age between 25 and 29
- 49% of the respondents have workforces with an average age between 30 and 39
- 13% has workforces with an average age between 40 and 49

In January of 2012, CEFIA conducted a Residential Solar PV Investment Program Survey of approximately 100 solar PV industry stakeholders; including contractors and third party energy service providers. The key survey findings are listed below.

Total number of employees:

- 59% have 0-10 employees total
- 15% have a total of over 50 employees
- 65% have 0-10 employees located in Connecticut
- 18% have 11-20 employees located in Connecticut

Highest installation cost associated with PV:

- **73% identified equipment as their highest cost**

- 24% identified labor as their highest cost

Expansion of company to provide energy efficiency services:

- 29% of companies currently offer energy efficiency services
- 18% will be expanding
- **53% will not be expanding**

Types of training employers will be seeking for employees:

- **PV-1 59%**
- E-1 34%
- E-2 34%
- ST-1 22%
- STC-1 9%
- **Solar Sales 81%**
- **Marketing 41%**
- Customer Service 31%
- **Solar Finance 47%**
- BPI 22%
- CEM 16%

3.8.2. Workforce Support

As a result of the Act, customer demand for clean energy in Connecticut, especially rooftop solar PV, will increase significantly. The increase in customer demand will result in an increase in the supply of a skilled clean energy workforce. CEFIA's predecessor, the Connecticut Clean Energy Fund, installed over 10 MW of residential solar PV since 2004. CEFIA is mandated to install *at least* 30MW of residential solar by 2022. The 30 MW mandate, in addition to the Z-REC market, will significantly expand the clean energy economy in Connecticut.

As mandated by statute, CEFIA must make provisions for comprehensive training, accreditation, and certification programs through institutions and individuals accredited and certified to national standards that support the development of a permanent Connecticut-based workforce. In order to maximize the effectiveness of CT's workforce development community training programs need to be expanded; apprenticeship and internship programs must be expanded and/or implemented. CEFIA shall provide support to ensure that Connecticut's workforce has the required credentials (i.e. certifications, licenses) and skills to meet the projected demand by providing the workforce development support suggested below.

- **Training for Contractors**
CEFIA will offer bi-annual seminars in energy efficiency in collaboration with the CEEF. All renewable energy contractors and energy efficiency contractors (HES vendors) will be invited to participate in the seminar. An overview of energy efficiency measures and example paybacks will be presented. CEFIA and CEEF

programs will be reviewed and there will be time for contractor Q&A. The culmination of the event will include a contractor meet and greet. This time is intended to give contractors an opportunity to meet one another and forge relationships (i.e.: PV contractor working with an HES contractor).

- **Clean Energy Workforce RFP**

CEFIA seeks to further the development and institution of self-sustaining clean energy training and education programs at public and private community colleges and universities, regional employment boards, community-based nonprofit organizations, and union and labor organizations. By working with these Connecticut entities and by providing funding for the purpose of purchasing clean energy demonstration and training equipment for practical laboratory and/or training space, the CEFIA will support these institutions and further educate students, clients and trainees in real-world scenarios that will prepare them for opportunities in the clean energy sector. Grants made through this solicitation are intended to prepare the Connecticut's training providers to meet the workforce needs of the clean energy sector. Programs must be designed based on local clean energy businesses' workforce needs.

- **Green Technologies Initiatives Program**

The Green Technologies Initiatives Program incorporates solar PV, solar thermal, weatherization and energy efficiency hands on training. The hands on component, E-Houses, are comprised of renewable energy technologies and energy efficiency technologies. The E-House provides both Weatherization and Building Analyst practical hands on experience, along with all required safety training as required by both NABCEP and BPI. The Green Technologies Program includes training and professional development for technical high school instructors, as well as curriculum and other classroom materials.

- **Clean Energy Sector Internship Program**

The Clean Energy Sector Internship Program focuses on enhancing the talent pipeline for Connecticut companies engaged in the clean energy industry. The Clean Energy Sector Internship Program will facilitate the placement of current students and recent graduates who are considering career opportunities in clean energy through paid summer internships across the state.

Section 4 - Funding Structure and Amounts

4.1. Funding Level and Type

The Act focuses on CEFA providing Expected Performance-Based Buy-down Incentives (EPBB) to support households that seek to own solar PV systems and Performance-Based Incentives (PBI) for households that seek to lease solar PV systems. The proposed combined budget for the EPBB and PBI is ~~\$51.0044.50~~ million – ~~\$25.5022.25~~ million for EPBB and ~~\$25.5022.25~~ million for the PBI (see Table 711). If achieved, the Program would result in the installation of over 50 MW of residential solar PV systems over a 10-year period and a payback period of between 5 to 7 years for residential customers.

Table 711. Proposed Budget for the EPBB and PBI Schedule of Incentives by Steps

Step	EPBB Budget (\$MM)	PBI Budget (\$MM)	Total Budget (\$MM)	Estimated Installed Capacity (kW)	Estimated Systems Installed
1	<u>1.25</u>	<u>1.25</u>	<u>\$2.50</u>	<u>1,261</u>	<u>204</u>
2	<u>2.50</u>	<u>2.50</u>	<u>\$5.00</u>	<u>3,036</u>	<u>491</u>
3	<u>3.00</u>	<u>3.00</u>	<u>\$6.00</u>	<u>4,296</u>	<u>695</u>
4	<u>3.50</u>	<u>3.50</u>	<u>\$7.00</u>	<u>5,728</u>	<u>927</u>
5	<u>4.00</u>	<u>4.00</u>	<u>\$8.00</u>	<u>9,102</u>	<u>1,473</u>
6	<u>4.00</u>	<u>4.00</u>	<u>\$8.50</u>	<u>12,165</u>	<u>1,969</u>
7	<u>4.00</u>	<u>4.00</u>	<u>\$8.50</u>	<u>15,764</u>	<u>2,551</u>
Total	<u>\$22.25</u>	<u>\$22.50</u>	<u>\$44.50</u>	<u>51,353</u>	<u>8,309</u>

Although the EPBB and PBI step budgets are the same, the cash outlay for the PBI differs. Whereas the EPBB incentives are paid out upfront at the completion of a project, the PBI is paid out on a quarterly basis over a 6-year timeframe based on the performance of the system (see Tables 8-12 and 913). One of the many benefits of a PBI, is that the incentives are spread out over time and therefore do not require a large upfront source of funds.

Table 812. Cash Outlay for the EPBB and PBI through the End of the Schedule of Incentives

Step	EPBB Cash Outlay (\$MM)	PBI Cash Outlay (\$MM)	Total Cash Outlay (\$MM)
1	<u>1.25</u>	<u>\$0.21</u>	<u>\$1.46</u>
2	<u>2.50</u>	<u>\$0.63</u>	<u>\$3.13</u>
3	<u>3.00</u>	<u>\$1.13</u>	<u>\$4.13</u>
4	<u>3.50</u>	<u>\$1.71</u>	<u>\$5.21</u>
5	<u>4.00</u>	<u>\$2.38</u>	<u>\$6.38</u>
6	<u>4.00</u>	<u>\$3.04</u>	<u>\$7.04</u>

7	4.00	\$3.50	\$7.50
Total	\$22.25	\$12.60	\$34.85

Table 913. Cash Outlay for the EPBB and PBI Incentives for the Years Following the Schedule of Incentives

Year Following Step 7	EPBB Cash Outlay (\$MM)	PBI Cash Outlay (\$MM)	Total Cash Outlay (\$MM)
1	\$0.00	\$3.08	\$3.08
2	\$0.00	\$2.58	\$2.58
3	\$0.00	\$2.00	\$2.00
4	\$0.00	\$1.33	\$1.33
5	\$0.00	\$0.67	\$0.67
Total	\$0.00	\$9.66	\$9.66

It is anticipated that over a 4415-year period, a programmatic investment of \$54.45 million will be made in declining incentives to support the Program.

4.2. Level of Support for Individual Awards

The EPBB supports local installers and homeowners that seek to own their solar PV system. Starting at an incentive level of \$2.45/W for up to 5 kW and \$1.25 for greater than 5 kW and up to 10 kW in Step 1 and ending at \$0.55/W for up to 10 kW in Step 7, CEFIA seeks to support the installation of nearly 26-25 MW of solar PV in over 4,000 homes. EPBB incentives will be provided at various levels up to and including 5 kW for the first level and greater than 5 kW and up to and including 10 kW for the second level. CEFIA will not provide EPBB incentives beyond 10 kW per home.

Projects that incorporate major components that are manufactured or assembled in Connecticut and/or major components that are manufactured or assembled in a distressed municipality or strategic investment community, will receive an additional 5 and 10%, respectively, from the Public Utility Regulatory Authority (PURA) – see Table 14. CEFIA anticipates processing about 35 applications and expending between \$400,000 to \$500,000 a month through the Program (see Table 10).

Table 1014. Proposed EPBB Schedule of Incentives by Step

Step	EPBB Incentive ≤5 kW (\$/W)	EPBB Bonus Incentive of 5% @ ≤5 kW (\$/W)	EPBB Incentive >5 kW and ≤10 kW (\$/W)	EPBB Bonus Incentive of 5% @ >5 kW and ≤10 kW (\$/W)
1	2.45	\$0.12	\$1.25	\$0.06
2	2.10	\$0.11	\$0.90	\$0.05
3	1.75	\$0.09	\$0.55	\$0.03

4	1.40	\$0.07	\$0.20	\$0.01
5	1.05	\$0.05	\$0.00	\$0.00
6	0.75	\$0.04	\$0.00	\$0.00
7	0.55	\$0.03	\$0.00	\$0.00

The PBI supports third-party financiers working with homeowners that seek to lease their solar PV system. Starting at an incentive level of ~~\$0.3430/kWh for up to 5 kW and \$0.01 for greater than 5 kW and up to 10 kW~~ in Step 1 and ending at \$0.08/kWh ~~for up to 10 kW~~ in Step 7, CEFIA seeks to support the installation of nearly 26 MW of solar PV in over 4,000 homes. ~~PBI incentives will be provided at various levels up to and including 5 kW for the first level and greater than 5 kW and up to and including 10 kW for the second level.~~—CEFIA will not provide PBI incentives beyond 10 kW per home.

Projects that incorporate major components that are manufactured or assembled in Connecticut and/or major components that are manufactured or assembled in a distressed municipality or strategic investment community, will receive an additional 5 and 10%, respectively, from the Public Utility Regulatory Authority (PURA) ~~— see Table 15. CEFIA anticipates processing about 35 applications and expending approximately \$400,000 a month through the Program (see Table 11).~~

Table 14.15. Proposed PBI Schedule of Incentives by Step

Step	PBI Incentive ≤5-10 kW (\$/kWh)	PBI Bonus Incentive of 5% @ >5 kW and ≤10 kW (\$/kWh)
1	\$0.300	\$0.015
2	\$0.243	\$0.012
3	\$0.209	\$0.010
4	\$0.198	\$0.010
5	\$0.137	\$0.010
6	\$0.107	\$0.010
7	\$0.087	\$0.000

It is envisioned, that as the level of EPBB and PBI as well as installed costs decline over time, that financing programs and energy efficiency will provide the necessary capital to support the sustained orderly development of the residential solar PV industry in Connecticut.

It should be noted that per Section 106 of P.A. 11-80 that the proposed Schedule of Incentives can be changed.

Nothing in this subsection shall restrict the authority from modifying the approved incentive schedule before the issuance of its next comprehensive plan to account for changes in federal or state law or regulation or developments in the solar market when such changes would affect the expected return on investment for a typical residential solar photovoltaic system by twenty per cent or more.

If CEFIA determines that a modification is necessary to the Schedule of Incentives, then it will provide installers with an advanced notification of 8 weeks prior to instituting the change.

4.3. Financing

In collaboration with the CEEF, CL&P, and UI, CEFIA will provide financing support for a long-term comprehensive loan and/or lease Residential Clean Energy Financing Program (the Finance Program).

An American Recovery and Reinvestment Act (ARRA) State Energy Program (SEP) grant in the amount of \$8,250,000 will be used for credit enhancements to support the implementation of the program. \$7,000,000 in loan loss reserves and interest rate buy-downs will be used for a Residential Clean Energy Financing Program (see descriptions below) and \$1,250,000 will be used for a Clean Energy Financial Innovation Program.

The sections below on the Finance Program are still in development. CEFIA is being provided technical assistance by the DOE to develop a comprehensive residential clean energy financing program.

The purpose is to develop a low interest financing product that is competitive and sustainable and would eliminate the need for subsidies.

4.3.1. Sources of Capital

The Finance Program envisions attracting low cost capital from community banks, credit unions, community development financial institutions, pension funds, impact investors (i.e. foundations, university endowments, etc.) and/or through revolving loan funds from system benefit funds like CEFIA and/or CEEF.

The target fund for the Finance Program is \$25,000,000 and will provide financing for approximately 1,250 homes with a \$20,000 loan.

4.3.2. Financing Mechanism

The Finance Program is expected to be a secured 10 or 15 year loan backed by the solar PV assets and will seek to incorporate cost-effective energy efficiency measures with less than a 5-year payback be included as part of the project. The goal of the Finance Program is to ensure that the energy savings from the solar PV system and the cost-effective energy efficiency measures cover the costs of the debt service payments.

4.3.3. Collection Mechanism

Working with CL&P and UI, CEFIA seeks to establish an on bill repayment capability. It should be noted that the Connecticut Housing Investment Fund's (CHIF) energy efficiency loan program has an on bill repayment feature with CL&P and UI.

If on bill repayment is not an option, then direct billing will be required.

4.3.4. Enhancements

Several credit enhancements will be used for the Residential Clean Energy Financing Program, including an interest rate buydown, loan loss reserves, and renewable energy credits.

- **Interest Rate Buydown (IRB)** – the interest rate buy-down seeks to target an interest rate to the customer of 5.99%. Funds will come from ARRA SEP grants.
- **Loan Loss Reserves (LLR)** – a loan loss reserve seeks to leverage private capital at 4.5:1.0 Funds will come from ARRA SEP grants.
- **Renewable Energy Credits (RECs)** – CEFIA retains the ownership rights to the RECs created from the Program. A present value of a 15-year stream of RECs at the right price¹³ may be used to cover either the cost of the interest rate buy-down on their loan or to support cost-effective energy efficiency measures as part of the Program. The creation of a Clean Energy Victory Bond is being considered as a mechanism to generate funds upfront that get repaid over time through the sale of RECs. Per Section 71 of Public Act 07-242, CEFIA seeks to work with DEEP, PURA, and the electric distribution companies to engage in a long-term REC contract for the sale of its residential solar PV RECs.

4.3.5. Eligible Installers

For renewable energy, insured PV-1, E-1, ST-1 and STC-1 solar contractors. For PV installations at least one staff member must have achieved a passing score on the NABCEP entry level PV exam, or hold a full NABCEP certification.

For energy efficiency contractors, insured HES approved program vendors or a BPI certified contractor, CEM, or PE on the job who is a registered home improvement contractor with the Connecticut Department of Consumer Protection.

4.3.6. Eligible Measures

The eligible measures for the Finance Program include energy efficiency and renewable energy technologies, including, but not limited to (see Table 4.2.16):

¹³ The present value of 15-years of RECs generated from 1 kW of installed solar PV is \$450. This assumes a discount rate of 5% and a REC price of \$40.

Table 4.216. Sample List of Eligible Energy Efficiency and Renewable Energy Measures for the Finance Program

Energy Efficiency	Renewable Energy
▪ Lighting	▪ Solar PV
▪ Duct sealing	▪ Solar thermal hot water
▪ Air sealing	▪ Geothermal
▪ Insulation	▪ Micro-wind
▪ Furnace replacement	▪ Micro-CHP
▪ Boiler replacement	▪ Micro-fuel cell
▪ Window replacements	

The goal is to incorporate cost-effective energy efficiency into the economics of solar PV systems. Combining energy efficiency with solar PV results in a quicker payback and higher rates of return and net present values for the solar PV system.

4.3.7. Underwriting Criteria

A FICO score of 640 if salaried, 680 if self-employed for at least 2 years, 720 if self-employed for less than 2 years, no bankruptcy in the last 7 years, debt to income or monthly obligations to monthly income of 50% for all FICO scores.¹⁴

Or, if on-bill repayment, then the underwriting criteria of CL&P and UI are appropriate.

Section 5 - Process and Timeline

Per the Operating Procedures of CEFIA, there are programmatic, competitive and strategic investments that will be made for various components of the Program:

- **Incentives** – once the Board of Directors approves the schedule of incentives, CEFIA staff will manage those incentives as a program investment. It is expected that the Program will be launched in ~~February~~ March of 2012;
- **Financing** – at a future date, the Board of Directors will approve of the financing program, and CEFIA’s Executive Vice President and Chief Investment Officer will manage those resources per the competitive or strategic investment processes. It is expected that the financing program will be launched at the end of Q2 or the beginning of Q3 of 2012;
- **Marketing** – once the CEFIA Board of Directors approves the marketing budget, CEFIA’s Director of Marketing and Outreach will manage those resources per the competitive or strategic investment processes. It is expected that the marketing program will be launched at the end of Q2 or the beginning of Q3 of 2012. The launch of the Program will coincide with the financing product;

¹⁴ Based on the underwriting criteria of the Connecticut Solar Lease program.

- **Legal** – once the CEFIA Board of Directors approves the legal budget, CEFIA’s General Counsel will manage those resources per the competitive or strategic investment processes;
- **Workforce Development** – once the CEFIA Board of Directors approves the workforce development budget, CEFIA’s Director of Renewable Energy Deployment and Director of Marketing and Outreach will manage those resources per the competitive or strategic investment processes. It is expected that a series of workforce development programs will be launched at the end of Q1 of 2012;
- **Technology** – once the CEFIA Board of Directors approves the technology budget, CEFIA’s Chief of Staff and Director of Renewable Energy Deployment will manage those resources per the competitive or strategic investment processes. It is expected that technology solutions will be developed on an ongoing basis and that major systems will be launched in Q3 of 2012; and
- **Evaluation, Measurement, and Verification** – once the CEFIA Board of Directors approves the EM&V budget, CEFIA’s President and Chief of Staff will manage those resources per the competitive or strategic investment processes. It is expected that by the end of Q4 of 2012, an EM&V program will be in place.

On a quarterly basis, through the Deployment Committee, progress on the Program will be reported and discussed. Through the development of a dashboard, bi-weekly meetings on progress will be held to discuss progress towards goals and objectives.

5.1. Evaluation Criteria

Discuss the intended method and criteria for application evaluation including any weighting factors

5.2. Risk Analysis

Risks associated with the successful implementation of the Program are described below (see Table 4317).

Table 4317. Risks and Risk Mitigation Strategies for the Program

Risk	Risk Mitigation Strategy
Too much demand is created from either the EPBB or PBI incentive	<ul style="list-style-type: none"> ▪ Provide contractors notice 6-8 weeks ahead of any decrease in schedule of incentives ▪ Ensure appropriate staffing by shifting resources to manage program administration
Not enough demand is created from either the EPBB or PBI incentive	<ul style="list-style-type: none"> ▪ Increase marketing activities ▪ Provide a financing product ▪ Implement a “solarize” aggregation

	model to reduce system costs
Panel cost volatility	<ul style="list-style-type: none"> ▪ Implement a “solarize” aggregation model to control costs
REC price volatility	<ul style="list-style-type: none"> ▪ Use a conservative forecast of REC prices that under estimates REC proceeds that will support program expenditures
Utility price volatility	<ul style="list-style-type: none"> ▪ Adjust incentives accordingly to provide a reasonable system cost payback with due notice to contractors ahead of any change in schedule of incentive

5.3. Resolution Authorizing Approval of a Residential Solar Photovoltaic Investment Program

WHEREAS, Section 106 of Public Act 11-80 “An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut’s Energy Future” (the Act) requires CEFIA to design and implement a Residential Solar Photovoltaic Investment Program (Program Plan) that results in a minimum of thirty (30) megawatts of new residential PV installation in Connecticut before December 31, 2022.

WHEREAS, pursuant to Section 106 of the Act, CEFIA has prepared this Program Plan to identify barriers to the development of a permanent Connecticut-based solar workforce and support comprehensive training and accreditation and certification programs.

WHEREAS, pursuant to Section 106 of the Act, CEFIA has prepared this Program Plan to offer direct financial incentives, in the form of performance-based incentives or expected performance-based buydowns, for the purchase or lease of qualifying residential solar photovoltaic systems.

WHEREAS, CEFIA has prepared a declining incentive block schedule (“Schedule”) that: (1) provides for a series of solar capacity blocks the combined total of which shall be a minimum of thirty megawatts and projected incentive levels for each such block; (2) provides incentives that are sufficient to meet reasonable payback expectations of the residential consumer; (3) provides incentives that decline over time and will foster the sustained, orderly development of a state-based solar industry; (4) automatically adjusts to the next block; and (5) provides comparable economic incentives for the purchase or lease of qualifying residential solar photovoltaic systems.

NOW, therefore be it:

RESOLVED, that the Board hereby approves the Program Plan and Schedule.

RESOLVED, the Board directs CEFIA to submit the proposed Schedule to the Commissioner of the Department of Energy and Environmental Protection for approval as required by Section 106 of the Act.

RESOLVED, that the Board approves the allocation of ~~\$23,675,000~~16,200,000 for the Program Plan fiscal years 2012 through ~~2014~~2013.

RESOLVED, that this Board action is consistent with Section 106 of the Act.

RESOLVED, that the proper CEFIA officers are authorized and empowered to do all other acts and execute and deliver all other documents as they shall deem necessary and desirable to effect this Resolution.

Section 6 - Evaluation, Measurement and Verification

6.1. Data Format and Collection

The following is a list of some of the key data that will be collected through the Program (see Table [4418](#))

Table [4418](#). Partial Listing of Data Collection by Method and Frequency

Field Name	Method	Frequency
Customer Information – customer demographic data (i.e. household income, location, square footage, etc.), historical energy consumption (i.e. electricity, natural gas, etc.)	CRM	Once
Project Information – hardware costs, non-hardware costs, process timeline, system details (i.e. size, tilt, etc.), incentives, product type, etc.	Power Clerk	Once
Contractor Information – business, staff, FTEs on the job by specialization, etc.	Power Clerk	Once
System Performance – current energy consumption, clean energy production, REC production, time-of-day production, etc.	Metering equipment	Real-time
Energy efficiency – measures undertaken, costs, and estimated energy	CRM	Once

savings		
Financing – loan amount, interest rate, repayment history, lease rate factor , etc.	CRM	Monthly
Marketing – e-mail , ¹⁵ webinar , ¹⁶ event , ¹⁷ social media , ¹⁸ communications , ¹⁹ website , ²⁰ online ad , ²¹ direct mail , ²² and customer ²³	CRM or Salesforce.com	Monthly

Data for the Program will be collected electronically as much as possible so as to automate administrative functions and to analyze data quicker.

6.2. Data Analysis

Data from the Program will be presented in various forms, including, but not limited to:

- **Customer Portals** – a customized public web-page for the customer to see how their system is performing in real-time and to track the economic savings resulting from the installation. Widgets for social media will be created to allow a homeowner to share how their system is performing with friends and family.
- **Program Administrator Portal** – a portfolio manager private web-page for CEFIA to see how a contractor and the program are performing. The web-page will provide a dashboard to the staff and a mechanism to see how progress is being made towards goals. It will include the performance of the system as well as loan repayment performance.
- **Virtual Utility** – a public web-page that serves to aggregate all of the installations into an online virtual utility. The virtual utility can be queried to see how a town is performing for example.
- **Cost Index** – a public web-page that provides up-to-date information on hardware and non-hardware related costs, installed costs by geography, size, etc.

Data for the Program will be used to bring transparency to consumers and contractors in the marketplace and for administrative and evaluation purposes.

¹⁵ [Unsubscribed rate, bounce rate, open rate, and click-through rates](#)

¹⁶ [Attendee rate, drop-off rate, and engagement rate](#)

¹⁷ [Registration, attendees, and satisfaction](#)

¹⁸ [Gross views, connections, mentions, activity, engagement, conversions, and sentiment](#)

¹⁹ [Number of releases, number of interviews, number of press events, volume of coverage, share of voice, earned media value](#)

²⁰ [Views, visitors, unique views, backlinks, and conversions](#)

²¹ [Impressions, cost per click, cost per thousand views, cost per conversion, and cost per action](#)

²² [Eyes on, delivery rate, response rate, and cost per conversion](#)

²³ [Churn rate, customer lifetime value, acquisition cost, share of wallet, and customer engagement](#)

6.3. Metrics

The following is a list of several of the key metrics for the Program (see Table 4519):

Table 4519. Key Metrics for the Program

Metric	Current	Target
Installed capacity	12 MW	At least an additional 30 MW by the end of 2022 at half of the allowable incentives
<u>Payback Period</u>	<u>Greater than 10 years</u>	<u>Between 7 to 10 years in the first 5 years and then 5 to 7 years over the decade</u>
Incentives leveraged	1.0:1.0	Deploy \$200 million of private capital leveraged by about \$50 million from the CEF for a leverage ratio of 4.0:1.0
Financing leveraged		Leverage private capital at a ratio of 4.5:1.0
<u>Low interest rate</u>	<u>5.5 percent on the CT Solar Lease</u>	<u>TBD</u>
Financing performance	Very low defaults	Maintain very low default levels
Customer acquisition	2,000	At least an additional 7,500
<u>Installed cost</u>	<u>\$5,000/kW</u>	<u>Target reduction of between 20 to 40 percent over time</u>
Model community with 5% penetration rate	0	Between 5 to 10
<u>Non-hardware-related cost reductions</u>	<u>\$2,100/kW</u>	<u>At most \$1,785/kW (a 15% reduction from current costs)</u>
Energy efficiency measures	HES	HES or BPI-certified, cost-effective energy efficiency measures <u>(i.e. duct and air sealing and insulation)</u>
Workforce	TBD	Increase in the number of trained and employed people in the residential solar PV workforce
Accessibility	TBD	Demonstrate that solar PV system ownership or leasing can be accessible by limited and middle income households

Section 7 - Appendices

7.1. Section 106 of the Act

Sec. 106. (NEW) (*Effective July 1, 2011*) (a) The Clean Energy Finance and Investment Authority established pursuant to section 16-245n of the general statutes, as amended by this act, shall structure and implement a residential solar photovoltaic investment program established pursuant to this section, which shall result in a minimum of thirty megawatts of new residential solar photovoltaic installations located in this state on or before December 31, 2022, the annual procurement of which shall be determined by the authority and the cost of which shall not exceed one-third of the total surcharge collected annually pursuant to said section 16-245n.

(b) The Clean Energy Finance and Investment Authority shall offer direct financial incentives, in the form of performance-based incentives or expected performance-based buydowns, for the purchase or lease of qualifying residential solar photovoltaic systems. For the purposes of this section, "performance-based incentives" means incentives paid out on a per kilowatt-hour basis, and "expected performance-based buydowns" means incentives paid out as a one-time upfront incentive based on expected system performance. The authority shall consider willingness to pay studies and verified solar photovoltaic system characteristics, such as operational efficiency, size, location, shading and orientation, when determining the type and amount of incentive. Notwithstanding the provisions of subdivision (1) of subsection (j) of section 16-244c of the general statutes, as amended by this act, the amount of renewable energy produced from Class I renewable energy sources receiving tariff payments or included in utility rates under this section shall be applied to reduce the electric distribution company's Class I renewable energy source portfolio standard. Customers who receive expected performance-based buydowns under this section shall not be eligible for a credit pursuant to section 16-243b of the general statutes.

(c) Beginning with the comprehensive plan covering the period from July 1, 2011, to June 30, 2013, the Clean Energy Finance and Investment Authority shall develop and publish in each such plan a proposed schedule for the offering of performance-based incentives or expected performance-based buydowns over the duration of any such solar incentive program. Such schedule shall: (1) Provide for a series of solar capacity blocks the combined total of which shall be a minimum of thirty megawatts and projected incentive levels for each such block; (2) provide incentives that are sufficient to meet reasonable payback expectations of the residential consumer, taking into consideration the estimated cost of residential solar installations, the value of the energy offset by the system and the availability and estimated value of other incentives, including, but not limited to, federal and state tax incentives and revenues from the sale of solar renewable energy credits; (3) provide incentives that decline over time and will foster the sustained, orderly development of a state-based solar industry; (4) automatically adjust to the next block once the board has issued reservations for financial incentives provided pursuant to this section from the board fully committing the target solar capacity and available incentives in that block; and (5) provide comparable economic incentives for the purchase or lease of qualifying residential solar photovoltaic

systems. The authority may retain the services of a third party entity with expertise in the area of solar energy program design to assist in the development of the incentive schedule or schedules. The Department of Energy and Environmental Protection shall review and approve such schedule. Nothing in this subsection shall restrict the authority from modifying the approved incentive schedule before the issuance of its next comprehensive plan to account for changes in federal or state law or regulation or developments in the solar market when such changes would affect the expected return on investment for a typical residential solar photovoltaic system by twenty per cent or more.

(d) The Clean Energy Finance and Investment Authority shall establish and periodically update program guidelines, including, but not limited to, requirements for systems and program participants related to: (1) Eligibility criteria; (2) standards for deployment of energy efficient equipment or building practices as a condition for receiving incentive funding; (3) procedures to provide reasonable assurance that such reservations are made and incentives are paid out only to qualifying residential solar photovoltaic systems demonstrating a high likelihood of being installed and operated as indicated in application materials; and (4) reasonable protocols for the measurement and verification of energy production.

(e) The Clean Energy Finance and Investment Authority shall maintain on its web site the schedule of incentives, solar capacity remaining in the current block and available funding and incentive estimators.

(f) Funding for the residential performance-based incentive program and expected performance-based buydowns shall be apportioned from the moneys collected under the surcharge specified in section 16-245n of the general statutes, as amended by this act, provided such apportionment shall not exceed one-third of the total surcharge collected annually, and supplemented by federal funding as may become available.

(g) The Clean Energy Finance and Investment Authority shall identify barriers to the development of a permanent Connecticut-based solar workforce and shall make provision for comprehensive training, accreditation and certification programs through institutions and individuals accredited and certified to national standards.

(h) On or before January 1, 2014, and every two years thereafter for the duration of the program, the Clean Energy Finance and Investment Authority shall report to the joint standing committee of the General Assembly having cognizance of matters relating to energy on progress toward the goals identified in subsection (a) of this section.

7.2. Section 109 of the Act

Sec. 109. (NEW) (*Effective July 1, 2011*) The Public Utilities Regulatory Authority shall provide an additional incentive of up to five per cent of the then-applicable incentive provided pursuant to section 106 of this act for the use of major system components manufactured or assembled in Connecticut, and another additional incentive of up to five per cent of the then applicable incentive provided pursuant to section 106 of this act

for the use of major system components manufactured or assembled in a distressed municipality, as defined in section 32-9p of the general statutes, or a targeted investment community, as defined in section 32-222 of the general statutes.

LATHAM & WATKINS LLP

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MEMORANDUM

January 31, 2012

PRIVILEGED AND CONFIDENTIAL
ATTORNEY-CLIENT PRIVILEGE
DRAFT

To: Reed Hundt and Ken Berlin, Coalition for Green Capital
From: Latham & Watkins LLP
File no: 503152-0000
Subject: Overview of statutory authority and potential opportunities for the Connecticut Clean Energy Finance and Investment Authority (CEFIA)

In 2011, the State of Connecticut enacted the nation's first Green Bank in the form of the Clean Energy Finance and Investment Authority (CEFIA). Public Act 11-80¹ streamlines Connecticut's energy programs under a consolidated Department of Energy and Environmental Protection and provides CEFIA with both the authority and the mandate to pursue innovative financing measures to promote deployment of clean energy projects.

During the negotiations that resulted in the drafting, legislative approval and enactment of PA 11-80, members of the Connecticut legislature made it clear that they supported the creation of CEFIA as provided in PA 11-80 because they believed it would change the way that Connecticut funds clean energy projects. The legislature envisioned PA 11-80 as establishing an entity that would largely replace the emphasis on grant type programs with programs that provide low cost financing support, including loans and guarantees, to encourage greater deployment of renewable and energy efficiency projects. The legislature expects CEFIA to attract private capital investment to combine with public funds to financially support deployment of clean energy projects, and to develop new mechanisms that would enable it to further leverage limited public funds using substantial private capital investment.

This advisory memorandum² examines CEFIA's authority under PA 11-80 and briefly outlines financing opportunities that could be pursued by CEFIA in accordance with its statutory authority and obligations. Part I summarizes CEFIA's authority and obligations under

¹ Public Act 11-80, An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut's Energy Future (PA 11-80), §99, codified at Conn. Gen. Stat. §16-245n.

² This advisory memorandum was prepared at the request of and for the Coalition for Green Capital. This memorandum is not a legal opinion, and should not be interpreted or relied upon as such.

PA 11-80, including specific procedural requirements with which CEFIA is expected to comply before it may engage in financing activities. Part II summarizes four categories of financing activities in which CEFIA could engage in accordance with its authority under PA 11-80, including a list of examples of potential programs and specific activities which could be undertaken by CEFIA. Because CEFIA enjoys broad statutory authority under PA 11-80, the list of potential financing activities is near limitless; as such the activities presented are intended only as examples of the types of activities CEFIA could pursue. Part III outlines a proposed Energy Efficiency Lending Trust, one potential financing structure that illustrates how the broad and flexible authority provided to CEFIA under PA 11-80 possibly could be exercised to provide significant benefits to the public. Finally, Part IV concludes this advisory memorandum by attempting to address some of the immediate issues which PA 11-80 requires the CEFIA Board to address, and provides suggestive guidance regarding the Board's consideration of these issues.

I. CEFIA'S STATUTORY AUTHORITY

A. Scope

PA 11-80 expressly provides CEFIA with broad statutory authority to foster a clean energy economy in Connecticut and move the state to the forefront of energy efficiency and renewable energy financing.³ CEFIA is charged by law with developing separate programs to finance clean energy investment in small projects and larger commercial projects; support financing and other expenditures that promote investment in clean energy; and stimulate demand for clean energy within the state.⁴ Pursuant to PA 11-80, CEFIA enjoys broad and flexible authority to establish programs; finance and support financing, expenditures and investments; own property; issue bonds; refinance existing obligations and other activities to spur the development of clean energy in Connecticut.⁵ While PA 11-80 contains a number of specific procedural requirements for CEFIA and the Clean Energy Fund, it contains very few substantive limitations on how CEFIA conducts its activities as long as such activities are consistent with (i) CEFIA's statutory purpose, (ii) resolutions adopted by the CEFIA Board relating to CEFIA's purpose, and (iii) a comprehensive plan adopted by the CEFIA Board to govern its activities, including those of the Clean Energy Fund. These requirements are detailed below. The CEFIA statute contains a number of specifically authorized funding sources for CEFIA (described in detail in Part III), while noting that CEFIA is not limited to these funding sources alone. Also worth noting is that there are no statutory limitations on financial participation in or relating to any Special Purpose Entities (SPE) established and/ or provided financing support (e.g., direct participation, guarantees) by CEFIA.

B. Structure

CEFIA is deemed to be a "quasi-public agency for purposes of chapters 5, 10 and 12 [of the Connecticut General Statutes] and within Connecticut Innovations, Incorporated for

³ In addition to CEFIA's other activities, it also manages the Clean Energy Fund. See Conn. Gen. Stat. §16-245n(c).

⁴ See Conn. Gen. Stat. §16-245n(d)(1).

⁵ Id.

administrative purposes only.”⁶ PA 11-80 also authorizes CEFIA to seek to qualify as a Community Development Financial Institution under Section 4702 of the United States Code.⁷

C. Procedural Requirements

1. Comprehensive Plan

PA 11-80 directs CEFIA to “support financing or other expenditures that promote investment in clean energy sources in accordance with a comprehensive plan developed by [CEFIA],”⁸ making such a comprehensive plan a precondition to CEFIA’s financing activities. PA 11-80 calls for the comprehensive plan to identify strategies “to foster the growth, development and commercialization of clean energy sources and related enterprises.”⁹

In addition to requiring CEFIA to develop a comprehensive plan, PA 11-80 also directs the Clean Energy Fund, a successor to the former Renewable Energy Investment Fund, to carry out its activities in accordance with a comprehensive plan developed by the Clean Energy Fund.¹⁰ As this requirement existed prior to PA 11-80, the current activities of the Clean Energy Fund would need to be consistent with the plan developed by the former Renewable Energy Investment Fund until amended.

While the statute is ambiguous, a fair reading is that CEFIA may use the comprehensive plan required under PA 11-80 to govern all of its activities, including financing provided by the Clean Energy Fund.

2. Other Procedural Requirements

The CEFIA Board must also take three additional specific procedural steps prior to undertaking the activities authorized and mandated by PA 11-80. First, the Board must adopt a resolution establishing CEFIA.¹¹ Second, the Board must adopt a resolution providing for CEFIA’s purposes (consistent with the purposes found in the statute).¹² Finally, “[b]efore making any loan, loan guarantee, or such other form of financing support or risk management for a clean energy project, [CEFIA] shall develop standards to govern the administration of the

⁶ Id. Chapters 5, 10 and 12 of the Connecticut General Statutes relate to bonds, codes of ethics, and quasi-public agencies, respectively.

⁷ Conn. Gen. Stat. §16-245n(d)(2)(A). If approved by the U.S. Department of the Treasury as a Community Development Finance Institution, CEFIA or a CEFIA subsidiary would be treated as a qualified community development entity for purposes of Section 45D and Section 1400N(m) of the Internal Revenue Code.

⁸ Conn. Gen. Stat. §16-245n(d)(1)(B).

⁹ Id.

¹⁰ Conn. Gen. Stat. §16-245n(c).

¹¹ Conn. Gen. Stat. §16-245n(d)(1).

¹² Id.

authority through rules, policies and procedures that specify borrower eligibility, terms and conditions of support, and other relevant criteria, standards, or procedures.”¹³

In addition, because CEFIA is deemed to be a quasi-public agency under chapters 5, 10 and 12 of the Connecticut General Statutes, it arguably is subject to the procedural requirements imposed on quasi-public agencies as defined under chapter 12.¹⁴ For example, under chapter 12, prior to adopting a proposed procedure, a quasi-public agency shall give at least thirty (30) days notice of its intended action by publishing its proposal in the Connecticut Law Journal.¹⁵ The notice shall include the following:

- (1) either a statement of the terms of the substance of the proposed procedure or a description sufficiently detailed so as to apprise persons likely to be affected of the issues and subjects involved in the proposed procedure;
- (2) a statement of the purposes for which the procedure is proposed; and
- (3) when, where and how interested persons may present their views on the proposed procedure.¹⁶

In addition, a two-thirds vote of the full membership of the board of a quasi-public agency is required to adopt its proposed procedure.¹⁷

D. Other Statutory Requirements

In addition to the procedural requirements detailed above, CEFIA is also required to provide information regarding rates and terms and conditions for public inspection and subject to private audits;¹⁸ submit an annual report to the Connecticut Department of Energy and Environmental Protection, with copies to the Connecticut General Assembly, on programs and activities undertaken by CEFIA;¹⁹ and review annual statements setting forth all sources and uses of funds from entities receiving financing.²⁰ Finally, PA 11-80 requires establishment of a number of specific pilot programs to be administered by CEFIA, including establishing a three-year pilot program by March 1, 2012 with one or more standardized grant amounts, loan

¹³ Conn. Gen. Stat. §16-245n(d)(2)(B).

¹⁴ CEFIA is not expressly listed in chapter 5, §1-120(1), which includes a list of those entities defined as quasi-public agencies, including, among others, Connecticut Innovations, Incorporated.

¹⁵ Conn. Gen. Stat. §1-121(a).

¹⁶ Id.

¹⁷ Id.

¹⁸ Conn. Gen. Stat. §16-245n(d)(2)(F).

¹⁹ Conn. Gen. Stat. §16-245n(f)(1).

²⁰ Conn. Gen. Stat. §16-245n(f)(3). Under the statute, residential projects for buildings with one to four dwelling units are exempt from any annual auditing requirements, though they may be required to grant their utility companies' permission to release their usage data to CEFIA.

amounts and power purchase agreements to promote development of up to 50 MW of new combined heat and power projects that are each below 2 MW;²¹ establishing a three-year pilot program to support using organic waste from farms with on-site anaerobic digestion facilities to generate electricity and heat;²² structuring and implementing a residential solar investment program to create at least 30 MW of new residential solar photovoltaic installations by December 31, 2022;²³ providing performance-based incentives and performance-based buydowns for the purchase or lease of qualifying residential solar photovoltaic systems;²⁴ maintaining a publicly accessible schedule of incentives and solar capacity;²⁵ making provisions for comprehensive training, accreditation and certification programs to create a permanent Connecticut-based solar workforce;²⁶ and establishing a “condominium renewable energy grant program” to provide grants to residential condominium associations and owners for purchasing clean energy sources.²⁷ Nothing in PA 11-80 mandates precisely how CEFIA shall provide financing support to these pilot projects directly; rather, CEFIA appears to have considerable statutory flexibility to tailor the finance-related aspects of its pilot programs to complement its broader goal of achieving greater private sector financing support for clean energy deployment (*e.g.*, combining limited performance-based buydowns with lower cost debt financing, providing performance-based incentives in the form of lower cost debt financing, etc.).

E. Sources of funding for CEFIA and its activities

PA 11-80 provides CEFIA with a number of specifically authorized funding sources, while expressly providing that CEFIA is not limited to these funding sources alone. Specifically authorized funding sources include (i) funds repurposed from existing statutorily-created clean energy programs, subject to approval by the Connecticut General Assembly and the requirement that such funds be used for expenses of financing, grants and loans;²⁸ (ii) any federal funds that can be used for the activities of the Clean Energy Fund; (iii) charitable gifts, grants, and contributions and loans from individuals, corporations, university endowments and philanthropic foundations; (iv) earnings and interest derived from CEFIA’s activities; (v) to the extent that CEFIA or a CEFIA subsidiary qualifies as a Community Development Financing Institution under Section 4702 of the United States Code, funding from the Community Development Financing Institution Fund administered by the United States Department of

²¹ PA 11-80, §103(a).

²² PA 11-80, §103(b).

²³ PA 11-80, §106(a).

²⁴ PA 11-80, §106(b).

²⁵ PA 11-80, §106(e).

²⁶ PA 11-80, §106(g).

²⁷ PA 11-80, §111.

²⁸ While the statutory language contains some ambiguity regarding what sorts of fund repurposing requires additional legislative approval, the best reading of this language (and the reading that best reflects the intent of the General Assembly in enacting PA 11-80), is that CEFIA has sufficient statutory authority to repurpose funds as between programs and activities already supported by the Clean Energy Fund or otherwise managed by CEFIA. The statute merely protects other funds that subsequent to the enactment of PA 11-80 remained within another statutorily-created clean energy program from being repurposed into the Clean Energy Fund without additional legislative approval.

Treasury, as well as loans from and investments by depository institutions seeking to comply with their obligations under the United States Community Reinvestment Act of 1977; and (vi) contracts entered into by CEFIA with private sources to raise capital, subject to limitations on the average rate of return set by the CEFIA Board.²⁹

II. CATEGORIES OF FINANCING ACTIVITIES AUTHORIZED UNDER PA 11-80

A. Direct lending by CEFIA, including establishment of a revolving loan fund

The first category of financing available to CEFIA is to continue providing direct loans to end users in Connecticut, including the establishment of a revolving loan fund.³⁰ CEFIA currently uses this type of structure for the Connecticut Solar Lease Program, a direct lending program that does not utilize outside debt capital and instead relies on the Clean Energy Fund's existing public funding sources as the source of lending capital.

In addition to the Connecticut Solar Lease Program, other examples of direct lending programs which could be undertaken by CEFIA include the following:

- Direct lending to renewable energy projects and residential and commercial retrofit programs, including specialized commercial projects such as those in the municipal and state governments, universities, schools, and hospitals (MUSH) markets.
- For each of the above, this lending can be done either directly using existing funding sources administered by CEFIA or through auction financing.
- Similarly, for each of the above, loans can be made either directly or to other institutions, including energy distribution companies doing the retrofits or project developers responsible for renewable energy installations.
- Repayment of these loans could be made directly or through an on-bill repayment mechanism. Use of on-bill financing, however, would need regulatory approval and may extend the timeframe for these projects.
- Provide direct up-front financing in connection with a Property-Assessed Clean Energy (PACE) program for either commercial or residential projects, with loans repaid through the property taxes under the program. Note that commercial PACE would require the enactment of legislation being crafted by DEEP.

Assuming that direct loans are prudently made by CEFIA, direct lending presumably will guarantee results for the funding available, as well as enabling CEFIA to gain experience in making such loans and providing CEFIA with the opportunity to learn from the market and other lending partners. However, absent additional leverage, the limited capital available to CEFIA

²⁹ Conn. Gen. Stat. §16-245n(d)(2)(C).

³⁰ While not addressed in this advisory memorandum, grants also would fall into the general category of offering direct financial assistance to end-users.

from its existing public funding sources will likely constrain near-term wide-scale deployment of clean energy resources and the attendant near or medium-term development of a clean energy economy in Connecticut. These funding constraints can be overcome by seeking to attract private investment in CEFIA directly, as authorized by PA 11-80, as well as by attracting private investment in one of more CEFIA-related SPEs created for that purpose.

B. Participation in a direct lending deal with one or more outside lenders

Perhaps the most straight-forward of leveraging CEFIA's limited capital from public funding sources would be to partner with one or more outside private lenders in providing direct financing to end-users. This sort of financing would have many of the characteristics of the direct lending opportunities described above, but instead of CEFIA being responsible for the full amount being financed, the loan(s) would have multiple participants including CEFIA and one or more outside private lenders.

In addition to the results that direct lending can provide in terms of financing for end-users, loan participation offers at least three additional significant advantages for CEFIA. First, the involvement of outside lenders provides leveraging opportunities for CEFIA that simply do not exist when CEFIA is responsible for providing the full loan amount. Even instances where outside lenders limit their investment to 50% of the total, with CEFIA providing the other 50%, allow CEFIA to double the funding available for its direct lending programs. Second, participation by outside lenders allows CEFIA to "piggy back" on the diligence performed by these lenders. Because these lenders are making a significant investment of their own, CEFIA can rely to some extent on their expertise in making the loan, ensuring all such loans are carefully vetted in accordance with traditional banking standards. Finally, CEFIA can also use the outside lender as the loan administrator, saving CEFIA from having to perform loan processing functions for which its lending partner may be substantially better placed to perform.

Each of the direct lending programs described above in Section A could also be undertaken in partnership with one or more outside lenders.

C. Facilitate pooling and securitization of project loans

In addition to direct lending, PA 11-80 provides sufficient flexibility for CEFIA to create funding structures to pool and securitize project loans to end-users, allowing for the involvement of substantial amounts of outside investment capital. Any such securitization, including any issuance of bonds to underwrite the pooled costs of clean energy projects, would require the formation of a bankruptcy-remote SPE in the form of a trust. The trust could then participate in direct lending or further leverage the investment capital through participation with other lenders. CEFIA's involvement in such financing, therefore, would be the development of the funding structure and the creation of the trust mechanism and any other entities necessary for the funding structure's operation. CEFIA could also offer credit enhancements to reduce the cost of capital and make the trust more attractive to outside investors. An example of such a structure focusing on financing energy efficiency projects is found in Part III below.

While more complicated than direct lending, this type of financing structure is not new in Connecticut. A similar structure to that proposed below (including loan loss reserve support) is currently being used for an energy efficiency financing program administered by the Connecticut

Energy Efficiency Fund (which is not currently under CEFIA), though there are some factors which limit the impact of the CEEF program, including its scale, its income eligibility restrictions and its reliance on debt capital provided by utilities (and repaid at the utilities weighted cost of capital).

The primary advantages of this type of financing structure are its ability to raise potentially significant amounts of capital in the markets for rated debt and the fact that an existing financial institution would be responsible for actual program administration, minimizing CEFIA's responsibility to actually run the day-to-day mechanics of the program. In addition, because this structure relies either exclusively or virtually exclusively on outside capital, CEFIA's limited capital sourced from public funds can be used for other purposes.

D. Provide credit enhancements to reduce the cost of capital

The final category of financing options open to CEFIA is to provide a range of credit enhancements, including loan loss reserve funds and loan guarantees. These credit enhancements can be used to lower the cost of capital for projects fully financed using outside capital; direct lending projects in which CEFIA is participating with outside lenders; and pooling and securitization arrangements in which the credit enhancements reduce the risk profile of the investment products being offered in the markets for rated debt.

III. THE ENERGY EFFICIENCY LENDING TRUST

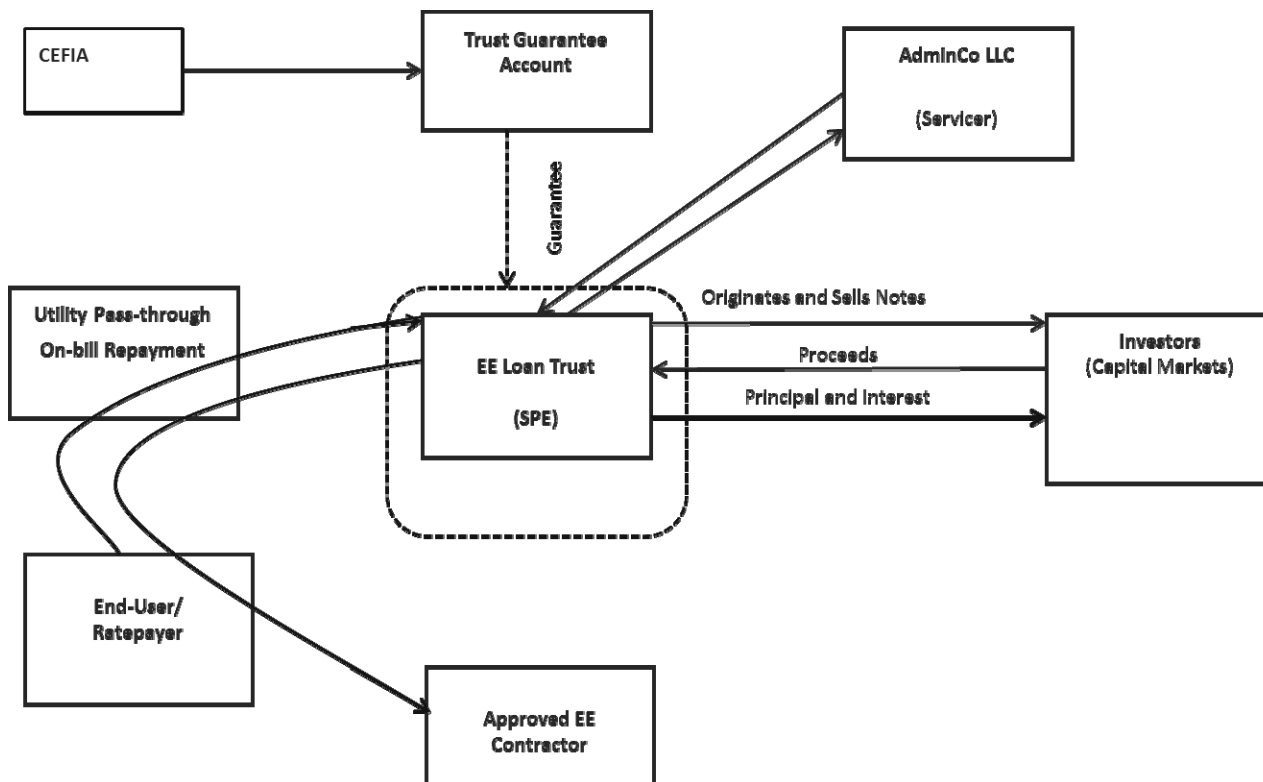
The potential promise of pursuing a path based on CEFIA's inherent flexibility is most easily illustrated with energy efficiency financing examples. Energy efficiency is widely recognized as the lowest cost option for providing energy services over the long term when compared with other resources, yet deploying energy efficiency measures at scale has proven to be a so-far insurmountable challenge because of, among other things, large up-front costs and limited capital resources available to the consumer or the public financing entity. Many of the key barriers to large-scale deployment of energy efficiency can be overcome by CEFIA if it takes advantage of its flexibility to develop public-private partnership financing vehicles that induce significant participation by private capital investors in providing 100 percent up-front loans for energy efficiency projects. Such vehicles should enable CEFIA to supplant existing financing programs that have little or no private capital participation on the debt side, such as direct loans and grants/rebates and interest rate buy-downs. Such public-private partnership vehicles also should enable CEFIA to succeed in its mission without having to develop significant staffing and a large internal infrastructure to engage banking-type functions.

At least initially, CEFIA will likely need to partner with other financial institutions in order to scale up quickly and best use its resources by tapping the capital and expertise of others in the private sector. CEFIA's comprehensive plan and lending standards should allow and encourage delegation of those standards to commercially reasonable practices, as practiced by partners with solid financing histories and experience.

One potential model (outlined in Chart 1), with which we assume CEFIA already has some familiarity, would have CEFIA use some of its limited capital resources to provide the credit enhancement, such as a loan loss reserve, necessary to support the securitization of large numbers efficiency loans to end-users pooled together through a special purpose trust (e.g., a

master trust cycling through individual loans) that issues bonds sold to private investors. This investment vehicle should be particularly attractive to private investors, would lessen any risk borne by CEFIA (giving it greater leverage), and should result in a lower cost to borrowers, if the loans underlying the trust can be repaid through utility bills (as appears to be contemplated under Connecticut law),³¹ as the unmitigated risk of default might be determined by a rating agency to be at or below the default rate for utility bills payments. At the same time, the trust and its loans would be serviced by a private financial institution avoiding the need for CEFIA to develop internal infrastructure and expertise to perform loan servicing, traditional back office banking-type functions, or loan trust administration services (e.g., communications with trust investment participants). As noted above, the trust could combine its pooling and securitization activities with the other categories of financing activities (direct lending, loan participation with other lenders, and the creation of credit enhancements); in this way the trust serves as a different and complementary means of accomplishing the same goals as CEFIA making these loans and loan guarantees directly.

Chart 1.



³¹ See Public Act No. 07-242 of 2007.

IV. IMMEDIATE ISSUES FOR CONSIDERATION BY THE CEFIA BOARD

A. Standards and Rules to guide CEFIA's activities

As mentioned above, “[b]efore making any loan, loan guarantee, or such other form of financing support or risk management for a clean energy project, [CEFIA] shall develop standards to govern the administration of the authority through rules, policies and procedures that specify borrower eligibility, terms and conditions of support, and other relevant criteria, standards, or procedures.”³² However, other than the procedural requirement that these standards be in place prior to the extension of financing assistance, the statute contains few specific requirements concerning the substance of these standards, providing significant flexibility to the CEFIA Board to develop standards that fit with the specific purposes and activities identified by the Board. The fact that these standards must be in place prior to any financing activities, however, makes the development of such standards a top priority for the organization. One approach which CEFIA might pursue would be to adopt a broad standard of commercially reasonable practices, and delegate the defining of such practices to partners with which CEFIA participates in lending projects.

B. An initial plan of action: demonstrating CEFIA's ability to successfully execute a limited number of financing tasks

Rather than pursuing the broad range of financing opportunities authorized under PA 11-80, CEFIA may want to consider focusing initially on developing the various pilot programs required under PA 11-80, as well as undertaking specific financing activities for which it can demonstrate near-term positive results. Specifically, direct lending through the existing Connecticut Solar Lease Program will allow CEFIA to develop internal expertise and gain insight from such direct market participation, especially in partnership with lead borrowers with solid financing histories and experience. In addition, CEFIA may want to consider working with one or more financial institutions to develop the Energy Efficiency Lending Trust illustrated in this advisory memorandum, including its loan loss reserve mechanism supported directly by CEFIA.

Together, these two types of financing activities could demonstrate CEFIA's capacity to develop and administer (or oversee the administration of) direct lending, pooling and securitization, and credit enhancement programs, offering a range of financing support for renewable energy and energy efficiency deployment in Connecticut.

C. Maximizing lending activity performed or supported by CEFIA

CEFIA should consider the development and adoption of principles to govern CEFIA's programs in CEFIA's comprehensive plan that will provide it with the operational flexibility to pursue both the pilot programs required under PA 11-80 but also the financing activities described above. Specifically, CEFIA should consider adopting principles that commit it to maximizing its leverage through loan participation programs, pooling and securitization arrangements, and the development of credit enhancement programs. These will allow for

³² Conn. Gen. Stat. §16-245n(d)(2)(B).

CEFIA to fully leverage its limited resources for maximum impact, while also limiting its exposure to potential losses in direct lending arrangements for which CEFIA provides the full loan amount. These strategies are designed to fulfill the promise of the nation's first Green Bank and foster a clean energy economy in Connecticut.



CLEAN ENERGY
FINANCE AND INVESTMENT AUTHORITY

Memo

To: Deployment Committee
From: Christin A. Cifaldi, Manager, Clean Energy Deployment
Date: February 9, 2012
Re: Smith Elementary School, West Hartford

In February 2010, the Connecticut Clean Energy Fund (CCEF) Projects Committee approved a grant of \$299,900 for a SunEdison project to be installed on Smith Elementary School in West Hartford, Connecticut.

SunEdison has experienced delays procuring the Sharp panels specified in the original application submitted to CCEF in December 2008. In July 2011 SunEdison requested an extension of the time allotted to complete this project. The Financial Assistance Agreement (FAA) lapsed between SunEdison and CCEF on August 16, 2011, one year after execution. SunEdison requested a ninety (90) day extension. Due to the shift from CCEF to CEFIA the Deployment Committee has been unable to meet until this point. I would recommend granting the requested ninety (90) day extension until April 30, 2012.

Project Description

- The project is a Power Purchase Agreement (PPA) owned by SunEdison.
- The solar photovoltaic (PV) system will be installed on the roof of the Smith Elementary School located at 64 Saint James Street in West Hartford.
- Design, installation, testing, operation and maintenance of the PV system will be coordinated by SunEdison.

Recommendation

Approval of an extension until April 30, 2012 for the grant of \$299,900, which includes \$14,393 as the net present value of the renewable energy certificates (RECs). If SunEdison has not delivered materials to Smith Elementary School and requested the first payment from CEFIA by this date the project will be cancelled and the money returned to CEFIA's budget.

Prepared and Presented by: Christin A. Cifaldi, Manager, Clean Energy Deployment

Committee Meeting Date: February 9, 2012

Resolution

WHEREAS, a Standard Grant Agreement (“Agreement”) was executed between CEFIA and Sunedison Origination3, LLC (Sunedison) on August 16, 2010, (“Effective Date”), for a solar photovoltaic (“PV”) system to be located at the Smith Elementary School located at 64 Saint James Street in West Hartford.

WHEREAS, the PV system was to be installed, tested and accepted by Sunedison within one year from the Effective Date of the Agreement (“Commissioning Date”).

WHEREAS, Sunedison has requested and CEFIA has agreed to an extension to April 30, 2012 for the Commissioning Date.

NOW, therefore be it:

RESOLVED, the Commissioning Date for the Agreement between CEFIA and Sunedison is revised from August 16, 2011 to April 30, 2012; and

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



CLEAN ENERGY
FINANCE AND INVESTMENT AUTHORITY

Memo

To: Deployment Committee
From: Christin A. Cifaldi, Manager, Clean Energy Deployment
Date: February 9, 2012
Re: Whole Foods Distribution Warehouse

In June 2010, the Connecticut Clean Energy Fund (CCEF) Projects Committee approved a grant of \$344,970 for a SunEdison project to be installed on Whole Foods Distribution Center in Cheshire, Connecticut.

SunEdison has experienced delays procuring the SolarFun panels specified in the original application submitted to CCEF in January 2009. In July 2011 SunEdison requested an extension of the time allotted to complete this project. The Financial Assistance Agreement (FAA) lapsed between SunEdison and CCEF on August 16, 2011, one year after execution. SunEdison requested a ninety (90) day extension. Due to the shift from CCEF to CEFIA the Deployment Committee has been unable to meet until this point. I would recommend granting the requested ninety (90) day extension until April 30, 2012.

Project Description

- The project is a Power Purchase Agreement (PPA) owned by SunEdison.
- The solar photovoltaic (PV) system will be installed on the roof of the Whole Foods Distribution Center located at 400 East Johnson Avenue in Cheshire.
- The installation is an extension of the 125 kW_{STC} PV system installed on Whole Foods under the CCEF OSDG program in 2005.
- Design, installation, testing, operation and maintenance of the PV system will be coordinated by SunEdison.

Recommendation

Approval of an extension until April 30, 2012 for a grant of \$344,970, which includes \$8,970 as the net present value of the renewable energy certificates (RECs). If SunEdison has not delivered materials to Whole Foods and requested the first payment from CEFIA by this date the project will be cancelled and the money returned to CEFIA's budget.

Prepared and Presented by: Christin A. Cifaldi, Manager, Clean Energy Deployment

Committee Meeting Date: February 9, 2012

Resolution

WHEREAS, a Standard Grant Agreement (“Agreement”) was executed between CEFIA and Sunedison Origination1, LLC (“Sunedison”) on August 16, 2010, (“Effective Date”), for a solar photovoltaic (“PV”) system to be located at the Whole Foods Distribution Warehouse located at 400 East Johnson Avenue, Cheshire, Connecticut 06410.

WHEREAS, the PV system was to be installed, tested and accepted by Sunedison within one year from the Effective Date of the Agreement (“Commissioning Date”).

WHEREAS, Sunedison has requested and CEFIA has agreed to an extension to April 30, 2012 for the Commissioning Date.

NOW, therefore be it:

RESOLVED, the Commissioning Date for the Agreement between CEFIA and Sunedison is revised from August 16, 2011 to April 30, 2012; and

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