

NEIGHBOR TO NEIGHBOR ENERGY CHALLENGE - A COMMUNITY ENERGY SAVINGS PROJECT
 SUBMITTED BY THE CONNECTICUT CLEAN ENERGY FUND

Appendix G. Project Impact Table for Topic Area 2

A) Key Metrics Identified by the DOE

PROJECT IMPACT METRICS	DURING PROJECT PERIOD			POST PROJECT PERIOD (YEARS 4-6)		
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Average utilities savings (\$)	\$ 1,957,611	\$ 4,631,942	\$ 5,491,226	\$ 6,449,885	\$ 7,483,500	\$ 8,167,932
Average utilities savings (MMBtu's)	71,372	118,530	126,503	135,444	144,385	140,690
Average emissions reductions (MMTCO ₂)	8,515	18,069	23,985	28,762	33,538	32,917
Number of buildings retrofit	11,725	11,725	2,575	2,325	2,325	2,325
Total square footage of buildings retrofit	26,892,975	26,892,975	5,906,133	5,332,722	5,332,722	5,332,722
Renewable Energy Capacity Installed (MW)	2.2	4.3	6.2	7.8	9.3	8.8
Jobs created or retained	109	106	44	39	40	39
EECBG Funds Expended	\$ 2,043,393	\$ 1,690,553	\$ 437,179	\$ -	\$ -	\$ -
Leverage Funds and In-Kind Resources Expended	\$ 8,251,179	\$ 8,169,116	\$ 3,257,861	\$ 3,132,308	\$ 3,133,112	\$ 3,133,941

KEY ASSUMPTIONS

The following are general assumptions for energy, environment and economic factors that apply to the project as a whole:

Energy - the following energy assumptions for Connecticut (based primarily on EIA data) apply to this project:

- Residential electricity price - \$0.2023/kWh
- Residential natural gas price - \$1.867/therm
- Residential heating oil price - \$2.783/gallon
- Residential propane price - \$2.445/gallon
- Energy Inflation Rate - 4.1%
- Average Monthly Electricity Usage - 9,000 kWh
- CTCleanEnergyOptions Price - \$0.013/kWh
- Class I REC Price - \$10/MWh. The price of a Class I REC can range between \$0 to \$55.
- Class III REC Price - \$10/MWh. The price of a Class III REC can range between \$10 to \$31.

Environment - the following environmental assumptions for Connecticut (based primarily on eGRID2007 Version 2.1, Dec 2008 data) apply to this project:

- Emissions rates for electricity New England Region - 0.46384000 TCO₂/MWh
- Emissions rates for electricity New England Region - 0.00117965 TSO₂/MWh
- Emissions rates for electricity New England Region - 0.00043150 TNO_x/MWh
- Emissions rates for electricity New England Region - 0.00000565 THg/MWh
- RGGI Allowance Price - \$2.30 (October 30, 2009 settlement price as reported by Evolution Markets)
- RGGI Allowances Retired on behalf of the CTCleanEnergyOptions program - 0.554 TCO₂/MWh

Economic - the following economic assumptions for Connecticut apply to this project:

- Minimum Wage Rate - \$8.25/hour. This assumption is used to calculate volunteer in-kind time for the project.
- 1 Job-Year Created or Retained - \$92,000 invested (Executive Office of the President Council of Economic Advisors)
- Also used local economic indicators for jobs in Connecticut to determine a range between federal and state job creation or retention benefits:
- CT Renewable Energy / Energy Efficiency Baseline Study by Navigant Consulting (March 2009)*
- 1 Job-Year Created or Retained - \$131,579 invested in residential solar thermal systems
- 1 Job-Year Created or Retained - \$150,057 invested in residential solar photovoltaic systems
- 1 Job-Year Created or Retained - \$77,519 invested in residential energy efficiency

These project impact metrics are a result of a portfolio of residential energy efficiency, conservation and clean energy programs that have the following key assumptions by program:

Personal Energy Advisor - households reached (8,000 by end of Yr 3), lifetime of savings (5 years), reduction (6%), and average annual energy usage

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per household for: natural gas (372 therms), heating oil (53 gallons), and propane (33 gallons). Efficiency 2.0 has submitted a paper into the Journal of Industrial Ecology to estimate the average residential energy end-use from U.S. Census, EIA and NCDC data. Assumes behavior qualifies as an eligible resource for the Class III RPS. Efficiency 2.0 currently has a request for a declaratory ruling into the DPUC - Docket No. 05-07-19RE02.

Lighting Retrofit Program - households reached (7,000 by end of Yr 2), lifetime savings (10,000 hours), operating hours of 2.67 and 3.63 hours per day for distributed and installed lightbulbs respectively, 10,000 and 30,000 bulbs distributed and installed respectively, 10% annual degradation rate, and 9W-13W-19W-23W bulbs. Earth Markets received a positive ruling from the DPUC that residential aggregation of lighting retrofits qualifies as an eligible resource for the Class III RPS.

Home Energy Solutions - households reached (6,250 Yrs 1-3, 10,000 Yrs 1-6), lifetime savings (between 6-13 years), annual savings for the regular program: electricity 741 kWh, natural gas 65 ccf, and heating oil 46 gallons, annual savings for the low income program: electricity 1,217 kWh, natural gas 116 ccf, and heating oil 46 gallons. Utility incentive is between \$475 to \$670 and requires a co-pay by the homeowner for the regular program of \$75. Marketing and in-kind labor leverage are 2% and 3% respectively. The utility programs are eligible resources for the Class III RPS.

CTCleanEnergyOptions - households reached (3000 Yrs 1-3, 5,250 Yrs 1-6), lifetime (5 years), sign-up 100% of their energy usage to clean energy, marketing leverage from community grant program that provides participating towns with \$71,500 in total. Community incentive of free solar PV systems for every 100 sign-ups to clean energy (~53 kW of solar PV systems).

Feedback Devices - households reached (200 by end of Year 1), lifetime (5 years), feedback device without (\$300) and with (\$650) control, and reduction on average (6%)

Major Retrofits - households reached (1,250 Yrs 1-3, 2000 Yrs 1-6), lifetime (between 25-30 years), measures include weatherization and HVAC systems, federal tax credit of 30% up to \$1,500, state incentive of between \$1,000 to \$3,000, average annual energy savings: electricity (between 4,000-4,750 kWh) and fossil fuel (between 30-50 MMBtu's), and total installed cost (between \$5,000-\$15,000). Assumptions provided by Connecticut Light & Power. The utility programs are eligible resources for the Class III RPS.

Solar Thermal - households reached (200 Yrs 1-3, 350 Yrs 1-6), lifetime (30 years), federal tax credit of 30%, state incentive of \$500/MMBtu, average system size (12 MMBtu), installed cost (\$1,250/MMBtu), O&M costs (\$200/year), Community incentive of free solar PV systems of 3 points per install (~11 kW of solar PV systems). Funds for the solar thermal program are provided by ARRA SEP funds. Funding is anticipated to support funding for two years following the start of the Project. Additional funding beyond this period has not yet been committed, but it is likely that programs will be continued by the CCEF.

Solar PV - households reached (125 Yrs 1-3, 200 Yrs 1-6), lifetime (25 years), federal tax credit of 30%, state incentive of \$1,607/kW, average system size (7 kW), capacity factor (15%), installed cost (\$9,000/kW), Community incentive of free solar PV systems of 3 points per install (9 kW of solar PV systems), and 1% annual degradation rate.

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Figure 1. Average Utilities Savings (\$'s) for Year 1-3 and 4-6

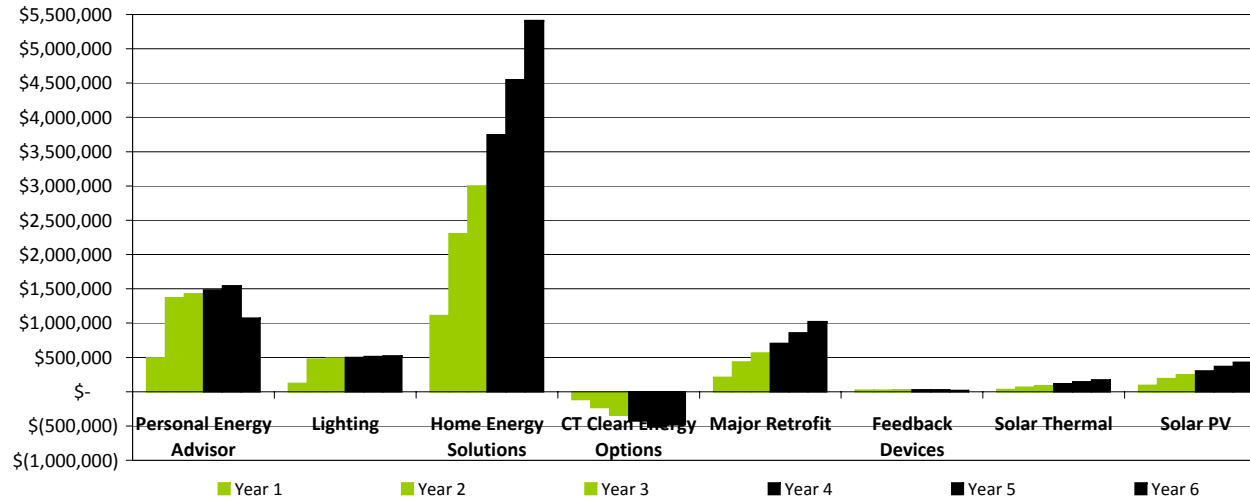
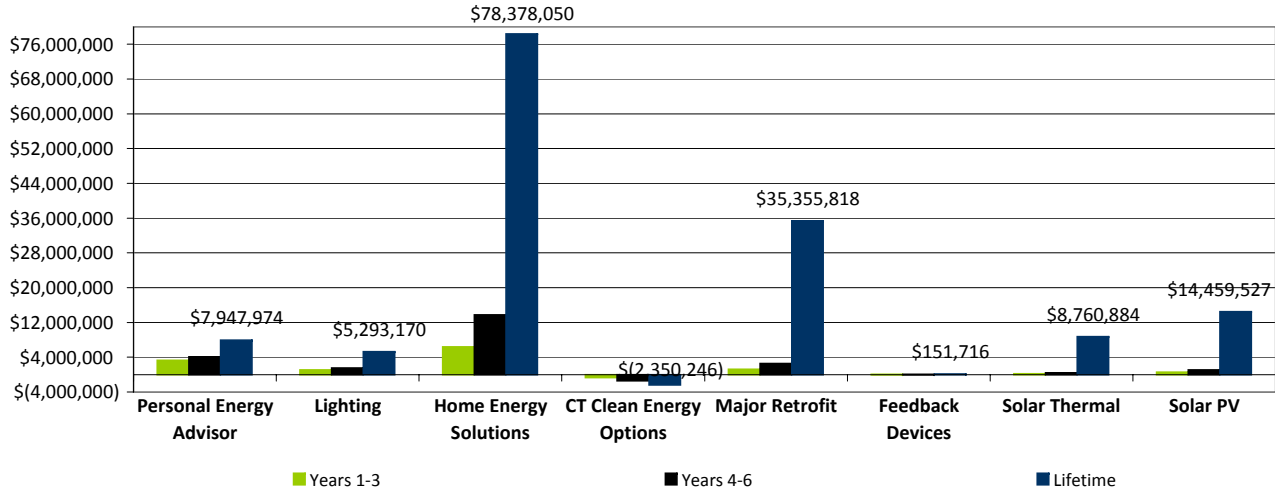


Figure 2. Average Utilities Savings (\$'s) for Years 1-3, Years 4-6, and Lifetime



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Figure 3. Average Utilities Savings (MMBtu's) for Year 1-3 and 4-6

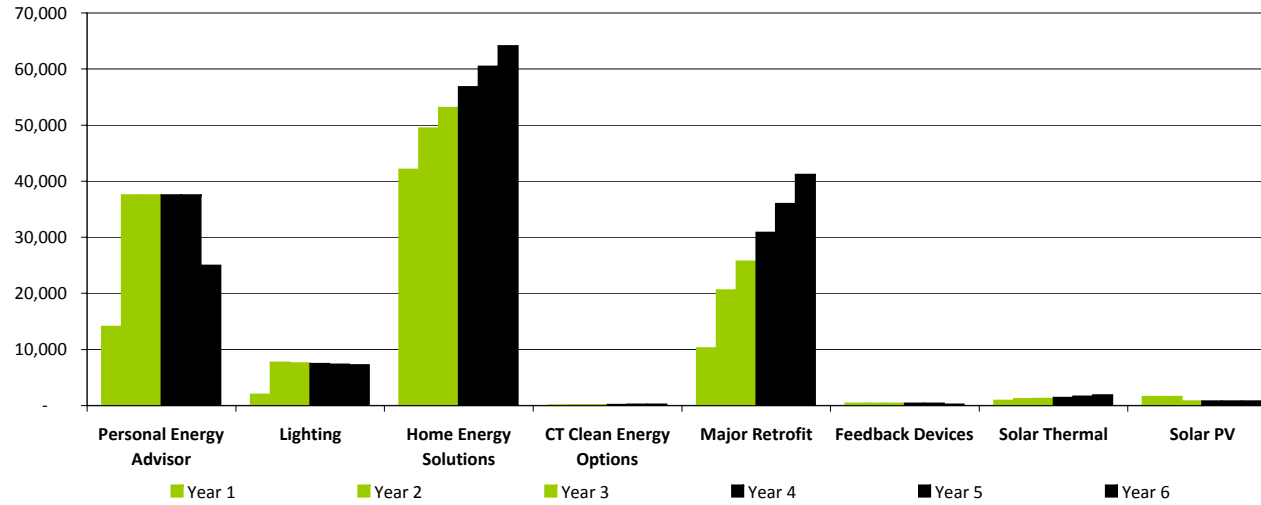
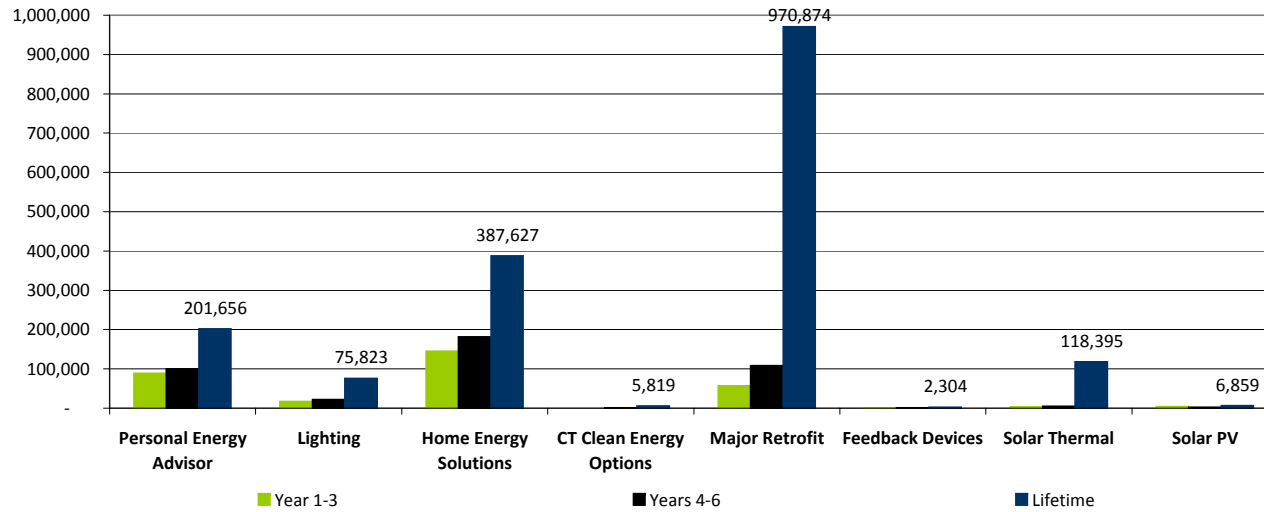


Figure 4. Average Utilities Savings (MMBtu's) for Years 1-3, Years 4-6, and Lifetime



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Figure 5. Average Emissions Reductions (MMTCO₂) for Year 1-3 and 4-6

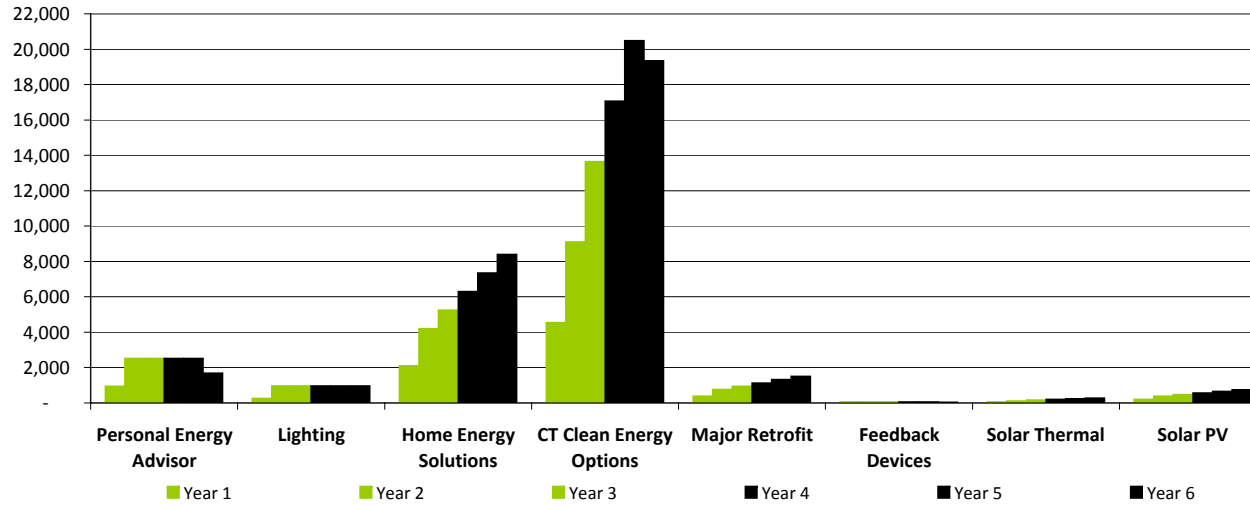
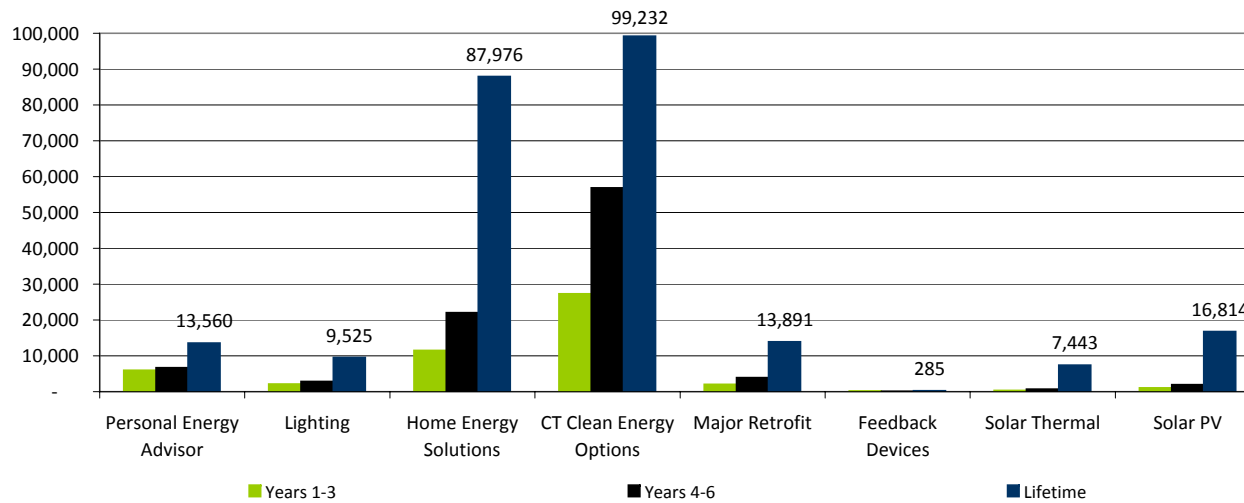


Figure 6. Average Emissions Reductions (MMTCO₂) for Year 1-3, Years 4-6, and Lifetime



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Figure 7. Jobs Created or Retained for Year 1-3 and 4-6

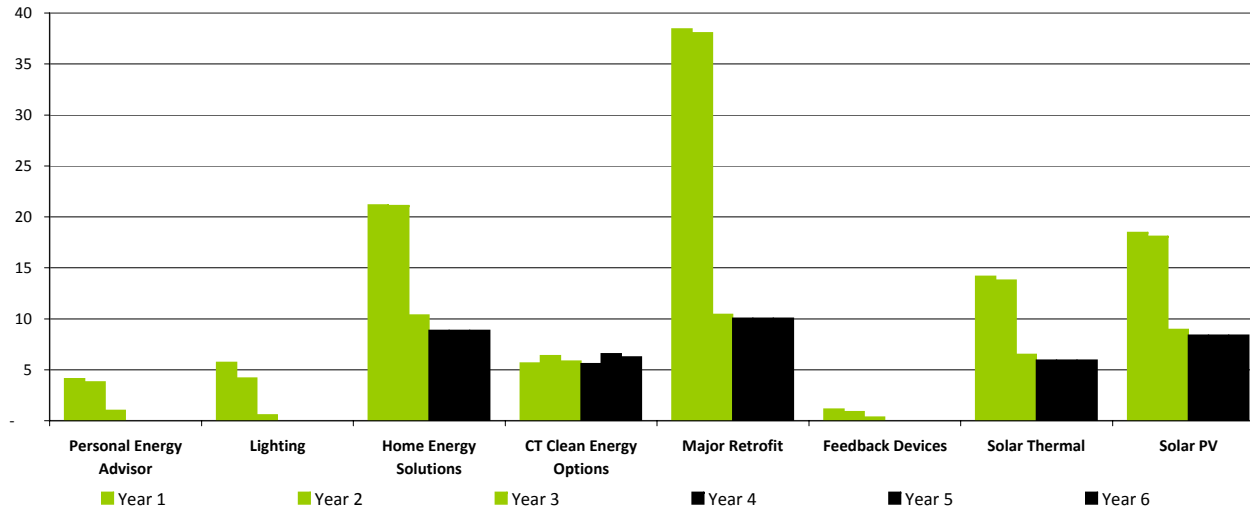
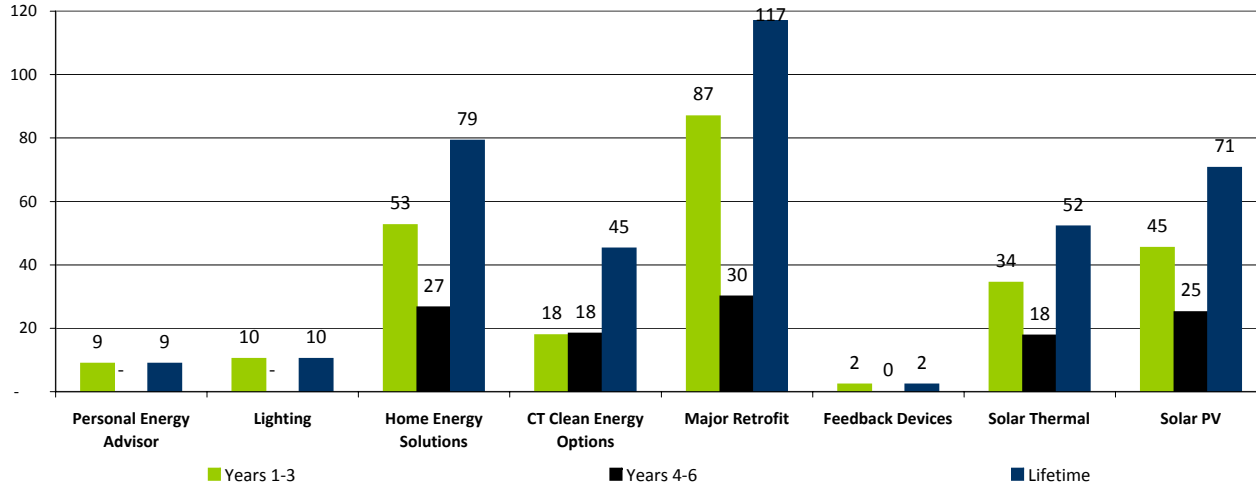


Figure 8. Jobs Created or Retained for Years 1-3, Years 4-6, and Lifetime



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B) Key Metrics Identified by the Project

PROJECT IMPACT METRICS	DURING PROJECT PERIOD			POST PROJECT PERIOD (YEARS 4-6)		
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Leverage Funds and In-Kind Resources Expend	\$ 8,251,179	\$ 8,169,116	\$ 3,257,861	\$ 3,132,308	\$ 3,133,112	\$ 3,133,941
Federal Tax Incentives	\$ 2,032,500	\$ 2,032,500	\$ 1,072,500	\$ 1,072,500	\$ 1,072,500	\$ 1,072,500
Ratepayer Funds	\$ 4,056,524	\$ 4,096,524	\$ 2,096,137	\$ 1,993,637	\$ 1,993,637	\$ 1,993,637
Financing	\$ 1,582,140	\$ 1,582,140	\$ -	\$ -	\$ -	\$ -
Marketing	\$ 51,771	\$ 51,771	\$ 37,802	\$ 13,969	\$ 13,969	\$ 13,969
Volunteer Time	\$ 402,120	\$ 321,120	\$ -	\$ -	\$ -	\$ -
In-Kind Labor	\$ 126,125	\$ 85,060	\$ 51,422	\$ 52,202	\$ 53,006	\$ 53,835
Energy Efficiency Credit Revenues	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Jobs created or retained (Connecticut study)	105	101	37	32	32	32
Btu's saved per \$1,000 EECBG funds invested	34,928,372	70,113,023	289,361,055	-	-	-
Btu's saved per \$1,000 total funds invested	6,933	12,022	34,236	43,241	46,084	44,892
Potential Carbon Offset Value Under RGGI	\$ 16,083	\$ 32,634	\$ 44,676	\$ 53,851	\$ 63,026	\$ 58,232
Emissions Reductions (T/SO ₂)	5.5	12.2	13.8	15.4	17.1	16.9
Emissions Reductions (T/NO _x)	2.0	4.4	5.0	5.6	6.2	6.2
Emissions Reductions (lbs/Hg)	40	88	99	111	123	122

KEY ASSUMPTIONS

The following are various key assumptions for specific areas of innovation in Connecticut:

Federal Incentives - for federal incentives we assumed the investment tax credit for solar thermal and PV systems of 30% of the total installed cost of a project, and a tax credit up to \$1,500 for major retrofits.

Ratepayer Fund Incentives - for ratepayer funds we assumed direct incentives for the Home Energy Solutions and Major Retrofit programs (see Section A above), and a performance-based reward program (\$200,000) for achieving energy reduction targets all provided by the Connecticut Energy Efficiency Fund, and direct incentives for the solar thermal and solar photovoltaic system installations, and a performance-based reward program (\$621,000) for achieving sign-up targets for the CTCleanEnergyOptions program and installations of solar thermal and solar photovoltaic systems.

Financing - with the Connecticut Energy Efficiency Fund providing \$462,000 for an interest rate buydown program, we are able to leverage over \$2.6 million (5.6:1 leverage) in private sector capital from AFC First Financial. Through this FOA, we are requesting \$107,100 in funding to support a solar thermal program that will leverage nearly \$550,000 (5.0:1 leverage) in private sector capital from AFC First Financial.

Marketing - the Connecticut Energy Efficiency Fund estimates marketing support at 2% of the incentives provided through the Home Energy Solutions program. The Connecticut Clean Energy Fund estimated marketing support of \$71,500 through its Community Innovations Grants Program. The Town Consortium is eligible to provide grants for community projects to raise the awareness of the benefits and availability of clean energy.

Volunteer Time - based on a minimum wage rate of \$8.25 an hour, we estimated an in-kind contribution of volunteer time based on two programs: the Community Innovations Grant Program supported by the Connecticut Clean Energy Fund, and the Clean Energy Corps program led by the Student Conservation Association. For the Community Innovations Grants Program, towns typically support local events or programs that involve volunteer citizens in various activities. Each of these activities must produce a grant report. The grant report indicates the number of volunteers and the volunteer time spent on the activity. A sample of reports from Portland and Bethany indicated that two volunteers on average spent 10 hours per event. We will be organizing 240 events over the two-year project period resulting in \$39,600 in volunteer time spent. For the Student Conservation Association, volunteer time is based on the following assumptions: Corps Member Personnel Volunteer Value - based on the Independent Sector's established rate of \$20.25 per hour of service at 10 members, 40 hours per week, 42 weeks for Year 1 (\$340,200), and service at 10 members, 40 hours per week, 32 weeks for Year 2 (\$259,200); and Intern Personnel Volunteer Value: SCA conservation interns are expense-paid volunteers that do not receive salary or compensation based on work performed. Based on the Independent Sector's established rate of \$20.25 per hour of service at 2 interns, 40 hours per week, 52 weeks for the project (\$84,240).

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In-Kind Labor - Earth Markets estimates in-kind labor of two months based on beginning the project immediately upon notification by the DOE by March 15, 2010. The Connecticut Energy Efficiency Fund estimates in-kind labor at 3% of the value of the incentives provided by the Home Energy Solutions program. The Connecticut Clean Energy Fund estimates in-kind labor of \$75,822 based on staff time proportionally allocated to the Community Innovation Grants (CIGP), solar thermal and solar PV programs. Basic assumptions for CIGP include fringe benefits (61.6%), COLA (3%): Director 0.55 by program, 7.3% of households, salary \$110,000; Program Manager 0.20 by program, 7.3% of households, salary \$80,000; Program Assistant 0.90 by program, 7.3% of households, salary \$55,000. Basic assumptions for solar thermal and solar PV in aggregate include fringe benefits (61.6%), COLA (3%): Director 0.30 by programs, 7.3% of households, salary \$110,000; Program Manager 1.15 by programs, 7.3% of households, salary \$80,000; Program Associate 0.63 by program, 7.3% of households, salary \$60,000; Program Assistant 1.13 by programs, 7.3% of households, salary \$50,000; Program Administrator 0.10 by program, 7.3% of households, salary \$48,000. MIT estimates in-kind labor of two months based on beginning the project immediately upon notification by the DOE by March 15, 2010 and working for two months without compensation until April 15, 2010 (\$5,000) and faculty advisors providing 2 hours of feedback for 36 weeks for two years (\$18,000).

Potential Energy Efficiency Credit Revenues - we estimated energy saving certificate revenues for Earth Markets (\$98,914). We did not assume revenues from Efficiency 2.0 (\$217,797) because the regulator has not yet made a decision on whether or not behavior would qualify as an eligible resource under the Class III RPS (see Class III Renewable Portfolio Standard below).

We also attempted to estimate the environmental market value from carbon offsets for energy efficiency and voluntary clean energy purchasing under RGGI, and for the sale of energy savings certificates from Connecticut's Class III RPS. The following are descriptions of those assumptions:

Regional Greenhouse Gas Initiative - Connecticut is a participant in RGGI. Given this, there is potential carbon offset value. We estimated the potential offset value for energy efficiency offsets under RGGI for the following categories and programs assuming an allowance price of \$2.30 TCO₂:

- Installation or improvement of energy management systems - Personal Energy Advisor and Feedback Devices
- Improvements in the efficiency of heating distribution systems, including proper sizing and commissioning of heating systems - Major Retrofit
- Measures that improve the thermal performance of the building envelope and/or reduce building envelope air leakage - Major Retrofit
- Improvements in the energy efficiency of combustion equipment that provide space heating and hot water, including a reduction in fossil fuel consumption through the use of solar and geothermal energy - Solar Thermal

We also included the set aside value of carbon allowances as a result of voluntary purchases of clean energy through the CTCleanEnergyOptions program.

Class III Renewable Portfolio Standard - Connecticut has an energy efficiency resource standard that allows for the aggregation of residential energy savings. In Docket No. 05-07-19RE01, Earth Markets advocated for privately financed residential energy efficiency projects to be able to aggregate savings and participate in the Class III RPS. The Department of Public Utility Control ruled in favor of Earth Markets request to allow residential ratepayers an opportunity to participate in the energy efficiency policy. This decision was featured in a Wall Street Journal article entitled "Credits for Cutbacks" because this ruling created an opportunity for privately financed residential energy efficiency projects to receive tradable energy savings certificates as long as an independent 3rd party professional engineer measures and verifies the energy savings. This decision resulted in 7 companies entering the Connecticut market to attempt to provide residential ratepayers with energy efficiency programs.

- **Docket No. 09-01-08** - "Request for Declaratory Ruling on Eligibility for Class III Status for 'Community Energy Savings Project - Lighting' by Earth Markets," was approved by the Department of Public Utility Control allowing for the aggregation of electricity savings as a result of residential lighting retrofit programs to be an eligible resource for the energy efficiency resource standard. Proceeds generated from the sale of energy savings certificates (\$98,914) will be put into a Community Incentive Fund for performance-based rewards for the Town Consortium.
- **Docket No. 09-01-22** "Request for Declaratory Ruling on Eligibility for Class III Status for Behavior-Based Residential Energy Reduction Strategies that Employ Large Scale Data Analysis for Measurement and Verification Purposes," is currently being discussed in Docket No. 05-07-19RE02. This request was submitted by Efficiency 2.0. A draft decision is expected on December 14, 2009 as to whether or not behavior-based strategies will be allowed to participate in the energy efficiency resource standard. We do not include revenues from the sale of energy savings certificates (\$217,797) as a result of behavior-based strategies. If a positive decision is reached by the regulator, then Efficiency 2.0 will use the proceeds generated from the sale of energy savings certificates to provide rewards to individual households for reducing energy usage.

It should be noted that if renewable energy certificates are created and sold into Connecticut's Class I, II, or III RPS, then the carbon benefit is included in that certificate. This means that one can not sell a renewable energy certificate under the RPS and a carbon offset under RGGI.

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Jobs Created or Retained (Connecticut Study) - the Connecticut Department of Economic and Community Development, Connecticut Energy Efficiency Fund, and Connecticut Energy Efficiency Fund hired Navigant Consulting to determine the job benefits for energy efficiency and clean energy development in the state. 1 job-year for every \$1 million invested is equal to \$77,519 for residential energy efficiency, \$131,579 for residential solar thermal, and \$150,057 for residential solar PV. We felt it was important to estimate a range of possible "green jobs" that the project would create using both federal and state estimates (see Figure 9 below).

Emissions Reductions - based on electricity savings and determined by regional emissions rates for SO₂, NO_x, and Hg.

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Figure 9. Energy Efficiency Jobs Created or Retained for Years 1-6 Comparing Federal vs. Connecticut Estimates

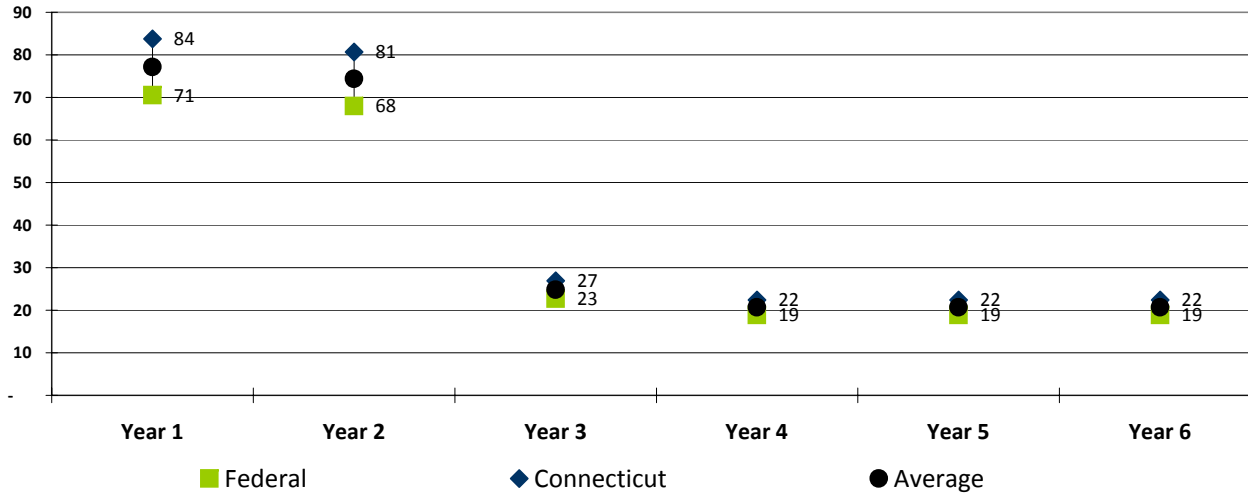


Figure 10. Renewable Energy Jobs Created or Retained for Years 1-6 Comparing Federal vs. Connecticut Estimates

