PROPOSED AMENDMENTS TO RAISED BILL NO. 6603

AN ACT CONCERNING THE CLASS III RENEWABLE PORTFOLIO STANDARD

BY EARTH MARKETS, LLC

CONTACT INFORMATION:

Kerry O'Neill
President and CEO
Earth Markets, LLC
kerry@earthmarkets.com
(203) 258-2550

PROPOSED AMENDMENTS BY EARTH MARKETS, LLC

RAISED BILL NO. 6603

AN ACT CONCERNING THE CLASS III RENEWABLE PORTFOLIO STANDARD

Be it enacted by the Senate and House of Representatives in General Assembly convened:

That Public Act (PA) 07-242 "An Act Concerning Electricity and Energy Efficiency" be modified through Raised Bill No. 6603 "An Act Concerning the Class III Renewable Portfolio Standard" for the purpose of advancing residential energy efficiency in Connecticut, reducing energy costs and peak energy use for residential households, reducing greenhouse gas emissions, increasing investment in energy efficiency and helping create green jobs through the expansion of market-based policy mechanisms by (1) extending the Class III Renewable Portfolio Standards goal for energy efficiency beyond 2010 to 20 percent by the year 2020, (2) establishing a 25 percent cap on the number of Class III Renewable Energy Credits that can be registered and sold by the Connecticut Energy Efficiency Fund to encourage private sector investment in energy efficiency, (3) allowing non-electric efficiency actions to be registered as a Class III resource to support a fuel-blind market mechanism for energy efficiency investment, (4) allowing behavior-based strategies as an energy efficiency resource and large-scale data analysis as an appropriate measurement and verification, and (5) clarifying existing Class III Renewable Portfolio Standards legislation based on regulatory precedent and legislative intent as to the treatment of residential energy efficiency actions.

Addendum to Section 42 of PA07-242:

b) [and] (3) include any other information that the department deems appropriate, and (4) for programs that involve behavior-based strategies, provide historical electric utility bill information obtained with the permission of residential ratepayers, to perform large scale data analyses, as referenced in the National Action Plan on Energy Efficiency "Model Energy Efficiency Program Evaluation Guide", that compare electricity usage before and after an energy efficiency or conservation measure has been implemented; specific measurement and verification plans that utilize large-scale data analyses must be overseen by third party professionals and approved by the Department of Public Utility Control.

Amendment to Section 42 of PA07-242:

c) For conservation and load management projects that serve residential customers, seventy-five per cent of the financial value derived from the credits shall be directed to the Conservation and Load Management Funds. For conservation and load management projects that serve residential customers but receive no Conservation and

Load Management funding, one hundred per cent of the financial value derived from the credits shall be directed to the residential customer who implemented the conservation and load management measures or such residential customer's designated agent pursuant to subsections (a) and (b) of this section. The financial value derived from the credits earned by residential customers may be aggregated by a customer's designated agent pursuant to this subsection and subsections (a) and (b) of this section. The financial value derived from the credits earned by residential customer or their designated agent may be aggregated, with a minimum aggregation of 100 kW, pursuant to this section and Sections 16-243t(a) and (b).

Amendment to Section 43 of PA07-242:

(a) Based on 2005 total electricity industry usage data provided by the Energy Information Agency for Connecticut, on and after January 1, 2007, each electric distribution company providing standard service pursuant to section 16-244c, as amended by this act, and each electric supplier as defined in section 16-1, as amended by this act, shall demonstrate to the satisfaction of the Department of Public Utility Control that not less than one per cent of the total output of such supplier or such standard service of an electric distribution company shall be obtained from Class III [resources] sources. On and after January 1, 2008, not less than two per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On or after January 1, 2009, not less than three per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2010, not less than four per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2011, not less than six percent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2012, not less than eight per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2013, not less than ten per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2014, not less than twelve per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility

Control, be obtained from Class III [resources] sources. On and after January 1, 2015, not less than fourteen per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2016, not less than sixteen per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2017, not less than seventeen per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2018, not less than eighteen per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2019, not less than nineteen per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2020, not less than twenty per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. Electric power obtained from customer-side distributed resources that does not meet air and water quality standards of the Department of Environmental Protection is not eligible for purposes of meeting the percentage standards in this section.

Amendment to Section 43 of PA07-242:

(b) Except as provided in subsection (d) of this section, the Department of Public Utility Control shall assess each electric supplier and each electric distribution company that fails to meet the percentage standards of subsection (a) of this section a charge of up to five and five-tenths cents for each kilowatt hour of electricity that such supplier or company is deficient in meeting such percentage standards. Seventy-five per cent of such assessed charges shall be deposited in the Energy Conservation and Load Management Fund established in section 16-245m, as amended by this act, and twenty-five per cent shall be deposited in the Renewable Energy Investment Fund established in section 16-245n, as amended by this act, except that such seventy-five per cent of assessed charges with respect to an electric supplier shall be divided among the Energy Conservation and Load Management Funds of electric distribution companies in proportion to the amount of electricity such electric supplier provides to end use customers in the state using the facilities of each electric distribution company. Beginning in 2010, the Conservation and Load Management Fund cannot register more

than twenty-five percent of the annual Class III resource requirements to satisfy the RPS.

Amendment to Section 44 of PA07-242:

Class III [renewable energy] source" means the electricity output from combined heat and power systems with an operating efficiency level of no less than fifty per cent that are part of customer-side distributed resources developed at commercial and industrial facilities in this state on or after January 1, 2006, a waste heat recovery system installed on or after April 1, 2007, that produces electrical or thermal energy by capturing preexisting waste heat or pressure from industrial or commercial processes, the natural gas, fuel oil and electricity savings created by residential households in this state from efficiency, conservation and load management programs, supported by the Conservation and Load Management Fund or financed by other agents begun on or after January 1, 2006.

Statement of Purpose:

To modify Raised Bill No. 6603 "An Act Concerning the Class III Renewable Portfolio Standard" for the purpose of advancing residential energy efficiency in Connecticut.

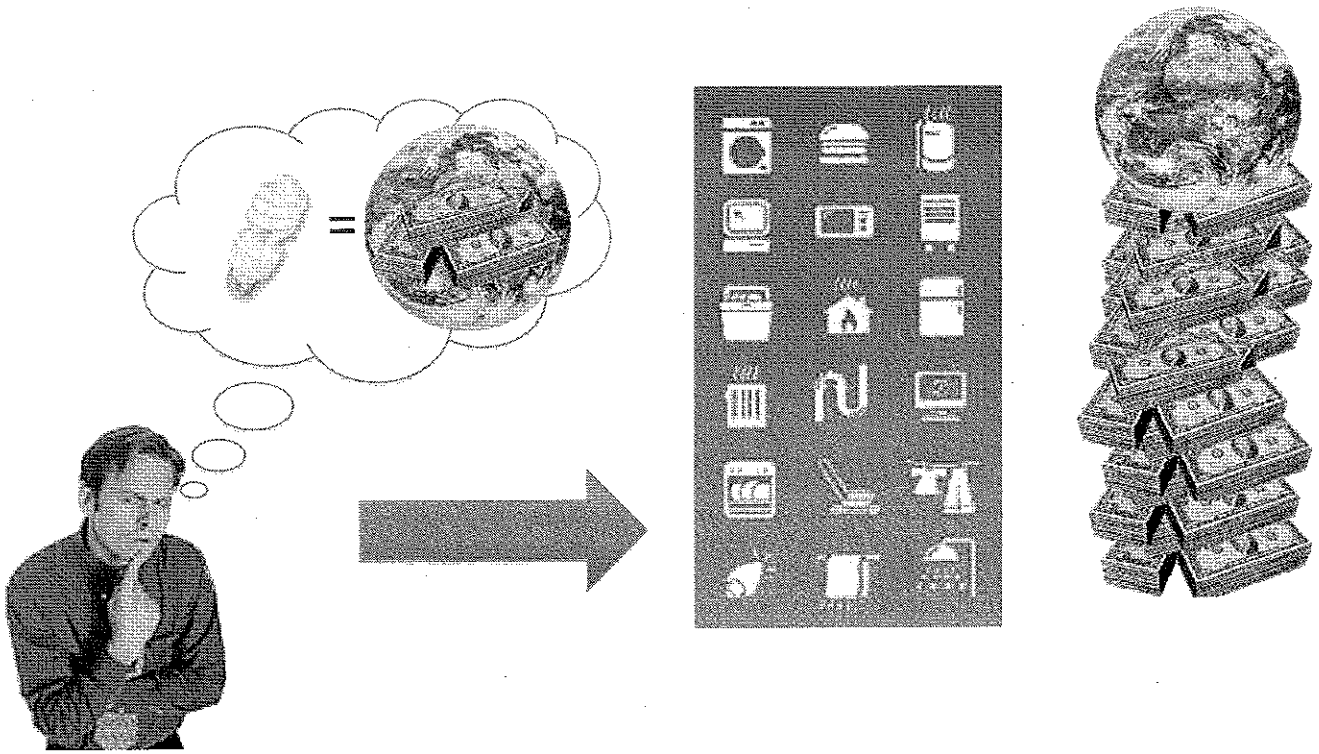
[Proposed deletions are enclosed in brackets. Proposed additions are indicated by underline.]

ENERGYSMARTCT

PolicySmart Proposals to Advance Privately Financed Residential Energy Efficiency

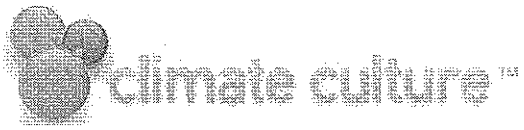
WORKING DOCUMENT

(January 2009)



PolicySmart Proposals That Support an EnergySmart CT

Advancing Privately Financed Residential Energy Efficiency in Connecticut



Executive Summary

The following policy proposals aim to **clarify and extend Connecticut's Class III Renewable Portfolio Standard (RPS), particularly as it applies to the residential market. These policies do not require any state funding** and merely strengthen and extend existing market mechanisms that support residential energy efficiency.

These policies also support EnergySmartCT, a campaign developed by SmartPower, Climate Culture, and Earth Markets to motivate Connecticut cities and towns, including their residents, businesses and institutions, to commit to and achieve a decrease in electricity usage of 20 percent below current levels by 2020 through energy efficiency investments and conservation behavior. This campaign complements the existing CT Clean Energy Communities program which has, to date, led to the participation of 85 communities and over 20,000 sign-ups to the CTCleanEnergyOptions program.[1] Together, this "20-20 by 2020 EnergySmart Connecticut Campaign" will **reduce fossil fuel energy use by 40% by 2020**, a goal in line with current Class I (renewables) RPS goals.

These PolicySmart Proposals have the following goals for Connecticut:

- **Reduce energy costs** for residential households throughout the state;
- **Reduce peak energy use**, mitigating the need for new fossil-fuel based power plants;
- **Direct benefits to residential households**, balancing the current RPS market that favors C&I;
- **Create green jobs** within the state, including local energy efficiency contractors & retailers;
- **Meet greenhouse gas commitments** through energy reductions and clean energy promotion;
- **Increase investment in energy efficiency** through market-based policy mechanisms; and
- **Demonstrate continued national leadership** in energy efficiency programs and policy.

To accomplish these goals, the following amendments are proposed to Public Act (PA) 07-242, "An Act Concerning Energy Independence" for the purpose of clarifying existing Class III RPS legislation based on regulatory precedent and legislative intent as well as extending the Class III RPS beyond the current ending date of 2010:

(A) Clarification of existing Class III RPS legislation

1. Behavior as an Energy Efficiency Resource, Large-Scale Data Analysis as Appropriate M&V – acknowledge the importance for behavior-based smart energy strategies and consequent need for measurement and verification through large-scale data analysis of energy use before and after a programmatic intervention;

2. Conservation & Load Management Financed Residential Projects – provide 100 percent of the value of Renewable Energy Credits (RECs) that are generated from incentives provided by the Connecticut Energy Efficiency Fund (CEEF) for residential ratepayers to the CEEF;

3. Privately Financed Residential Projects – provide 100 percent of the value of RECs that are generated from independently funded residential projects to the residential ratepayer or their designated agent;

[1] The CT Clean Energy Communities program is supported by the Connecticut Clean Energy Fund, SmartPower, Environment Northeast, Clean Water Action, the Inter-Religious Eco-Justice Network and the Department of Public Utility Control with the support of Connecticut Light & Power, United Illuminating, Sterling Planet, and Community Energy.

4. Residential Ratepayer Inclusion in the Class III RPS – remove any ambiguity from the statute and allow residential ratepayer participation as a Class III resource.

(B) Extension of Class III RPS beyond 2010

5. Extension of the Class III RPS – increase energy efficiency in Connecticut with the goal of 20 percent below 2005 levels by the year 2020 through the Class III Renewable Portfolio Standard (RPS);[1]

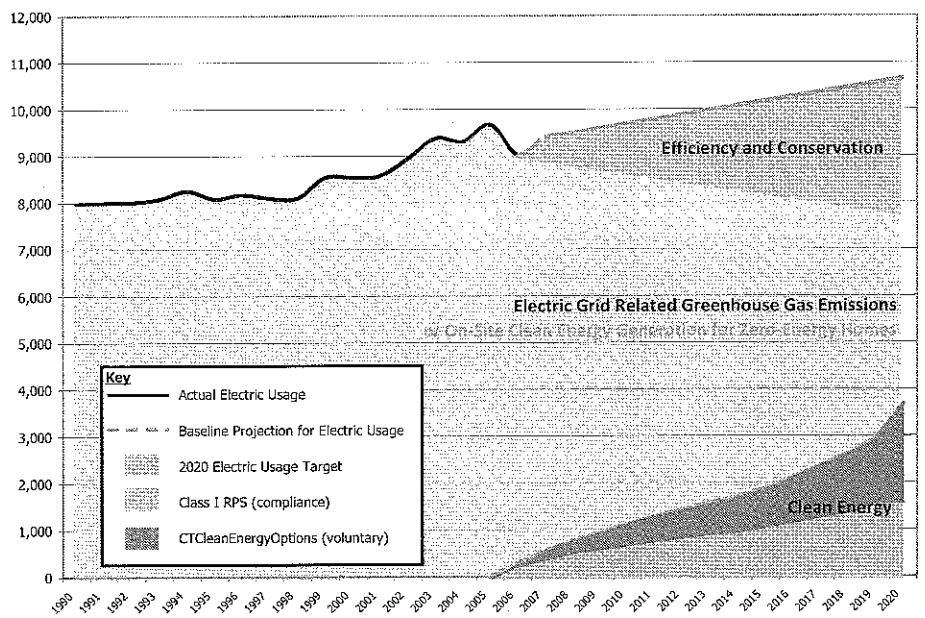
6. Competition in the Class III RPS – establish a 25% cap on the number of Class III RECs that can be registered and sold by the CEEF to encourage private sector investment in energy efficiency in CT.

7. Advance Non-Electric Efficiency Benefits to Residential Ratepayers – to advance global warming, energy independence, and "green job" economic development goals by allowing homeowners an ability to monetize non-electric efficiency actions as a Class III resource.

The inclusion of these public policy recommendations into PA 07-242, will provide the necessary guidance and structure for the Class III RPS to operate efficiently, effectively, and competitively while also encouraging additional private sector investment in residential energy efficiency, conservation and load management measures in Connecticut. By allowing residential ratepayers an opportunity to participate in the Class III RPS, policymakers will encourage private sector investors to support least-cost residential energy efficiency and conservation actions in Connecticut that will provide a full home energy solution.

If EnergySmartCT is successful, by the end of 2020, the greenhouse gas emissions associated with residential electricity usage will be dramatically reduced through reduced electricity usage and increased support for clean energy (see Figure 1).

Figure 1. EnergySmartCT - 20-20 by 2020 Campaign (Residential Electricity Usage in kWh)



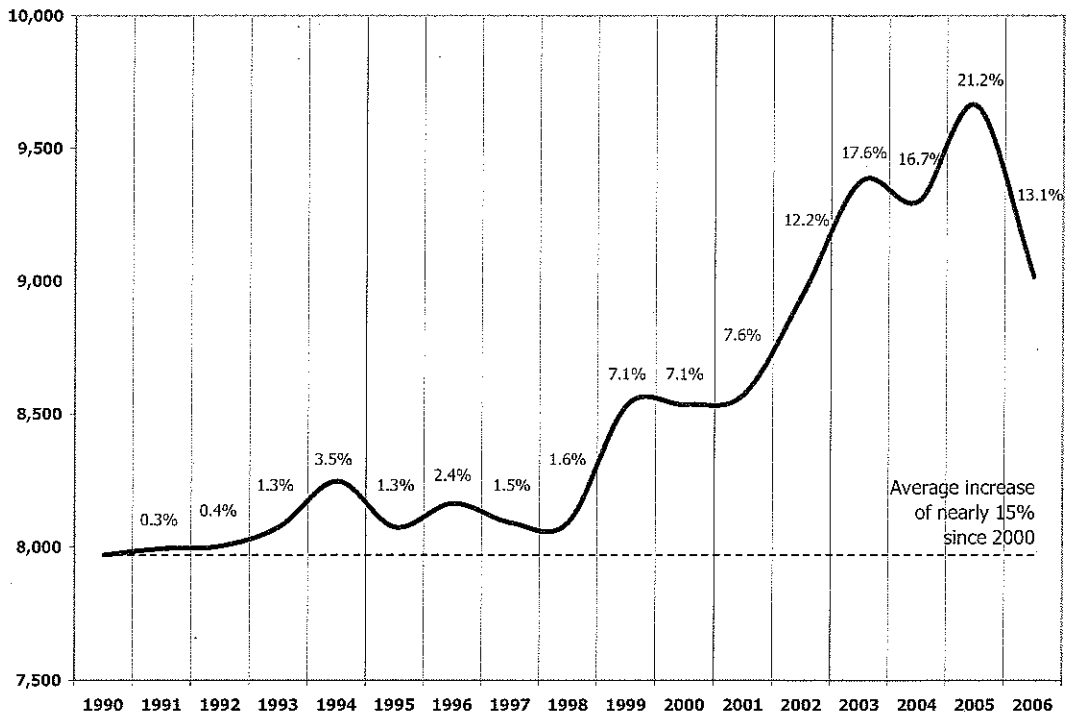
[1] The European Union has committed to a 20-20-20 by 2020 target to produce 20% of its energy from renewable resources (consistent with Connecticut Class I RPS), increase energy efficiency by 20%, and cut greenhouse gas emissions by 20% - all by the year 2020.

Market Overview

Connecticut has some of the most advanced public policies on clean energy and energy efficiency in the United States. The state has established award-winning ratepayer-supported incentive funds through the Connecticut Clean Energy Fund (CCEF) and the Connecticut Energy Efficiency Fund (CEEF) that invest collectively over $125 million per year. It has established progressive Renewable Portfolio Standards (RPS) for Class I, II, and III resources to support least-cost and market-based solutions to advance clean energy and energy efficiency. These public policies have created nearly a $200 million market for clean energy and energy efficiency in Connecticut – $ 90 million for clean energy and $105 million for energy efficiency in 2007 alone (see Appendix I). Connecticut residences pay at least $50 per year to support the cost of these public policies – nearly $20 for the Class I, II, and III RPS alone. The Class III RPS market provides an opportunity for residential ratepayers in Connecticut to benefit directly from these public policies by receiving energy savings that are greater than the costs of the public policies. To date, residential ratepayers, as opposed to commercial and industrial ratepayers, have received very little, if any, direct financial benefit from the Class I, II and III RPS.

Connecticut households are increasingly recognizing that energy efficiency and conservation are actions that individuals can take to help reduce global warming. According to Nexus Market Research, 61% of survey respondents believe that energy efficiency and conservation are actions that individuals can take to help reduce global warming – up two-fold in 2007 from 28% in 2006.[2] Despite significant incentives to encourage household energy efficiency in the state and the economics of rising energy costs, since 1990 Connecticut households have continued to increase their use of electricity by up to 20% - nearly 15% on average since 2000 (see Figure 2), while increasing their overall electricity costs by over 90% - over 40% on average since 2000 (see Figure 3). Connecticut households in aggregate paid over $2 billion in electricity costs for 2006. Connecticut households use and pay 25% more for electricity than households in the other New England states. [3]

Figure 2. Average Annual Household Electricity Usage (kWh) and Percent Increase Since 1990 in Connecticut[4]

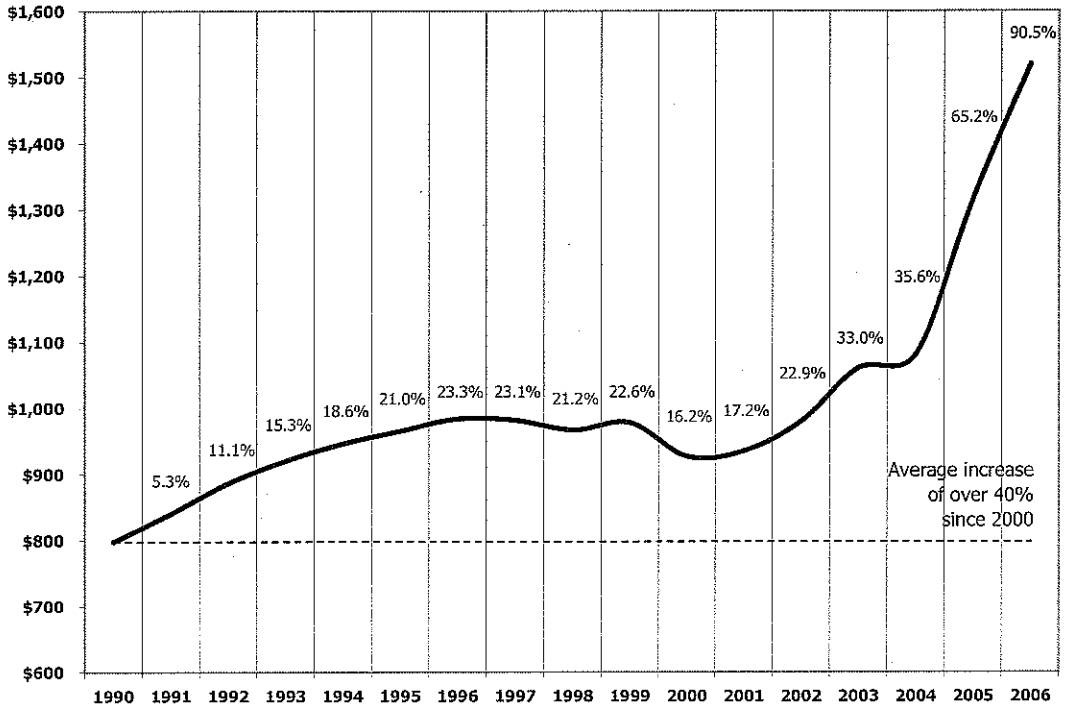


[2] Annual Report of the Connecticut Clean Energy Fund's Public Awareness, Education, and Voluntary Market Demand Initiatives. Nexus Market Research (June 2008).

[3] EIA Data: retail electricity price for residential customers, residential sales (kWh), and customers (2007)

[4] EIA Data: residential sales (kWh) and customers (2007)

Figure 3. Average Annual Household Electricity Costs and Percent Increase Since 1990 in Connecticut[5]



As a result of increasing electricity usage and rising costs being paid per year in Connecticut, there is a need for new approaches towards residential energy efficiency and conservation in Connecticut. EnergySmartCT represents a complementary approach to the Connecticut Energy Efficiency Fund's incentive programs. The purpose of EnergySmartCT is to advance residential energy efficiency and conservation in Connecticut through commitment, sign-up, and action that is verified through credible, transparent, and high quality measurement & verification methodologies.

[5] EIA Data: retail electricity price for residential customers, residential sales (kWh), and customers (2007)

Campaign Overview

EnergySmartCT has three key components that lead to three key actions. The three key components of EnergySmartCT are:

1. **Marketing** – the campaign focus is to use community-based research and marketing as well as Web 2.0 social networking strategies to advance energy efficiency and conservation in Connecticut with a focus on households and communities;

2. **Technology** – the campaign will utilize advanced technologies, including installations in homes, sophisticated online engagement tools and measurement & verification sampling devices; and

3. **Finance** – the campaign will be financed through private and philanthropic sector investments, as well as through the monetization of energy and demand savings from the Class III renewable portfolio standards and forward capacity markets, respectively.

The three key actions of EnergySmartCT include:

1. **Commitment** – cities and towns, and their residents, businesses and institutions commit to the "20-20 by 2020 EnergySmart Connecticut Campaign";

2. **Sign-Up** – residents sign-up to a fun, user-friendly, and informative website portal for individual ratepayers to compare individual and collective actions being taken within their communities and homes to reduce carbon emissions by reducing energy usage; and

3. **Take Action** – reduce net fossil fuel use through the purchase and installation of energy efficient products, long-term changes in energy behavior and signing up to the CTCleanEnergyOptions program.

The partners in EnergySmartCT include:

- **Climate Culture** – a New York-based software company that engages consumers on energy use and climate change, and measures, verifies and aggregates reductions in energy use through its patent-pending Personal Energy Advisor℠ combined with robust statistical analysis. Climate Culture enables individuals to make smarter choices that reduce their climate change impacts while saving money.

- **Earth Markets** – a Connecticut-based marketing and finance company that is focused on advancing residential energy efficiency and clean energy by accelerating the diffusion of technologies through the use of environmental markets and finance, and community-based marketing and social networking strategies.

- **SmartPower** – the nation's award-winning, non-profit marketing organization on clean energy and energy efficiency that was created by private foundations and the Connecticut Clean Energy Fund to develop effective marketing campaigns around clean energy and energy efficiency.

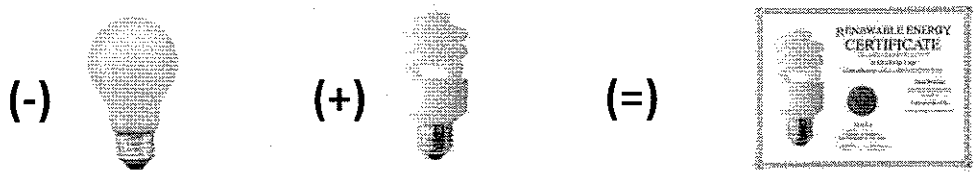
Over the course of the winter and spring of 2009, EnergySmartCT will be engaging other partners to get involved with the campaign. It should be noted that utility bill financing, long-term REC procurement and smart meters are part of PA 07-242 and can be used to support residential energy efficiency and conservation, however, their implementation is slower than expected. While making no specific proposals, therefore, we encourage the state to accelerate the implementation of these existing policies.

Public Policy

In addition to an award-winning ratepayer-supported energy efficiency fund,[6] the Class III RPS is another public policy mechanism supported by the Connecticut General Assembly that seeks to advance energy efficiency and conservation in the state. Connecticut has established a Class III RPS[7] that requires competitive electricity suppliers and standard service providers to derive an increasing percentage of their electricity from Class III resources[8] by the end of 2010 – 1 percent by 2007, 2 percent by 2008, 3 percent by 2009 and 4 percent by 2010 and beyond.[9] The Class III RPS requirements apply to customers located in Connecticut Light & Power (CL&P) and United Illuminating (UI) territories and are satisfied through Class III Renewable Energy Credits (RECs) created in Connecticut from residential,[10] commercial and industrial energy efficiency and conservation projects. The Class III RPS represents an opportunity to reduce electricity usage in Connecticut through a credit trading program.

A Class III REC is essentially 1 MWh (1 REC = 1 MWh = 1,000 kWh) of independently verified electricity savings resulting in a calendar year from a Class III qualified energy efficiency or conservation projects (see Figure 4). The Class III RPS will lead to the reduction of approximately 1,250,000 MWh's of electricity by the end of 2010 at a maximum public policy cost of $10 per year for residential ratepayers (see Figure 5). The reductions in electricity usage for 2010 are equivalent to the power produced from a 150, 500, or 1,000 MW fuel cell, wind, or solar power farm respectively. EnergySmartCT will assist residential ratepayers in saving more costs on their electricity usage than they are paying for the Class I, II and III RPS and system benefit fund policies combined.

Figure 4. Example of a Class III REC Created from Residential Energy Star Lighting Retrofits



Take-Out and Recycle 20
80-W Incandescent

Install 20
20-W CFL

Electricity Savings
1,000 kWh

Combined, the Class I and III RPS provide various benefits and costs to Connecticut ratapayers (see Figure 6). As can be seen from this graphic, the benefit from retail electric savings resulting from the current Class III RPS are exceeded by the costs of the Class I and III RPS policies in 2016. EnergySmartCT proposes to increase the Class III RPS in Connecticut to 20 percent by 2020 to provide greater ratepayer benefits than costs for the Class I and III RPS policies. To that end, EnergySmartCT proposes the following public policy proposals:

[6] The Connecticut Energy Efficiency Fund, managed by Connecticut Light & Power and United Illuminating and overseen by the Energy Conservation Management Board, provides energy efficiency incentives through a 3 mill surcharge from Connecticut ratepayers.

[7] PA 05-01 "An Act Concerning Energy Independence" and amended in PA 07-242 "An Act Concerning Electricity and Energy Efficiency"

[8] Class III resources include (1) customer-sited CHP systems with a minimum operating efficiency of 50% installed at commercial or industrial facilities on or after January 1, 2006; (2) electricity savings from conservation and load management programs that started on or after January 1, 2006; and (3) systems that recover waste heat or pressure from commercial and industrial processes installed on or after April 1, 2007.

[9] See Sections 42-44 of PA 07-242

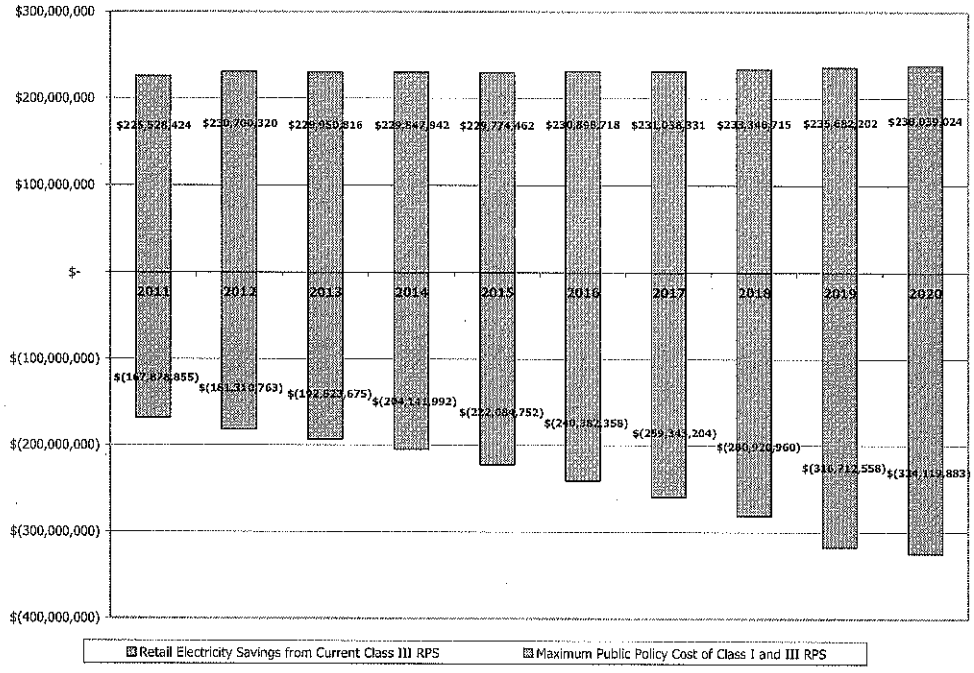
[10] Earth Markets presented a case in Docket No. 05-07-19RE01 that was supported by the DPUC to allow independently funded residential energy efficiency projects to receive 100% of the financial value from the sale of RECs. Prior to this decision, the statute was silent on how to treat residential energy efficiency projects that did not receive funding from the CEEF.

Figure 5. Class III RPS Market Forecast and Public Policy Cost Estimate (2009-2015)[11]

Forecast

	2009	2010	2011	2012	2013	2014	2015
Connecticut Light & Power	25,215,000	25,375,000	25,434,000	25,571,000	25,544,000	25,581,000	25,617,000
United Illuminating	6,092,000	5,921,000	5,872,000	5,825,000	5,750,000	5,699,000	5,653,000
Estimated Electric Demand (MWh)[1]	31,307,000	31,296,000	31,306,000	31,396,000	31,294,000	31,280,000	31,270,000
Class III RPS Target	3%	4%	4%	4%	4%	4%	4%
Estimated Class III RECs	939,210	1,251,840	1,252,240	1,255,840	1,251,760	1,251,200	1,250,800
Minimum Class III Public Policy Cost	$ 9,392,100	$ 12,518,400	$ 12,522,400	$ 12,558,400	$ 12,517,600	$ 12,512,000	$ 12,508,000
Maximum Class III Public Policy Cost	$ 29,115,510	$ 38,807,040	$ 38,819,440	$ 38,931,040	$ 38,804,560	$ 38,787,200	$ 38,774,800
Estimated Class III Public Policy Cost	$ 18,784,200	$ 25,036,800	$ 25,044,800	$ 25,116,800	$ 25,035,200	$ 25,024,000	$ 25,016,000
Estimated Annual Household Cost of the Class III RPS Public Policy							
Minimum Annual Household Cost	$ 2.52	$ 3.36	$ 3.36	$ 3.36	$ 3.36	$ 3.36	$ 3.36
Maximum Annual Household Cost	$ 7.81	$ 10.42	$ 10.42	$ 10.42	$ 10.42	$ 10.42	$ 10.42

Figure 6. Benefits (Retail Savings from the Current Class III RPS) vs. the Maximum Public Policy Costs of the Current Class I and III RPS[12]



[11] State and Utility Energy Requirements by the Connecticut Siting Council 2008-2017 Ten Year Forecast. Assumes 8,400 kWh average annual household electricity usage, $10 minimum, $31 maximum, and $20 estimated Class III REC price.

[12] Assumes Alternative Compliance Payment cost of REC at $55 for Class I and $31 for Class III, average retail electric price of $0.1801/kWh increasing at 2% per year. The ratepayer cost of implementing Project 150 have not been included in this benefit to cost comparison graph.

Public Policy Proposals
PA 07-242 "An Act Concerning Electricity and Energy Efficiency"

Section 42. (verbatim)

a) Notwithstanding the provisions of title 16 of the general statutes, a customer who implements energy conservation or customer-side distributed resources, as defined in section 16-1 of the general statutes, as amended by this act, on or after January 1, 2008, shall be eligible for Class III credits, pursuant to section 16-243q of the general statutes, as amended by this act. The Class III credit shall be not less than one cent per kilowatt hour. For nonresidential projects receiving conservation and load management funding, twenty-five per cent of the financial value derived from the credits earned pursuant to this section shall be directed to the customer who implements energy conservation or customer-side distribution resources pursuant to this section with the remainder of the financial value directed to the Conservation and Load Management Funds. For nonresidential projects not receiving conservation and load management funding submitted on or after March 9, 2007, seventy-five per cent of the financial value derived from the credits earned pursuant to this section shall be directed to the customer who implements energy conservation or customer-side distribution resources pursuant to this section with the remainder of the financial value directed to the Conservation and Load Management Funds. Not later than July 1, 2007, the Department of Public Utility Control shall initiate a contested case proceeding in accordance with the provisions of chapter 54 of the general statutes, to implement the provisions of this section.

b) In order to be eligible for ongoing Class III credits, the customer shall file an application that contains information necessary for the department to determine that the resource qualifies for Class III status. Such application shall (1) certify that installation and metering requirements have been met where appropriate, (2) provide a detailed energy savings or energy output calculation for such time period as specified by the department, and (3) include any other information that the department deems appropriate.

c) For conservation and load management projects that serve residential customers, seventy-five per cent of the financial value derived from the credits shall be directed to the Conservation and Load Management Funds.

Section 43. (verbatim)

Sec. 43. Section 16-243q of the general statutes is repealed and the following is substituted in lieu thereof (*Effective October 1, 2007*):

(a) On and after January 1, 2007, each electric distribution company providing standard service pursuant to section 16-244c, as amended by this act, and each electric supplier as defined in section 16-1, as amended by this act, shall demonstrate to the satisfaction of the Department of Public Utility Control that not less than one per cent of the total output of such supplier or such standard service of an electric distribution company shall be obtained from Class III [resources] sources. On and after January 1, 2008, not less than two per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On or after January 1, 2009, not less than three per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2010, not less than four per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. Electric power obtained from customer-side distributed resources that does not meet air and water quality standards of the Department of Environmental Protection is not eligible for purposes of meeting the percentage standards in this section.

(b) Except as provided in subsection (d) of this section, the Department of Public Utility Control shall assess each electric supplier and each electric distribution company that fails to meet the percentage standards of subsection (a) of this section a charge of up to five and five-tenths cents for each kilowatt hour of electricity that such supplier or company is deficient in meeting such percentage standards. Seventy-five per cent of such assessed charges shall be deposited in the Energy Conservation and Load Management Fund established in section 16-245m, as amended by this act, and twenty-five per cent shall be deposited in the Renewable Energy Investment Fund established in section 16-245n, as amended by this act, except that such seventy-five per cent of assessed charges with respect to an electric supplier shall be divided among the Energy Conservation and Load Management Funds of electric distribution companies in proportion to the amount of electricity such electric supplier provides to end use customers in the state using the facilities of each electric distribution company.

(c) An electric supplier or electric distribution company may satisfy the requirements of this section by participating in a conservation and distributed resources trading program approved by the Department of Public Utility Control. Credits created by conservation and customer-side distributed resources shall be allocated to the person that conserved the electricity or installed the project for customer-side distributed resources to which the credit is attributable and to the Energy Conservation and Load Management Fund. Such credits shall be made in the following manner: A minimum of twenty-five per cent of the credits shall be allocated to the person that conserved the electricity or installed the project for customer-side distributed resources to which the energy credit is attributable and the remainder of the credits shall be allocated to the Energy Conservation and Load Management Fund, based on a schedule created by the department no later than January 1, 2007, and reviewed annually thereafter. The department may, in a proceeding and for good cause shown, allocate a larger proportion of such credits to the person who conserved the electricity or installed the customer-side distributed resources. The department shall consider the proportion of investment made by a ratepayer through various ratepayer-funded incentive programs and the resulting reduction in federally mandated congestion charges. The portion allocated to the Energy Conservation and Load Management Fund shall be used for measures that respond to energy demand and for peak reduction programs.

(d) An electric distribution company providing standard service may contract with its wholesale suppliers to comply with the conservation and customer-side distributed resources standards set forth in subsection (a) of this section. The Department of Public Utility Control shall annually conduct a contested case, in accordance with the provisions of chapter 54, to determine whether the electric distribution company's wholesale suppliers met the conservation and distributed resources standards during the preceding year. Any such contract shall include a provision that requires such supplier to pay the electric distribution company in an amount of up to five and one-half cents per kilowatt hour if the wholesale supplier fails to comply with the conservation and distributed resources standards during the subject annual period. The electric distribution company shall immediately transfer seventy-five per cent of any payment received from the wholesale supplier for the failure to meet the conservation and distributed resources standards to the Energy Conservation and Load Management Fund and twenty-five per cent to the Renewable Energy Investment Fund. Any payment made pursuant to this section shall not be considered revenue or income to the electric distribution company.

(e) The Department of Public Utility Control shall conduct a contested proceeding to develop the administrative processes and program specifications that are necessary to implement a Class III sources conservation and distributed resources trading program. The proceeding shall include, but not be limited to, an examination of issues such as (1) the manner in which qualifying activities are certified, tracked and reported, (2) the manner in which Class III certificates are created, accounted for and transferred (3) verification of the accuracy of conservation and customer-side distributed

resources credits, (4) verification of the fact that resources or credits used to satisfy the requirement of this section have not been used to satisfy any other portfolio or similar requirement, (5) the manner in which credits created by conservation and customer-side distributed resources may best be allocated to maximize the impact of the trading program, and (6) setting such alternative payment amounts at a level that encourages development of conservation and customer-side distributed resources. The department may retain the services of a third party entity with expertise in the development of energy efficiency trading or verification programs to assist in the development and operation of the program. The department shall issue a decision no later than February 1, 2008.

Section 44. (verbatim)

Sec. 44. Subdivision (44) of subsection (a) of section 16-1 of the general statutes is repealed and the following is substituted in lieu thereof (*Effective from passage*):

Class III [renewable energy] source" means the electricity output from combined heat and power systems with an operating efficiency level of no less than fifty per cent that are part of customer-side distributed resources developed at commercial and industrial facilities in this state on or after January 1, 2006, a waste heat recovery system installed on or after April 1, 2007, that produces electrical or thermal energy by capturing preexisting waste heat or pressure from industrial or commercial processes, or the electricity savings created in this state from conservation and load management programs begun on or after January 1, 2006.

CLARIFICATION OF EXISTING LEGISLATION

1. Behavior as Energy Efficiency Resource, Large-Scale Data Analysis as Appropriate M&V

Purpose To acknowledge behavior as an important energy efficiency resource, recognizing that previous legislative and regulatory precedent on this issue is vague and uncertain, and including an appropriate and credible measurement & verification methodology in statute for determining energy and demand savings for the Class III RPS from any behavior-based efficiency and conservation efforts for residential ratepayers.

Comments Studies spanning three decades suggest that behavior strategies can have a large effect on energy use, both in the short and long-term,[13] and that residential consumers can reduce over 20 percent of their energy use through conservation measures if they set a goal, receive feedback, and are given concrete actions. Tracking actual energy and demand reductions through an aggregate bill analysis methodology that is corrected for exogenous factors such as weather, can improve measurement & verification for residential projects, programs, or initiatives that use efficiency or conservation strategies that lead to behavior change. Numerous energy efficiency programs across the country, including the Sacramento Municipal Utility District, have utilized large-scale data analysis to measure and verify behavior-based programs, and there is growing academic, policy, and regulatory consensus that behavior is a key leverage point in reducing residential energy use. The National Action Plan on Energy Efficiency (NAPEE), a consensus document developed by the US EPA and DOE specifically, with the involvement of state agencies in Connecticut, [14] recommends large-scale data analysis in their "Model Energy Efficiency Program Evaluation Guide" for projects that involve a census of project sites, but do not necessarily rely on site-specific installation information.

Policy Change Addendum to Section 42

[13] A recent American Council for an Energy Efficient Economy (ACEEE) study, "Behavior, Energy, and Climate Change: Policy Directions, Program Innovations, and Research Paths," estimates that the "behavioral resource" could reduce energy use by 25% or more.

[14] NAPEE included the Connecticut Office of Consumer Counsel, Connecticut Department of Environmental Protection, and the Connecticut Department of Public Utility Control as members of its public leadership group.

b) [and] (3) include any other information that the department deems appropriate, and (4) for programs that involve behavior-based strategies, provide historical electric utility bill information obtained with the permission of residential ratepayers, to perform large-scale data analyses, as referenced in the National Action Plan on Energy Efficiency "Model Energy Efficiency Program Evaluation Guide", that compare electricity usage before and after an energy efficiency or conservation measure has been implemented; specific measurement and verification plans that utilize large-scale data analyses must be overseen by third party professionals and approved by the Department of Public Utility Control.

RPS Impact This policy would have a positive impact on the RPS by reducing Class III RPS compliance costs to all ratepayers as a result of increased market competition, increasing residential energy efficiency and conservation, and improving measurement & verification standards for residential programs and initiatives. The policy would also reduce or remove administrative burdens for ratepayers to execute their Class III property right, raising support for the RPS as a policy mechanism to meet climate change targets.

2. Conservation & Load Management Financed Residential Projects

Purpose To provide clarity and security that Conservation and Load Management (C&LM) Fund incentive programs for residential energy efficiency and conservation projects receive 100 percent of renewable energy credit value for their incentives.

Comments The Electric Distribution Companies (EDC's) presented a case in Docket No. 05-07-19RE01 that was supported by the DPUC (September 29, 2008) to allow for the remaining 25 percent of Class III RECs that are owned by the residential customer – from residential energy efficiency projects that receive C&LM funding – to be allocated to the C&LM fund for a total 100 percent of the value of the RECs. By including this regulatory decision into the statute, it will be clear to residential ratepayers that the value of Class III RECs is to be retained by the C&LM fund if the residential ratepayer receives incentives from the fund.

Policy Change Amendment to Section 42

c) For conservation and load management projects that serve residential customers, [and] receive Conservation and Load Management funding, and a minimum aggregation of 100 kW, [seventy-five] one-hundred per cent of the financial value derived from the credits shall be directed to the Conservation and Load Management Funds.

RPS Impact This policy would not have a substantive impact on the RPS.

3. Privately Financed Residential Projects

Purpose To provide clarity and security that privately financed residential energy efficiency and conservation projects receive 100 percent of renewable energy credit value for their investments.

Comments Earth Markets presented a case in Docket No. 05-07-19RE01 that was supported by the DPUC (September 29, 2008) to allow independently funded residential energy efficiency projects to receive 100% of the financial value from the sale of RECs. By including this regulatory decision into the statute, investors can be assured that privately financed residential energy efficiency and conservation measures will continue to receive full economic value for their investments.

Policy Change Addendum to Section 42

d) For energy efficiency, conservation and load management projects that serve residential customers and that do not receive Conservation and Load Management funding, one-hundred percent of the financial value derived from the credits earned shall be directed to the residential customer who implements the efficiency, conservation or load management measure, or that residential customer's designated agent, pursuant to Sections 16-243t(a) and (b). The financial value derived from the credits earned by residential customer or their designated agent may be aggregated, with a minimum aggregation of 100 kW, pursuant to this section and Sections 16-243t(a) and (b).

RPS Impact This policy would have a positive impact on the RPS by reducing Class III RPS compliance costs to all ratepayers as a result of increased market competition, increasing private sector investment in residential energy efficiency and conservation programs, and accelerating least-cost solutions and achieving better benefit to cost ratio energy efficiency and conservation programs.

4. Residential Ratepayer Inclusion in the Class III RPS

Purpose To clearly articulate in statute without any ambiguity that residential ratepayers can participate in the Class III RPS.

Comments The Class III RPS presents an opportunity to advance least-cost residential energy efficiency and conservation efforts in Connecticut. The statute is silent on whether or not Class III sources can come from the electricity savings created from residential ratepayers in this state. Clarifying the policy language will enable more private sector investment in residential energy efficiency and conservation.

Policy Change Amendment to Section 44

Class III [renewable energy] source" means the electricity output from combined heat and power systems with an operating efficiency level of no less than fifty per cent that are part of customer-side distributed resources developed at commercial and industrial facilities in this state on or after January 1, 2006, a waste heat recovery system installed on or after April 1, 2007, that produces electrical or thermal energy by capturing preexisting waste heat or pressure from industrial or commercial processes, the electricity savings created at commercial and industrial facilities, and by residential households in this state from efficiency, conservation and load management programs, supported by the ECMB or financed by other entities begun on or after January 1, 2006.

RPS Impact This policy would first and foremost allow residential ratepayers an opportunity to participate in the Class III RPS. It would have a positive impact on the RPS by reducing compliance costs to all ratepayers as a result of increased market competition, increasing private sector investment in residential energy efficiency and conservation programs, and accelerating least-cost solutions and achieving better benefit to cost ratio energy efficiency and conservation programs.

Together, these policy proposals to clarify the Class III RPS will provide market certainty and transparency, allowing private investment in the residential energy efficiency market.

EXTENSTION OF CLASS III RPS

5. Extension of the Class III RPS

Purpose To reduce electricity usage in Connecticut by extending the Class III RPS beyond 4 percent by 2010 towards a target of 20 percent electricity reduced from 2005 levels by the year 2020.

Comments Encouraging energy efficiency and conservation by extending and expanding upon the Class III RPS will provide least-cost solutions to energy security and reliability, global warming, and economic growth and development. A target of 20 percent clean renewable energy and 20 percent energy efficiency by 2020 would be consistent with an initiative in the European Union that is intended to reduce greenhouse gas emissions by 20 percent.[15] The EnergySmartCT campaign is modeled after this goal to support clean energy and energy efficiency, while reducing greenhouse gas emissions.

Policy Change Amendment to Section 43

(a) Based on 2005 total electricity industry usage data provided by the Energy Information Agency for Connecticut, on and after January 1, 2007, each electric distribution company providing standard service pursuant to section 16-244c, as amended by this act, and each electric supplier as defined in section 16-1, as amended by this act, shall demonstrate to the satisfaction of the Department of Public Utility Control that not less than one per cent of the total output of such supplier or such standard service of an electric distribution company shall be obtained from Class III [resources] sources. On and after January 1, 2008, not less than two per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On or after January 1, 2009, not less than three per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2010, not less than four per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2011, not less than six percent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2012, not less than eight per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2013, not less than ten per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2014, not less than twelve per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2015, not less than fourteen per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2016, not less than sixteen per cent of the total output of any such supplier or such standard service of an electric distribution company

[15] *Carbon Finance: Environmental Market Solutions to Climate Change* by Bryan Garcia and Eric Roberts of the Center for Business and the Environment at Yale. See Chapter 3 "A Pot of Gold for Renewable Energy? Funding Renewable Energy with Carbon Finance" by Peter Sweatman of Climate Change Capital (75).

shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2017, not less than seventeen per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2018, not less than eighteen per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2019, not less than nineteen per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. On and after January 1, 2020, not less than twenty per cent of the total output of any such supplier or such standard service of an electric distribution company shall, on demonstration satisfactory to the Department of Public Utility Control, be obtained from Class III [resources] sources. Electric power obtained from customer-side distributed resources that does not meet air and water quality standards of the Department of Environmental Protection is not eligible for purposes of meeting the percentage standards in this section.

RPS Impact

Establishing a base year for electric reductions is important otherwise how do you know whether or not you are improving. The year 2005 represents a reasonable base year from which the increase in the Class III RPS policy could be measured against. It also establishes a limit to the number of Class III RECs that can be registered and sold in any given year based on the 2005 electric usage data (see Table 1).[16]

Table 1. Estimated Class III REC's Required per Year Based on 2005 Baseline

Year	Class III RECs Required
2011	1,974,315
2012	2,632,420
2013	3,290,525
2014	3,948,629
2015	4,606,734
2016	5,264,839
2017	5,593,892
2018	5,922,944
2019	6,251,997
2020	6,581,049

An increase in the Class III RPS would result in greater ratepayer benefits than costs for the entire Class I and III RPS policies combined (see Figure 8).

For residential ratepayers paying for the RPS policies, the following would be the range of costs for Class III RPS compliance (see Table 2):

Table 2. Minimum (@$10 REC Price) and Maximum (@$31 REC Price) Public Policy Cost by Year or Residential Ratepayers for the Proposed Class III RPS Extension[17]

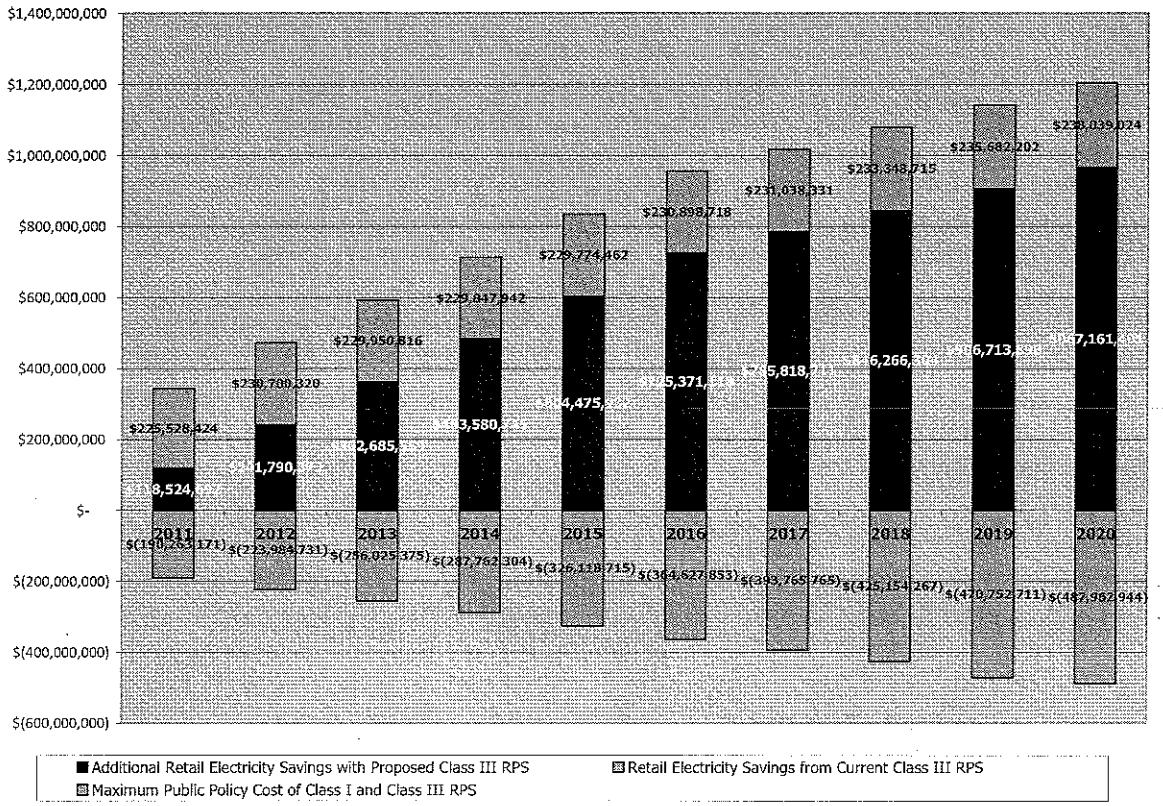
[16] The total electric usage in Connecticut for 2005 based on EIA data was 32,905,245 MWh.

[17] Assumes an annual average residential electricity usage of 8,400 kWh.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Minimum	$ 5.65	$ 7.69	$ 9.87	$ 12.14	$ 14.51	$ 16.91	$ 18.18	$ 19.26	$ 20.34	$ 21.42
Maximum	$ 17.53	$ 23.83	$ 30.60	$ 37.62	$ 44.99	$ 52.41	$ 56.35	$ 59.70	$ 63.05	$ 66.39

EnergySmartCT seeks to assist residential ratepayers save more energy than they are paying into the Class III RPS so as to directly benefit them from this market-based public policy.

Figure 8. Class I and III RPS Benefits (Retail Electric Savings from Class III RPS) vs. Costs for Proposed Class III RPS Extension



6. Competition in the Class III RPS

Purpose To encourage competition in the Class III RPS market.

Comments There are competitive issues with regards to the number of registered and sold RECs in the Class III RPS market. The CEEF has the potential to over-supply the market with RECs, which would result in less investment by the private sector and a continued reliance on ratepayer-supported funds instead of market-based mechanisms to provide energy and demand savings for Connecticut ratepayers. Private sector investors have the potential to achieve better benefit to cost ratios than the CEEF if the Class III RPS market were more competitive and transparent. Incentives for energy efficiency provided by the CEEF in combination with market-based private sector investment in the Class III RPS can create significant energy and demand savings for Connecticut ratepayers over and beyond current efforts.

Class III RECs are being registered, exchanged and sold through the NEPOOL Generation Information System (GIS) – see Figure 9.

Despite the number of registered RECs (437,854) exceeding the estimated demand (316,640) for the Class III RPS in 2007, the price appeared to be near the DPUC-established ACP of $31. One

would expect if the market for RECs is in surplus nearly 40%, or 121,214 RECs more than necessary, then the associated price would approach the floor price of $10, but this has not been the case. This market inconsistency presents market price risks for private sector investors interested in using the RPS to finance energy efficiency and conservation projects in Connecticut.

Figure 9. RECs Registered, Estimated Demand, and Price for Connecticut (2007 and 2008)

RECs	Q1	Q2	Q3	Q4	2007
Registered	209,431	49,078	58,655	120,690	437,854
Estimated Demand[18]	79,160	79,160	79,160	79,160	316,640
Surplus/(Deficit)	130,371	(30,082)	(20,505)	41,530	121,214
Market Prices[19]		$27.00			

RECs	Q1	Q2	Q3	Q4	2008
Registered	76,743	135,036	TBD	TBD	TBD
Estimated Demand[20]	160,185	160,185	160,185	160,185	640,740
Surplus/(Deficit)	(83,442)	(25,149)	TBD	TBD	TBD
Market Prices		$27.00	$26.75		

It should be noted that in 2007 the CEEF reported energy savings from their programs of 235,600 MWh and 119,900 MWh for commercial and industrial (C&I) and residential ratepayers, respectively. If all energy savings from the CEEF were to be registered as Class III RECs for 2007, then there would not be a private sector market for RECs in Connecticut given that supply of RECs by the CEEF of 355,400 would exceed the estimated demand from the Class III RPS of 316,640 by nearly 40,000 RECs – a supply of over 10 percent of the necessary demand.

Several questions that are important for the Connecticut General Assembly to answer are:

- Since the Class I, II and III RPS began, how many and what percentage of RECs have been registered and sold on behalf of residential ratepayers for energy efficiency and clean energy actions?
- Was the Class III RPS designed to provide more funding to the CEEF, to encourage additional private sector investment, or a combination of the two? Understanding the intent of the legislature to use market-based mechanisms to achieve additional energy and demand savings is important.
- What percentage of the Class III RPS in 2007 was satisfied by RECs registered and sold by the CEEF?

Policy Change Amendment to Section 43

(b) Except as provided in subsection (d) of this section, the Department of Public Utility Control shall assess each electric supplier and each electric distribution company that fails to meet the percentage standards of subsection (a) of this section a charge of up to five and five-tenths

[18] Assumes the estimated annual electric demand for 2007 is based on the Connecticut Siting Council's "Review of the Ten Year Forecast of Connecticut Electric Loads and Resources" times the RPS target (1%) times 25% for each quarter.

[19] Market prices based on Evolution Markets monthly market update reports for that quarter.

[20] Assumes the estimated annual electric demand for 2007 is based on the Connecticut Siting Council's "Review of the Ten Year Forecast of Connecticut Electric Loads and Resources" times the RPS target (1%) times 25% for each quarter.

cents for each kilowatt hour of electricity that such supplier or company is deficient in meeting such percentage standards. Seventy-five per cent of such assessed charges shall be deposited in the Energy Conservation and Load Management Fund established in section 16-245m, as amended by this act, and twenty-five per cent shall be deposited in the Renewable Energy Investment Fund established in section 16-245n, as amended by this act, except that such seventy-five per cent of assessed charges with respect to an electric supplier shall be divided among the Energy Conservation and Load Management Funds of electric distribution companies in proportion to the amount of electricity such electric supplier provides to end use customers in the state using the facilities of each electric distribution company. Beginning in 2010, the Energy Conservation and Load Management Fund cannot register more than twenty-five percent of the annual Class III resource requirements to satisfy the RPS.

RPS Impact By limiting the percentage of Class III RECs that can be registered and sold by the Connecticut Energy Efficiency Fund, then the private sector is encouraged to invest more resources in energy efficiency and conservation efforts in Connecticut. If the private sector is unable to meet the energy demand savings resulting from an increase in the RPS, then both the Connecticut Energy Efficiency Fund and the Connecticut Clean Energy Fund will receive alternative compliance payments for the shortage of Class III RECs met by the private sector and be able to invest those proceeds through their existing incentive programs.

7. Advance Non-Electric Efficiency Benefits to Ratepayers

Purpose To allow non-electric energy efficiency measures being taken by residential ratepayers into the Class III RPS.

Comments The Class III RPS currently focuses on electrical efficiency, conservation and combined heat and power for commercial and industrial ratepayers. By expanding the definition to not only include residential ratepayers an ability to participate in the Class III RPS, but to also allow non-electric efficiency measures to also be included within the Class RPS exclusively for homeowners would be an important step in addressing the full energy picture for ratepayers.

Policy Change Amendment to Section 44

Class III source" means the electricity output from combined heat and power systems with an operating efficiency level of no less than fifty per cent that are part of customer-side distributed resources developed at commercial and industrial facilities in this state on or after January 1, 2006, a waste heat recovery system installed on or after April 1, 2007, that produces electrical or thermal energy by capturing preexisting waste heat or pressure from industrial or commercial processes, the natural gas, fuel oil and electricity savings created at commercial and industrial facilities and by residential households in this state from efficiency, conservation and load management programs begun on or after January 1, 2006.

RPS Impact This policy would address all issues related to energy usage for residential homeowners including electricity, gas and oil while advancing important energy independence, global warming, and green job economic development goals. It would more than triple the available energy reductions from residential efficiency programs, allowing more aggressive Class III RPS targets to be met at minimum ratepayer cost. See Appendex 2 for a discussion of possible ways in which Class III RECs could be defined for fuel oil and natural gas.

Together, these policy proposals to extend the Class III RPS will enable a large amount of private investment in residential energy efficiency, meeting energy saving, green jobs and greenhouse gas goals while keeping ratepayer impacts to a minimum and maximizing benefits.

Appendix I

Connecticut Household Costs of Public Policies from
Clean Energy and Energy Efficiency for 2007

Ratepayer Supported Incentive Funds				
	Estimated 2007 Electric Demand (MWh)	Mill Rate ($/kWh)	Estimated Total Cost of Policy	Estimated Household Cost of Policy[21]
CL&P and UI[22]	31,664,000			
CCEF	31,664,000	$0.001	$31,664,000	$8.40
CEEF	31,664,000	$0.003	$94,992,000	$25.20
Total Costs			**$126,656,000**	**$33.60**

Connecticut ratepayers contributed over $125 million to support the incentives provided by the Connecticut Clean Energy Fund and the Connecticut Energy Efficiency Fund with households each contributing on average approximately $35.

Connecticut Renewable Portfolio Standards				
	Estimated 2007 Electric Demand (MWh)	REC Price ($/MWh)[23]	Estimated Total Cost of Policy	Estimated Household Cost of Policy
CL&P and UI	31,664,000			
Class I24 RPS @ 3.5%	1,108,240	$51.00	$56,520,240	$14.99
Class II25 RPS @3.0%	949,920	$0.60	$569,952	$0.15
Class III26 EEPS @ 1.0%	316,640	$27.00	$8,549,280	$2.27
Total Costs			**$65,639,472**	**$17.41**

Connecticut ratepayers paid over $65 million for the standard offer service providers and competitive suppliers to comply with the Renewable Portfolio Standards with households each contributing on average between $15 to $35.

Connecticut **ratepayers contributed approximately $90 million in total for clean energy**, or $25 per household between the Connecticut Clean Energy Fund and the Class I and II RPS.

Connecticut **ratepayers contributed approximately $105 million in total for energy efficiency**, or $30 per household between for the Connecticut Energy Efficiency Fund and the Class III EEPS.

[21] Assumes an average annual household electricity use of 8,400 kWh (or 700 kWh per month).

[22] Estimated annual electric demand for 2007 is based on the Connecticut Siting Council's "Review of the Ten Year Forecast of Connecticut Electric Loads and Resources"

[23] Class I, II, and III REC prices based on Evolution Markets monthly market update reports for April 2008

24 Class I resources include solar, wind, new sustainable biomass, landfill gas, fuel cells (using renewable or non-renewable fuels), ocean thermal power, wave or tidal power, low-emission advanced renewable energy conversion technologies, and new run-of-the-river hydropower facilities with a maximum capacity of five megawatts (MW). Air emissions limits regulations apply to electricity generated by biomass. Electricity produced by end-user distributed generation (DG) systems using Class I resources also qualifies.

25 Class II resources include trash-to-energy facilities, biomass facilities not included in Class I, and certain hydropower facilities.

26 Class III resources include (1) customer-sited CHP systems with a minimum operating efficiency of 50% installed at commercial or industrial facilities on or after January 1, 2006; (2) electricity savings from conservation and load management programs that started on or after January 1, 2006; and (3) systems that recover waste heat or pressure from commercial and industrial processes installed on or after April 1, 2007.

Appendix 2

Including Natural Gas and Fuel Oil in Class III REC Requirements

There are a number of potential options for determining equivalencies between electricity, fuel oil, and natural gas for the purposes of creating a standard unit of equivalence. Two options in particular stand out: carbon equivalence and energy equivalence. It might also be possible to develop some sort of consumer cost equivalence, though this would be more subjective and it would depend on the efficiencies of the residence's heating and cooling equipment and appliances.

Carbon Equivalence

If the primary goal of the RPS is to reduce carbon emissions, than the most relevant factor is the carbon associated with energy production. This should include full lifecycle production estimates, including fuel-cycle emissions (extraction, processing, transport, and leakage), facility construction and dismantlement, generation efficiencies, and transmission losses. The units compared should be CO2-equivilant per unit of final electricity (e.g. electricity at the socket), final natural gas deliveries, and final oil deliveries.

Electricity Calculations

To determine Connecticut final electricity emission factors, we take the generation mix and secondary generation efficiencies from the NEWE grid subregion. This yields:

Fuel Type	Generation Percent	EF (lbs / kWh)	Indirect Emissions	Other Non-CO2	Transmission Losses
Coal	15.1508	2.0111	0.0410	0.0106	5.8240
Oil	9.7991	1.7571	0.0838	0.0106	5.8240
Natural Gas	36.6478	0.9253	0.1888	0.0106	5.8240
Nuclear	25.6388	0	0.0375	0.0106	5.8240
Hydro	6.0083	0	0.0397	0.0106	5.8240
Biomass	5.2768	0	0.1014	0.0106	5.8240
Wind	0.0085	0	0.0309	0.0106	5.8240
Solar	0	0	0.0860	0.0106	5.8240
Geothermal	0	0	0.0331	0.0106	5.8240
Other Fossil	1.4700	1.7571	0.0838	0.0106	5.8240

Data for the year 2006 from EPA eGRID (2008). Other non-CO2 gasses include methane and N20, and respective global warming potentials are obtained from IPCC (2007). Indirect emissions based on Meier (2002). Transmission losses derived from DoE EIA Electric Power Annual reports (2008). All units are either percents (generation percents and transmission losses) or units in lbs CO2-equivilant per kWh of generation.

This yields a final estimated emission factor of 1.0104 lbs CO2-eq per kWh.

Natural Gas and Fuel Oil Calculations

Fuel Type	Direct Emissions	Indirect Emissions	Total (lbs/MBTU)	Total (lbs/kWh-eq)
Natural Gas	117.080	25.5820	142.6620	0.4868
Fuel Oil	173.906	8.8866	182.7926	0.6237

Direct Emission Factors based on EPA (2003). Indirect emissions based on Meier (2002) excluding plant construction and decomissioning. kWh conversions assume 1054.4 joules per BTU and 3.6 MJ per kWh.

Given that a therm of natural gas contains 100,000 BTU, a gallon of fuel oil contains approx. 140,000 BTU, and a kWh of electricity is equal to roughly 3412 BTU, we can create a simple conversion table using these factors.

Carbon-based Conversion Table

Using the BTU per kWh conversion derived above and weighting based on carbon intensities (such that natural gas is 48.18% the carbon of electricity and fuel oil is 61.73%), we get:

Fuel Type	kWh Electricity	Gallon Fuel Oil	Therm Natural Gas
kWh Electricity	1	25.3288	14.1208
Gallon Fuel Oil	0.0395	1	0.5574
Therm Natural Gas	0.0708	1.7937	1

Based on the energy content of various fuels (in BTUs) and electricity based on U.S. DOE EIA (2008) and carbon intensity weights derived above.

Energy Equivalence

If the goal of the RPS is simply to minimize energy usage, than the correct units of comparison are simply final energy reduced. To develop a conversion table for this, we use the basic energy content of various fuels derived above and ignore the carbon intensities of the respective fuels.

Energy-based Conversion Table

Fuel Type	kWh Electricity	Gallon Fuel Oil	Therm Natural Gas
kWh Electricity	1	41.0317	29.3083
Gallon Fuel Oil	0.0244	1	0.7142
Therm Natural Gas	0.0341	1.4	1

Based on the energy content of various fuels (in BTUs) and electricity based on U.S. DOE EIA (2008).

Comparison
Assuming the average CT home uses 8400 kWh/year and 730 gallons of heating oil or 921 therms of natural gas (based on RECs data for the Northeast U.S.), and one "credit" is granted under the RPS for each kWh-eq reduced. If our program reduces 15 percent of home energy use, distributed equally across all energy sources, we can easily calculate the number of RECs produced under either approach. To simplify things, we consider two household types: one that uses only natural gas, and one that uses only fuel oil. Under the current system, we would only gain RECs for the electricity reductions.

RECs Produced by Approach

House Fuel Type	Current System	Carbon Equivalence	Energy Equivalence
Fuel Oil House	1260	4034	5753
Natural Gas House	1260	3211	5309

Based on the Carbon Equivalence and Energy Equivalence tables above.
Expanding the scope of the RPS would dramatically expand the potential REC generation from our energy efficiency efforts. For the 15 percent reduction scenario, we would obtain between 2.9 times (in the carbon equivalence approach) and 4.4 times (in the energy equivalence approach) more RECs under the expanded RPS than under the current system.

Unsurprisingly, an energy equivalence-based approach makes reductions of fuel oil and natural gas more valuable than a carbon-equivalence based approach. It would end up generating around 43 percent more credits for a house using fuel oil and 65 percent more credits for a house using natural gas.