

**EFFICIENCY MAINE TRUST
FINAL REPORT**

**HEATING FUELS EFFICIENCY &
WEATHERIZATION FUND**

December 15, 2010

HEATING FUELS EFFICIENCY & WEATHERIZATION FUND

Preface

In order to help reduce the cost of energy to the Maine economy, enhance energy independence, and grow energy service businesses, the 124th legislature established the objective of saving heating fuel through improved energy efficiency and weatherization of homes and businesses. The Heating Fuels Efficiency and Weatherization Fund was created.

Using one-time federal funds from the American Recovery and Reinvestment Act (the Recovery Act), the Efficiency Maine Trust (the Trust) is, as of December 2010, mid-way through a two-year residential weatherization program that has:

- raised awareness about the benefits of home weatherization and more efficient heating systems;
- promoted quality workmanship through training and maintaining a database of certified energy auditors;
- established a call center that has provided technical support on more than 5,700 calls to date;
- provided rebates on energy improvements that are identified and prioritized through the audit process for their payback to the customer;
- saved customers between 25% and 50% on their annual heating bills (or \$630 - \$1260 for an average customer);
- helped more than 80 businesses expand their customer base so that they could hire new energy auditors and contractors and purchase additional equipment; and,
- achieved more than 2,400 energy audits to date, completing weatherization projects at a rate of more than 1,500 per year.

By the end of 2011, the federal funds will be exhausted and the rebates will be discontinued unless new funding can be found.

Recognizing that the federal funds were temporary, yet seeking to achieve the longer term statutory objective, the Maine legislature directed the Trust to submit a report to the Joint Standing Committee on Utilities and Energy regarding plans for the continued implementation of the Heating Fuel Efficiency and Weatherization Fund and options to maintain ongoing funding (Public Law 2009, Chapter 372 LD 1485 (An Act Regarding Maine's Energy Future), Section C-2(14)).

This document constitutes the Trust's report to the Legislature pursuant to the directive of Public Law 2009, Chapter 372, Section C-2(14). It describes how the Trust's programs would evolve to benefit more than 25,000 homes and businesses annually, introducing a new suite of low-cost, basic improvement options that are accessible for all Maine consumers. On a parallel track, it contemplates maintaining a program to achieve deep savings of 25% or more, using energy audits, developing a priority list of improvements, and providing modest rebates towards the cost of energy upgrades. Finally, it reviews the funding options available and briefly discusses the advantages and disadvantages of each. The report concludes that if the Legislature should decide to maintain funding for the Heating Fuels Efficiency and Weatherization Fund, the establishment of a fee on heating fuels would offer a more reliable and sustainable mechanism than the other options reviewed by the Trust.

There is widespread agreement among stakeholders on the desire to help Maine consumers lower their heating bills and on the value of improving the efficiency of building envelopes to reach this objective.

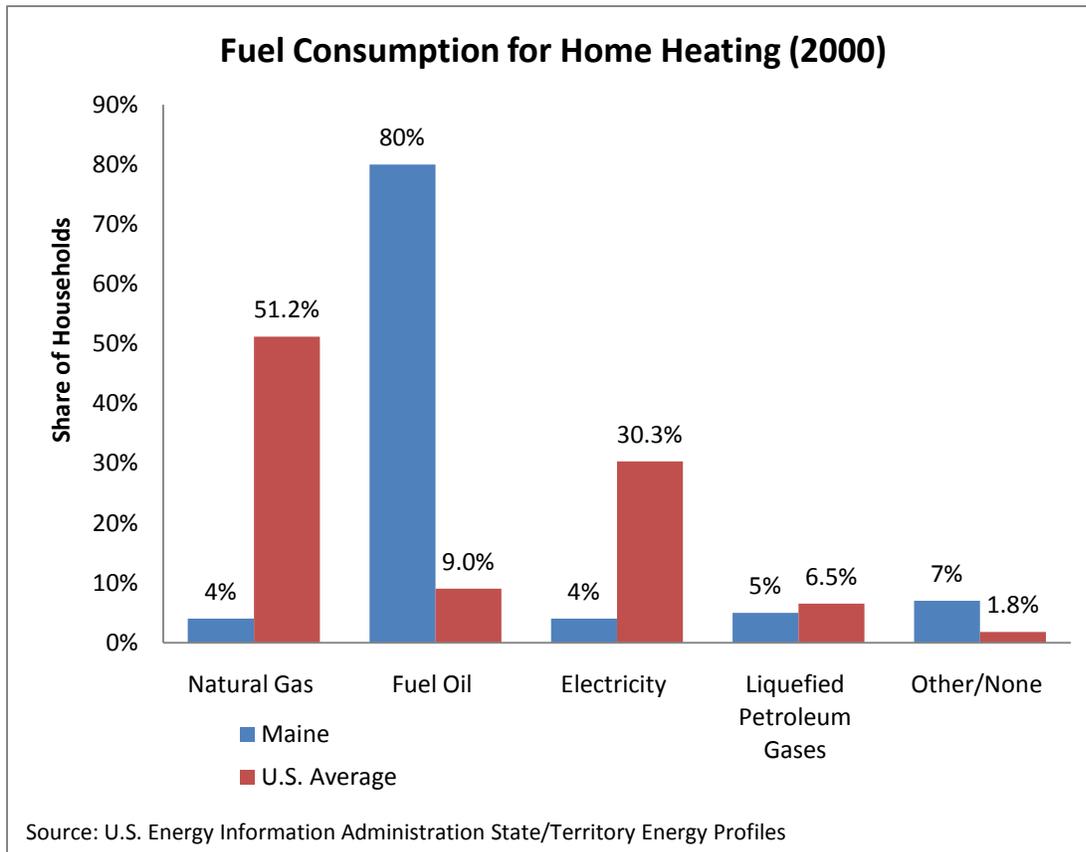
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However, there is not a consensus about how or when to establish a funding stream that can sustain weatherization programs. The Trust looks forward to working with the Legislature, the Governor's Office and the many stakeholders who offered their time and insights to this process to craft an approach that will provide sustained, reliable funding for these programs while ensuring that the benefits to Maine residents and businesses significantly outweigh the costs.

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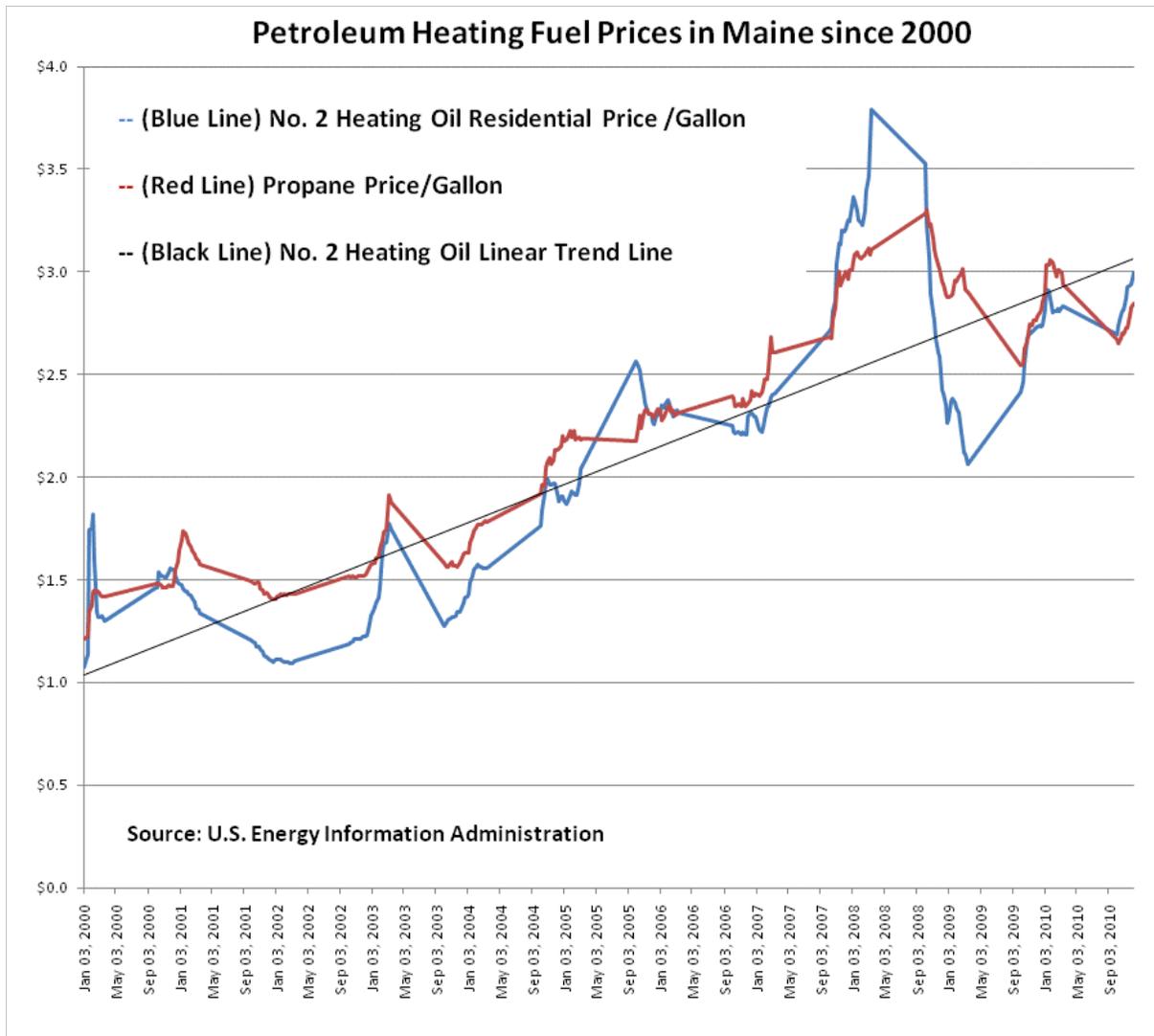
I. Introduction and Background

In 2007, policymakers in Maine became increasingly concerned about the economic risks associated with the price of heating fuel. Maine has the highest percentage of households heating with #2 distillate oil (also called home heating oil or fuel oil) of any state in the U.S., making the Maine economy among the most vulnerable to the price volatility of oil (and similar unregulated heating fuels such as propane and kerosene).



As the heating season began in 2007, the price of fuel oil crossed the \$3 per gallon mark. Only eight years earlier, the price had been below \$1 per gallon. A task force, comprising representatives of the heating fuel industry, the Maine Army National Guard, the Maine Emergency Management Agency, the United Way, the Chamber of Commerce, utilities, and numerous state agencies, was established to make a plan in the event that Maine homeowners could not afford to pay the rising heating bills associated with the average consumption of 900 gallons of oil per year.

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By the summer of 2008, the concern grew to crisis proportions as the price of fuel oil in Maine exceeded \$4.50 per gallon. At this price, an average homeowner could expect to spend more than \$4,000 in a year on heating bills, which would translate to serious hardship across the state economy. The task force report noted the success of Efficiency Maine programs in lowering energy costs for electricity and natural gas customers, but that there were no such programs for heating oil consumers other than the MaineHousing weatherization program for low-income households.¹ The task force further issued a set of recommendations to, among other things, implement a “state-wide energy efficiency program for the residential sector with a priority on reducing home heating oil use that would ensure that energy efficiency and weatherization programs are available to all Maine consumers” regardless of what type of fuel they use for heating.²

As the next legislative session approached in January 2009, several bills were introduced to establish a heating fuels energy efficiency and weatherization program. Objectives for the new legislation included

¹ Governor’s Pre-Emergency Energy Task Force, Final Report, August 7, 2008.

² Pre-Emergency Energy Task Force, *Phase One Report*, January 23, 2008, p. 15.

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making programs available to non-low income residential consumers and businesses,³ and consolidating the administration of these programs with the other Efficiency Maine programs. These bills were ultimately merged into an Act Regarding Maine's Energy Future Public Law 2009, chapter 372, which established the Efficiency Maine Trust⁴ and, within the Trust, established the Heating Fuels Efficiency and Weatherization Fund.⁵

A. Objectives and Directives in Maine Law on Heating Fuels

In order to help reduce the cost of energy to the Maine economy, the newly passed Act established the objectives of achieving heating 20% heating fuel savings by 2020 (and 30% by 2030) and weatherizing substantially all homes, and half of businesses, in the state in the next two decades.⁶ To help achieve these objectives, the Maine legislature also directed the Efficiency Maine Trust (the Trust), in consultation with stakeholders, to develop a proposal to implement the Heating Fuel Efficiency and Weatherization Fund and an appropriate funding mechanism.⁷

In developing an appropriate funding mechanism for the Fund, the law specifically directs the Trust to:

consider a comprehensive list of options, including, but not limited to, a system benefits charge on #2 heating oil, kerosene and propane; bonds; federal funds and grants; funds in the Energy and Carbon Savings Trust Fund; General Fund appropriations; and potential revenues from the leasing of state-owned lands for energy facilities.⁸

This document constitutes the Trust's proposal to the legislature pursuant to the directive of Public Law 2009, Chapter 372, Section C-2(14).

B. Current Programs and Current Funding

With funding from the U.S. Department of Energy under the American Recovery and Reinvestment Act of 2009 (Recovery Act), Efficiency Maine has taken important initial steps to address the State's heating fuels efficiency and weatherization objectives through several programs in 2009 and 2010. With the exception of two loan funds, the Recovery Act funds are projected to be completely exhausted by the end of 2011.

1. Residential Programs Targeting Heating Fuels

a. Home Energy Savings Program: The Home Energy Savings Program (HESP) is funded with \$9 million in Recovery Act funds through May 2012. It is a fuel-blind program that provides grants of up to \$3,000 to homeowners to implement a comprehensive set of energy efficiency measures, including weatherization and heating fuel system upgrades. After barely one year of

³ The Weatherization Assistance Program for low income households is administered separately at MaineHousing and funded by the U.S. Department of Energy.

⁴ Title 35-A MRSA chapter 97.

⁵ Title 35-A MRSA §10119.

⁶ Title 35-A MRSA §10104(4)(E) and §10119(2)(a)(1).

⁷ Public Law, Chapter 372 LD 1485 (An Act Regarding Maine's Energy Future), Section C-2(14).

⁸ *Id.*

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operation, the Trust's HESP program has promoted more than 725 comprehensive energy upgrades for homeowners in over 223 towns across the state. The program has yielded an average of 36% energy savings per home, saving participating homeowners approximately \$925 per year in energy bills. The program is presently averaging 80 energy assessments (audits) per week and more than 40 home energy upgrades completed per week. These performance metrics demonstrate market transformation in developing a sustainable new industry in Maine that is creating jobs while helping homeowners save money, reducing dependence on imported energy, and increasing the value of properties across the state.

b. Maine Home Energy Savings Loan Fund

The Trust won a competitive grant from the US Department of Energy's BetterBuildings Program through the Recovery Act to capitalize and administer a statewide revolving loan fund. The purpose of the loan fund is to provide low interest, long term financing to homeowners at any income level in Maine when they invest in comprehensive energy upgrades approved through the Home Energy Savings Program (HESP).

More than 35 municipalities, representing over 30% of the state's population, have already opted into the program. The fund, to be launched by January 2011, will be sustained for 10 years with revenue bonds. The repayment of the initial \$20 million in loans will provide the revenue needed to service the bond debt. This program builds on the success of HESP to drive economic development and investment.

2. Commercial and Industrial Programs

a. Large Project Grants Program

The Large Project Grants Program offers competitive grants for energy efficiency projects. The program has leveraged private investment in low cost energy supply with \$14.5 million in grants, generating \$76 million in private sector financing, or greater than 5:1 leveraging. To date, these grants have been funded by the Recovery Act and revenue from quarterly Regional Greenhouse Gas Initiative (RGGI) auctions.

Large project grants are awarded under a competitive process where projects are evaluated principally for energy reduced per year per dollar of grant funding. Projects have included combined heat and power (CHP), cost effective renewable generation, heat recovery and efficient motors and processes. Some of Maine's largest industrial companies are represented among Efficiency Maine's most recent projects including Verso Paper in Bucksport, GAC Chemical in Searsport, College of the Atlantic in Bar Harbor, Madison Paper Industries in Madison, among many others. The lifetime energy savings realized just from the Madison Paper project alone (having a total project cost of \$510,000) has a value of \$11.58 million in avoided energy costs.

b. Commercial Project Grants

The Commercial Project Grants Program, funded solely by the Recovery Act, supports the installation of energy efficiency measures or renewable energy systems to generate energy savings at commercial facilities throughout the State. Under this initiative, 64 grants have been awarded in the past year amounting to \$2 million in awards, leveraging \$4.1 million in private

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sector financing, or greater than 2:1 leveraging and realizing energy savings in some cases of greater than 50% annually.

Recent projects include the Alford Youth Center in Waterville, University of New England in Biddeford, LL Bean in Freeport, Corinth Wood Pellets in Corinth, The Jackson Laboratory in Bar Harbor, B&L Auto Parts in Bangor, among many others.

c. EECBG Grants to Municipalities

The Energy Efficiency and Conservation Block Grant (EECBG) Program is a separate program of the U.S. Department of Energy using Recovery Act funds. Through formula and competitive grants, the Program empowers local communities to make strategic investments to meet long-term goals for energy independence.

The program is intended to assist U.S. cities and counties to develop, promote, implement, and manage energy efficiency and conservation projects and programs designed to:

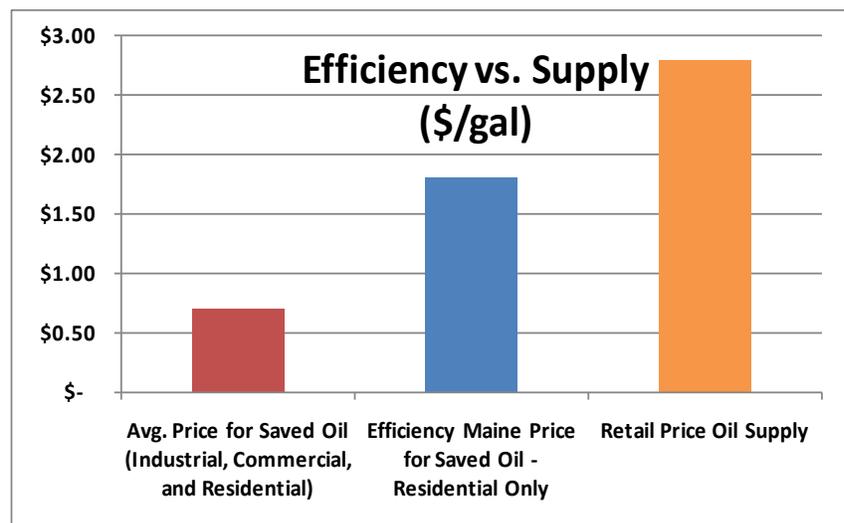
- Reduce fossil fuel emissions;
- Reduce the total energy use of the eligible entities;
- Improve energy efficiency in the transportation, building, and other sectors; and,
- Create and retain jobs.

Maine received \$15.03 million in direct formula grants from the Recovery Act, which is being distributed to 93 cities and towns, 10 counties, and four Indian tribes. Recent projects funded under this program include energy upgrades at the Oakland transfer station, efficient oil boiler replacements in Hampden and Pittsfield, and a community outreach project to help homeowners in Waterville and Winslow complete weatherization through Efficiency Maine's Home Energy Savings Program.

C. Benefits of Investment in Heating Fuels Efficiency

1. Cost Advantage

It is cheaper to avoid consuming a unit of energy by investing in efficiency than it is to buy a unit of energy supply. Energy efficiency is also available in vast supply and made in Maine. The figure to the right shows the price at which energy efficiency programs can save oil (by providing technical assistance and cash rebates) over the full lifetime of the measure compared to the cost of heating oil supply at the November, 2010 retail price in Maine.



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2. Benefits to the Maine Economy as a Whole

- **Investment stays in Maine.** For every \$5 spent on heating oil, \$4 leaves the State of Maine. By contrast, investments in energy efficiency, such as those described in the prior section, keep energy dollars in state where they are fed back into the local Maine economy.
- **Multiplier effect.** In addition to its low cost, energy efficiency has a strong multiplier effect on the economy. According to a macroeconomic study on the statewide benefits of energy efficiency programs, for every \$1 of program investment in heating fuel efficiency and weatherization, the Gross State Product (GSP) is projected to increase by \$6.60.⁹
- **Job creation.** The significant multiplier effect of expenditures on heating fuel efficiency translates into substantial job creation. For every \$1 million spent on programs, it is estimated that 74.7 job-years are created (a job year represents 1 job for 1 year).

3. Benefits to Maine Businesses

Efficiency Maine's programs are proving to be one of the best ways to improve the competitiveness of Maine businesses, helping them compete in a global marketplace and keep jobs here at home. Some of these dollars are supporting growing small businesses that offer energy services such as energy audits, insulation, and heating equipment sales.

The critical value of investment in energy efficiency to the Maine economy is recognized by The Maine State Chamber of Commerce and the Maine Development Foundation in a recently published report entitled, Making Maine Work: Critical Investments for the Maine Economy. The report offers 12 recommendations "to shift spending priorities in the public sector towards those investments that build productivity and the future economy; while at the same time, managing cost inflation in those areas that impede private investment." On the issue of how to reduce energy costs, the report expressly recommends "supporting the efforts of the Efficiency Maine Trust to increase investments in energy-saving lighting, insulation and industrial processes."¹⁰

4. Benefits to Maine Residents

With heating oil currently priced at more than \$2.80 per gallon,¹¹ and the average home using approximately 900 gallons of heating oil per year, Maine households are facing an annual heating bill of about \$2,500. Under the HESP program, Efficiency Maine is helping Maine homeowners reduce their energy costs by an average of 37%, or \$800, freeing up those dollars for expenditure on other goods and services in the Maine economy.

⁹ Murrow, Howland, Petraglia, Comings, *Energy Efficiency: Engine of Economic Growth -- A Macroeconomic Modeling Assessment*, October, 2009.

¹⁰ http://www.mainechamber.org/images/MakingMaineWork/MakingMaineWork_Report2010WEB.pdf

¹¹ Governor's Office of Energy Independence and Security, *Weekly Oil Survey*, November 8, 2010.

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II. Stakeholder Process

The Trust initiated a stakeholder outreach and engagement process that consisted of two formal stakeholder workshops, meetings with numerous associations and energy companies, and two rounds of written comments.

A. Stakeholder Workshops

Overall, more than 100 stakeholders representing over 40 organizations including oil dealers, utilities, energy contractors and auditors, small businesses, environmentalists, entrepreneurs, low-income advocates, elected officials, and manufacturers participated in the Trust's process. A list of stakeholders that participated in the two public workshops is included in the Appendix.

The first workshop took place at the Augusta Civic Center on September 30th and was attended by approximately 50 participants. The meeting provided an introduction to the legislative directives, the Trust's existing programs for using heating fuels more efficiently, and the Trust's Triennial Plan for programs through 2013. The meeting consisted of an extended question and answer period, drawing input and questions from more than 20 interested parties.

The second workshop occurred on October 20th at the University of Maine – Augusta campus and included video conferencing from the Portland, Presque Isle and Bangor branch campuses. This engagement was attended by more than 60 stakeholders and generated valuable input and discussions surrounding program design, sources and uses of funding, guiding principles, and overall benefits and costs. This meeting included input and questions from 31 interested parties.

B. Other Outreach and Opportunities for Comment

The Trust held individual meetings to collect information and advice from several oil dealers, the Maine Energy Marketers Association, the Chamber of Commerce, environmental groups, the Maine Equal Justice Partners, and representatives of contractors and energy auditors. The Trust also solicited written comments and feedback regarding key questions during the course of the stakeholder process. During the two separate written comment periods, Efficiency Maine received comments from 12 organizations including Maine Energy Marketers Association, Maine Association of Building Energy Professionals, Environment Northeast, the Natural Resources Council of Maine, Northeast Energy Efficiency Partnership, Thayer Corporation, Unitil, and the US Green Building Council, the Maine Wind Working Group, Maine Equal Justice Partners, and the Conservation Law Foundation.

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III. Analysis and Recommendations

A. Program Design

The Trust proposes no changes to existing law regarding program design for the Heating Fuels Efficiency and Weatherization Fund.

Effective July 1, 2010 the Heating Fuels Efficiency and Weatherization Fund was established at the Trust pursuant to Title 35-A, §10119. In 2010, the Trust implemented programs consistent with this section of the statute using grants from the U.S. Department of Energy pursuant to the American Recovery and Reinvestment Act (Recovery Act). The basic designs and benefits of those programs are described in the previous section.

Looking ahead, the Trust will continue implementation of its current programs to help homeowners and businesses improve the energy efficiency of their buildings until the federal Recovery Act funds are gone.¹² Other than the Trust's revolving loan fund for home energy savings, all Recovery Act funds available to invest in heating fuel efficiency projects are projected to be exhausted by the end of 2011 or the first quarter of 2012.

Thus, the program designs described below will be pursued by the Trust only if additional funding resources are realized.

1. Residential Programs

Funding the Heating Fuels Efficiency and Weatherization Fund would allow the Trust to establish an important innovation to the design of its home efficiency and weatherization program offering. Specifically, the Trust would introduce a simple, low-cost program (the "Short List") to provide basic energy saving measures in 25,000 homes per year in homes where heating oil, propane or kerosene are used as the central heating fuel. In 10 years, this program would reduce energy waste in roughly 50% of the houses in the state and would establish a large base on which to support the next phase of more costly home energy improvements (such as insulation, air sealing, and major heating system upgrades). In 20 years, nearly every house in the state could benefit from this program, moving the program toward the legislative heating oil goal set for the Trust. While every house is unique, the Trust estimates that for the average participating home this program will save between 5% and 10% of heating fuel consumption annually. For an average participating Maine household this translates into saving of between \$125-\$250 per year.

It is important to note that the Trust intends this program innovation to complement the existing design of its market-based program that is built around a Whole House approach -- education, energy audits, rebates and financing for "deep" and integrated energy improvements across all areas of a home's energy consumption. The Whole House program would be funded at a level sufficient to provide rebates to approximately 1,300 households each year.

Achieving 5%-10% savings is only the beginning of the road when it comes to home energy improvements. To ensure that Maine's economy is appropriately secured against price spikes of any

¹² These programs are separate from the low-income Weatherization Assistance Program administered by the MaineHousing and funded by the U.S. Department of Energy.

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heating fuel and to reduce heating costs as far as cost-effectively possible, a long term energy strategy would consider the basic energy saving measures proposed here as only a first step. Once customers have seen first-hand the benefits of efficiency measures, and saved money for a year or two, they will be more likely to take the next step of conducting a full energy assessment, identifying priority efficiency improvements to be undertaken, and using whatever loans, tax credits or rebates are available to have these improvements made. This approach contemplates homeowners establishing a long-running relationship with the businesses that offer energy services and heating equipment. Where the cost of achieving deeper retrofits exceeds what a homeowner can afford (or finance) in a one-time project, this approach will support the more affordable approach of picking away at the priority improvements over a period of years as their budget allows.

The program innovation proposed here – adding the Short List approach, described below -- would be available to residential heating fuel customers of any income level, including low-income customers. The program would deliver efficiency measures of \$200 in value, offering customers a choice of options. The following is an illustrative list of the options that could be offered, subject to further implementation design by Efficiency Maine and consultation with stakeholders:

- (1) Basic Short List – Up to \$200 to cover costs for any of a pre-determined list of measures commonly worked on by heating technicians and energy auditors. Eligible measures (such as a programmable thermostat, pipe wrap, hot water blankets, and spray foam for air sealing for holes and cracks in the basement) would be provided to the customer free of charge.
- (2) Do It Yourself (DIY) Short List -- \$150 for material costs for measures from the prescribed DIY Short List installed by the homeowner. A balance of \$50 would be held aside to cover costs of retailer participation, administration, and ensuring safe installation, such as by having a heating system technician check during an annual maintenance visit.
- (3) Heating System Short List -- \$200 rebate on the replacement of high mass instantaneous domestic water heating coils with any other form of water heating or on the installation of an outdoor temperature setback control.
- (4) Air Sealing Short List -- \$200 rebate on Air Sealing conducted in conjunction with a Blower Door that results in a significant, measured reduction in leakage from the building envelope.

A random sampling of projects performed pursuant to this program would be subject to spot checks to ensure that claimed energy improvements were completed and that the health and safety of the home is not adversely impacted by the installation work.

2. Commercial Programs

Efficiency Maine has already awarded all of the Recovery Act funds allocated for investment in energy retrofits in large commercial buildings heated with oil, with a few exceptions. Discounted energy audits, and loans at 1% interest rate for qualifying heating fuel efficiency projects, remain available to small businesses until funds are exhausted or June of 2013, whichever comes first. Efficiency Maine also continues to offer technical assistance and financial incentives for new construction and major renovations, which can be used for thermal efficiency measures. Incentives for high efficiency heating and weatherizing in new construction are available only as long as the federal Recovery Act funds remain (through 2013) unless additional funding is secured. Whatever Recovery Act funds are still

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available for investment in commercial building energy improvements will be exhausted by late 2011 or early 2012.

Funding the Heating Fuels Efficiency and Weatherization Fund at the level budgeted in the Triennial Plan would allow the continuation of these programs, plus two significant additions. First, Small Businesses located in buildings heated with the same type and size of system as a residential home would be eligible for the Basic Energy Saving program described above for residential customers. Second, Efficiency Maine's Business Program would be expanded so that rebates, presently limited to electric and natural gas equipment upgrades, would be extended to include a prescribed list of heating oil, propane and kerosene equipment as well.

3. Industrial Programs

The Trust has awarded all of the Recovery Act funds that were available for investment in energy retrofits in large industrial buildings. With funding of the Heating Fuels Efficiency Fund at the level budgeted in the Triennial Plan, the Trust would work with large industrial customers to establish a "Self-Direct" program. Under this approach, which has operated successfully in other states, the customer directs the use of the funds at its own facility, so long as the use provides demonstrated, cost-effective efficiency gains in the consumption of #2 distillate, propane or kerosene. Industrial consumers that can demonstrate no remaining cost-effective efficiency potential at their facility may receive a quarterly rebate from the program in the amount of any price impact of a funding mechanism on their costs for purchasing the covered heating fuels.

4. Ocean Energy

Earlier this year, the Maine legislature took up the Final Report of the Ocean Energy Task Force (OETF) which focused on the potential role that offshore wind power and tidal power could play in Maine's energy future.

Two features of Maine's offshore wind resource hold relevance to the Trust's report here: (a) the potential resource, should it prove technically, legally and economically viable, is extremely large and (b) offshore wind patterns in Maine are projected to produce most generation during off-peak hours (at night) and during the winter. Because electricity generally cannot be stored in large quantities, much of the offshore wind production would be wasted if it is unable to find a use during off-peak hours. On the other hand, the economic viability of offshore wind development would be greatly enhanced if it could find an off-peak use, especially in winter. The OETF report discussed overnight electric vehicle charging and electric heating as possible uses for off-peak offshore wind output.

In a letter from the co-chairs of the Joint Standing Committee on Utilities and Energy of the Maine Legislature at the close of the 124th Session, the Trust was asked to provide analysis as to heating options that could make use of the off-peak wind and their cost-effectiveness.

Cost-effectiveness is a guiding principle in the work of the Trust, and generally speaking, the Trust limits its investments to projects or technologies where the total financial benefits of the investment are greater than the financial costs, *i.e.*, the benefit-cost ratio is greater than one. Such projects or technologies satisfy the Trust's cost-effectiveness test.

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Among the electric heating options available to Maine customers, electric heat pump systems meet the Trust's cost-effectiveness test in certain situations, primarily for business customers. In the commercial and industrial context, the Trust has identified cost-effective applications for heat pumps, which gain most of their energy (and cost) savings from cooling, but can also provide savings on heating. Efficiency Maine currently offers incentives for such heat pumps under the Business Program. In the residential context, the Trust considered the cost-effectiveness of geothermal heat pumps and air-to-air heat pumps. The cost-effectiveness of geothermal heat pumps can be positive, although though the up-front capital costs pose a significant barrier for most Maine homeowners. The Trust has identified several challenges for residential air-to-air heat pumps in Maine. One challenge is that in order to maintain comfortable indoor temperatures during the coldest winter periods, the reduction in an air-to-air heat pump's performance typically requires a supplemental heating source, such as a switch to costly electric resistance heat. Combined with the relatively light cooling load that homes require in Maine, the opportunities for energy savings with air-to-air heat pumps are limited, making cost-effectiveness tests harder to meet for the air-to-air heat pump. Cost effectiveness of heat pumps for Maine residential consumers would benefit from further research and analysis.

Under current pricing for the transmission and distribution of electricity and the heating fuels that would be displaced, the option of using electric thermal storage does not meet the Trust's cost-effectiveness tests. Electric thermal storage is not an efficiency measure, but rather shifts some, or all, of the heat load to off-peak periods. In some cases it displaces one fuel source, such as heating oil or biomass with off-peak electricity. This does not mean that such technology might not become competitive when pricing changes. Preliminary analysis suggests that for electric thermal storage to be cost-effective in Maine, the full delivered price of electricity would need to drop to between 4 and 5 cents per kWh (while assuming the price of heating oil rises faster than U.S. Energy Information Administration projects). Electric thermal storage has certain niche applications, and may warrant further study for its economic competitiveness if, for example, it could be energized using electricity from intermittent resources that would otherwise be wasted.

At this time, the Trust does not propose changing the program design of the Heating Fuels Efficiency and Weatherization Fund from what is described above in the Residential, Commercial and Industrial subsections. As noted, several applications for electric heating systems are simply not cost-effective. More to the point, the urgency of Maine's current economic situation and the role that high costs of energy play in the state's economic challenges calls out for the Trust to focus on practical solutions that can help customers save energy on a mass scale. Except where heat pumps have a significant cooling load, the electric heating systems reviewed here appear to offer comparatively less value to Maine customers than could be had from weatherizing more homes and buildings and looking to other heating options.

B. Budget

In its Triennial Plan, the Trust set a budget to fund investments in heating fuel efficiency of \$14.3 million per year for Fiscal Years 2012 and 2013. This budget level was based on several considerations.

A study prepared for the Maine Public Utilities Commission estimated that \$14.3 million per year would be sufficient for, but not exceed, the investment level needed to capture the efficiency resource

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available from Maine's heating oil and propane consumers that was cost-effective, and less expensive than purchasing an equivalent amount of heating fuel.¹³

The Trust also wanted to set the budget at a level that would help maintain the emergence of a new industry consisting of businesses offering energy efficiency services to Maine customers. After the crisis of 2008, when heating oil prices reached above \$4.50 per gallon, Maine law set the ambitious long term targets of weatherizing substantially all homes in the state and half of the businesses, and saving 20% of statewide heating fuel consumption by 2020, in order to improve the economic security of the state and its energy customers.¹⁴ The Trust's Recovery Act-funds, together with funds from the Energy and Carbon Savings Trust, will total approximately \$15 million per year for customers of oil, propane and kerosene in FY2010 and FY2011. As a result of these programs, businesses providing heating equipment, energy audits, and weatherization have been established and continue to grow. These businesses have added employees and purchased new equipment in the latter half of 2010, just when the economy and Maine's energy customers have needed it most.

If the Heating Fuels Program budget in the Trust's Triennial Plan is not funded, however, the Trust will be unable to continue investment in efficiency projects for customers using heating oil, kerosene and propane. The business infrastructure and jobs that have been added to support this long term objective will no longer be added at the rate necessary to meet the Trust's objectives or continue to generate the level of job creation and economic development demonstrated through these programs. In fact, some of these small businesses will disappear, undermining the state's ability to unlock this emerging business potential. A healthy energy services sector in Maine will require steady, continued investment to help customers overcome market barriers and to sustain the business sector that has grown up to provide an valued service to Maine's economy.

For these reasons, the Trust proposed, in its Triennial Plan, a budget of \$14.3 million for programs contemplated in Title 35-A, §10119. After receiving comments at four public hearings, the stakeholder board of the Trust unanimously approved this budget in April, 2010.

The Trust makes no recommendation about Natural Gas efficiency and conservation funding at this time.

C. Funding Mechanisms

1. Funding Options

Maine law directs the Trust to consider a comprehensive list of funding options for the Heating Fuels Efficiency and Weatherization Fund, including:

- federal funds and grants;
- potential revenues from the leasing of state-owned lands for energy facilities;
- bonds;

¹³ Summit Blue and ACEEE, *Summary Report of Recently Completed Potential Studies and Extrapolation of Achievable Potential for Maine (2010-2019)*, December, 2009.

¹⁴ Title 35-A, §10104(4)(E) and §10119(2)(A)(1)

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- General Fund appropriations;
- the Energy and Carbon Savings Trust Fund; and
- a system benefits charge (SBC) on heating fuels

2. Analysis of Funding Options

Federal Funds and Grants

Maine has received significant Recovery Act grants from the U.S. Department of Energy for programs that the Trust has deployed to help heating fuel customers heat their buildings more efficiently and industrial customers to improve the efficiency of their manufacturing operations.

There is no immediate prospect of additional funds for heating fuel efficiency for Maine from the federal government.¹⁵ First, the Recovery Act funds, designed in large part to stimulate the economy during the recession, were a one-time appropriation from the federal government. Any additional federal stimulus in the foreseeable future is unlikely. Second, federal legislation that might have delivered funds to Maine for energy efficiency, including H.R. 2454: American Clean Energy and Security Act of 2009 and H.R. 5019: Home Star Energy Retrofit Act of 2010, are stalled in Congress. Third, while MaineHousing annually receives a small allotment for the low-income Weatherization Assistance Program, the budget is limited to low-income eligible households and is only enough to provide weatherization measures for no more than one thousand homes per year. Estimates are that considerably more than 100,000 households in Maine meet the eligibility requirements for the low-income Weatherization Assistance Program. Fourth, relying on federal government for this funding will always mean uncertainty and lack of control over the state's economic destiny. Several stakeholders commented to the Trust on the need for a stable, reliable source and level of funding.

The Trust recommends maintaining ongoing efforts to compete for and win additional funding awards from the federal government where such awards are consistent with the Trust's mission and Triennial Plan. Relying exclusively on receiving grants from the federal government, however, is not a prudent approach to funding the Heating Fuels Efficiency and Weatherization Fund. The funds Maine is likely to receive from this path will not be sufficiently stable or sufficiently large to achieve the objectives of the statute or the Triennial Plan, and will come with strings attached that may frustrate the state's efforts to develop solutions customized to suit Maine. For these reasons, the Trust recommends pursuing other options for funding the Energy Savings and Infrastructure Investment Fund.

Potential Revenues from the Leasing of State-Owned Lands

There are no pending proposals for the permitting and construction of energy facilities to be placed along corridors that would result in leasing state lands. While such leases could generate revenues to the state (a portion of which has been designated, by statute, to fund efficiency programs at the Trust),

¹⁵ Maine has received one grant, and applied for a second grant, that will provide capital for revolving loan funds for residential weatherization beyond 2012. The Trust has budgeted for additional funding of the programs described in Section A, above, because (a) the loan funds are insufficient to reach the scale of buildings that need energy improvements; (b) the loan funds are limited to residential units; and (c) numerous studies have shown that loan programs tend to have very low participation unless accompanied by additional resources, such as technical support, marketing, and financial incentives. Without the complementary action of such resources, together with financing, the Trust believes it cannot achieve the legislative targets.

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the Trust has received no indication that any projects have been proposed. Moreover, the Trust is mindful that large-scale energy projects of the type that would need to lease state land tend to require significant permitting process, are capital intensive, and are logistically complex. The time that would be required to permit, finance, and install any project of this sort will likely take several years, which means that at best the budget for Heating Fuels Efficiency and Weatherization Fund programs would not benefit from any potential revenues from this source during the period of the first Triennial Plan. As such, other options should be pursued in the interim.

Bonds

The Trust has researched the potential to use bonding to fund the Heating Fuels efficiency programs.

Generating capital through a General Obligation bond is one option. Under this approach, the principal and interest on the bond would be paid back from the State of Maine's general fund collected from various taxes.

Another option is to issue one or more Revenue Bonds. Under this approach the principal and interest must be paid back by a reasonably predictable revenue stream. Repayment of loans financed by the bond is a common source of such revenues, or the revenue could come from a System Benefit Charge assessed on each unit of energy sold. (See illustration of the costs of a hypothetical bond issuance, attached in the Appendix.)

The advantage of a Revenue Bond approach is that it can spread out the cost of raising capital over a period of time but allow the improvements in infrastructure to happen more quickly. However, the Trust's analysis is that this advantage is generally outweighed by the added cost of paying interest, issuing the bonds, and the risk that the revenue stream might someday be interrupted before final repayment is made. If other options are not available, the Revenue Bond may offer a suitable backup plan.

This bonding option, should it be pursued, warrants additional, in depth analysis because there are so many variables (including but not limited to: bond rating, market confidence in repayment, source of repayment – the type of bond, bond market conditions, etc.) that need to be factored in to determine if this option is viable and appropriate.

General Fund Appropriations

Appropriating \$14.3 million from the state's General Fund is an unappealing option. There is limited precedent for this approach. Vermont, Connecticut, Quebec and British Columbia are examples of jurisdictions that use taxes on petroleum fuels to collect funds used in conservation programs. While the use of Maine's General Fund moneys has the advantage of not relying on the federal government and being administratively straightforward, it has the disadvantage of being very challenging politically, particularly when there is a fiscal deficit. The Trust does not propose an appropriation from the general fund to pay for the Heating Fuels Efficiency and Weatherization Fund.

Regional Greenhouse Gas Initiative Fund

Maine established the Regional Greenhouse Gas Initiative (RGGI) Fund (formerly the Energy and Carbon Savings Trust Fund) to invest funds in energy efficiency. Revenues to the fund come from the sale of

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allowances to emit carbon that are purchased by electric power generators from across the entire Northeast U.S. In the past year, most of the funds were invested in medium and large Maine businesses for upgrades to their electrical equipment. Because the revenues come from electric power generators, the Carbon Savings Trust determined that the best way to minimize the costs of RGGI, and the most equitable disposition of the funds, is to direct the vast majority of those funds (85%) to help electric customers lower their costs through the installation of cost-effective electric efficiency measures. In fact, economic modeling showed that if all revenues from the auction of RGGI allowances were invested in energy efficiency for electric customers, the overall costs of electricity would actually go down because consumption would be significantly reduced.¹⁶ For this reason, the Trust is reluctant to recommend shifting more of the RGGI funds to assisting heating fuels customers.

Additionally, the total revenues coming into this fund have begun to drop in recent RGGI auctions. It seems likely that this trend will continue for the next year, and the Trust projects that in the next two years the Trust's revenues from RGGI will drop to less than \$4 million per year, and would not be sufficient to meet the target budget for the Heating Fuels Efficiency and Weatherization Fund.

A system benefit charge (SBC)

Another option is for the Legislature to establish a fee, such as a system benefit charge (SBC), through an assessment on each gallon of unregulated heating fuels -- heating oil, kerosene and propane -- sold in the state.

The advantages of an SBC funding mechanism are several. The SBC carries no interest cost, making it a comparatively less expensive mechanism than bonding. The funding is predictable and steady. The funding from an SBC is collected at the point of sale, either at the wholesale or retail level, and is transferred periodically to the program administrator. Funding from an SBC is not deposited in the State's General Fund and is therefore viewed as a safer way to ensure that the funds are deployed for the purpose of benefiting the consumers who pay into the fund. There is a direct nexus between the source of the SBC and those who benefit from the SBC.

The main disadvantages of an SBC on heating fuels relate to the challenges of: (a) administering rebates or exemptions to parties who, for policy reasons should be excluded from paying the charge and (b) establishing a charge when the economy is slow and energy prices are a concern.

The Trust finds that an SBC is a targeted mechanism that could be used to generate funds at lower total cost than bonding.

If the Legislature chooses to move forward to establish a funding stream for the Heating Fuels Efficiency and Weatherization Fund, the Trust finds that an SBC would be a more reliable and sustainable mechanism than the other options reviewed here. Pursuant to the direction in law, the Trust developed an illustration of how the legislature could design an SBC:

- Establishing an SBC in the amount of \$0.204 per million British Thermal Units (BTUs) of unregulated heating fuels, it would generate a fund of approximately \$14.3 million. Converting BTUs to gallons, the SBC would amount to:

¹⁶ Murrow, Howland, Petraglia, Comings, *Energy Efficiency: Engine of Economic Growth -- A Macroeconomic Modeling Assessment*, October, 2009.

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- \$0.028/gallon for #2 distillate (heating oil)
 - \$0.021/gallon for propane (LPG)
 - \$0.0275/gallon for kerosene
- Unregulated heating fuels covered by the SBC might include #2 distillate fuel, kerosene, and propane (or LPG), but should not include residual fuel (#6 distillate), un-dyed diesel fuel, or gasoline. (Natural gas efficiency programs already collect funds from one of the natural gas utilities).
 - Projected cost impact on the average Maine homeowner would be \$2 per month.
 - The charge could be assessed at the terminal – the wholesale level. This is the point at which oil importers also pay certain other fees required by law, and the collection mechanism is already established and administratively easy.
 - Any household in the state could be eligible to participate in the program, regardless of income level. However, every household that participates in LIHEAP, or is a Food Supplement Household, and that pays a heating fuel bill, could receive a flat rebate of a standardized amount annually on their Electronic Benefits Transfer (EBT) card to offset their cost of the SBC. Once a household participates in the Trust's program or the Weatherization Assistance Program through MaineHousing, they no longer would receive the offset rebate.
 - Any industrial or large commercial consumer that could demonstrate, by means of an energy audit conducted by an independent, third party, that no cost-effective heating fuel savings is available at their facilities, could receive a quarterly rebate equivalent to their cost of paying the SBC.
 - The SBC could become effective on July 1, 2011 to begin funding programs for FY 2012.

3. Impacts of Funding

The Trust estimates that the benefits to a typical household participating in the "Short List" program of the Heating Fuels Efficiency and Weatherization Fund would be to lower their annual heating costs by \$125-\$250 year from reduced energy waste. For 25,000 residential customers participating each year, the total savings would range from \$3.125 million - \$6.25 million per year. Participants that work with energy auditors to participate in the deep retrofits program are projected to save at least 25% of their energy consumption, lowering their annual heating bill by more than \$630 per year. The annual sum of these deep retrofits across 1,300 customers would save another \$800,000 in avoided heating costs.

Macroeconomic studies indicate that the multiplier effect of keeping these heating dollars at home in the Maine economy adds \$6.6 to the Gross State Product for every \$1 investment of efficiency funds from the Trust. Rather than send heating dollars out of the region to pay for imported fuels, deploying SBC funds to energy efficiency could be expected to add more than \$94 million to the Gross State Product of Maine for each year that we make the investments, amounting to nearly \$1 billion over 10 years. The Trust estimates that the cost to the average household in Maine would be about \$2 per month out of a heating bill that is typically more than \$200 per month, or 1%.

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Appendix

Revenue Bond Calculator – Illustration of Bonding to Generate \$14.3 Million/Year for 5 Years

5 yr Revenue Bond Calculator			Bond Fees	\$50,000.0	Fixed Costs (Legal)		
			Year 1 Startup Costs	\$125,000.0	Bond Indenture		
			Underwriter Fees	\$715,000.0	1%		
			Bond Value	\$71,500,000.0			
			Bond Interest	3.5%	Fixed Rate		Investment Interest
Payment date							Estimated Rate
Year	Month	Outstanding	Capital Payment	Interest Payment	Total Payment		3%
2011	may	\$ 71,500,000					
2011	oct			\$ 1,251,250	\$ 1,251,250		\$ 1,072,500
2012	may	\$ 57,200,000	\$ 14,300,000	\$ 1,251,250	\$ 15,551,250		\$ 965,250
2012	oct			\$ 1,001,000	\$ 1,001,000		\$ 858,000
2013	may	\$ 42,900,000	\$ 14,300,000	\$ 1,001,000	\$ 15,301,000		\$ 750,750
2013	oct			\$ 750,750	\$ 750,750		\$ 643,500
2014	may	\$ 28,600,000	\$ 14,300,000	\$ 750,750	\$ 15,050,750		\$ 536,250
2014	oct			\$ 500,500	\$ 500,500		\$ 429,000
2015	may	\$ 14,300,000	\$ 14,300,000	\$ 500,500	\$ 14,800,500		\$ 321,750
2015	oct			\$ 250,250	\$ 250,250		\$ 214,500
2016	may	\$ -	\$ 14,300,000	\$ 250,250	\$ 14,550,250		\$ 107,250
		Totals	\$ 71,500,000	\$ 7,507,500	\$ 79,007,500		\$ 5,898,750
			Bond Fees	\$ 50,000			
			Underwriter Fees	\$ 715,000			
			Startup Costs	\$ 125,000			
			Bond Interest Cost	\$ 7,507,500			
			Investment Revenue	\$ (5,898,750)			
			Total Bond Cost	\$ 2,498,750	or 3.5% of total bond issuance		

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Heating Fuels Efficiency Stakeholder Workshop Participants

First Name	Last Name	Organization
Patricia	Aho	PierceAtwood
Sandy	Amborn	Public Advocate
Virginia	Archambault	Vreeland Marketing
Debbie	Atwood	Brunswick Town Council
Douglas	Baston	North Atlantic Energy Advisors
William	Bell	Maine Pellet Fuels Association
Kevin	Bernier	Penquis Home Performance
Rob	Brown	Opportunity Maine
Alex	Brown	NextCentury Energy Consultants
Richard	Burbank	Evergreen Home Performance
Curry	Caputo	Maine Association of Building Energy Professionals
Cindy	Carroll	Unitil
Andy	Cashman	Industrial Energy Consumers Group
Ralph	Chapman	Consumer Energy Alliance
Paulina	Collins	Public Utilities Commission
Jack	Comart	Maine Equal Justice
Josh	Craft	Northeast Energy Efficiency Program
William	Crandall	Western Maine Community Action
Greg	Cunningham	Conservation Law Foundation
Richard	Davies	Public Advocate
Avery	Day	PierceAtwood
Laura	Deetz	Environment Maine
Barbara	DiBiase	NextCentury Energy Consultants
Brent	Dudley	New England Energy Solutions
Emily	Figdor	Environment Maine
Les	Fossel	Old House Restoration; State Rep D-53
Adam	Gifford	Conservation Services Group
Ann	Goggin	Green Oak Funding
Jennifer	Gray	Audobon Society
Todd	Griset	PretiFlaherty
Gradon	Haehnel	Bangor Hydro
Deb	Hart	Hart Public Policy
Ellen	Hawes	Environment Northeast
Al	Heath	One World Design
John	Hennessy	American Association of Retired Persons
Alan	Henry	Bureau of General Services
Natalie	Hildt	Northeast Energy Efficiency Program

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Bob	Howe	Maine Association of Building Energy Professionals
Vickie	Hoyle	Maine Community Action Association
Steven	Hudson	PretiFlaherty
Chris	Jackson	Chamber of Commerce
Sue	Jones	Community Action Partners
Jonathan	Kunz	Bangor Hydro
Peter	Laiho	GDS Associates
Rebecca	Lambert	Greater Portland Council of Governments
Jerry	Livengood	Bangor Hydro
John	Logan	Water Energy Distributors, Inc
Calvin	Luther	Bangor Hydro
Michael Kevin	Lynch	RE-Gen (Realty Resources Group)
Kevin	Maher	New England Geothermal Professionals Association
Michael	Mayhew	Heliotropic Technologies
Rick	McCarthy	Maine Tomorrow
Ronald	McKinnon	Maine.gov
Pam	McTigue	Thermal Energy Storage of Maine
Peter	Merrill	MaineHousing
Robert	Moore	Dead River Company
Fortunat	Mueller	ReVision Energy LLC
David	Noseworthy	SGT Distributors, Inc.
Richard	Nowak	Environmental Energy Systems
Martin	Orio	New England Geothermal Professionals Association
Beth	Otto	Maine DEP - Bureau of Air Quality
Greg	Payne	Avesta Housing
Kurt	Penney	IRC Maine
Ed	Pineau	Pineau Policy Associates
Jennifer	Puser	Office of Energy Independence and Security
Jamie	Py	Maine Energy Marketers Association
Brian	Robinson	Evergreen Home Performance
John	Rohman	WBRC Architects
Suzanne	Sayer	Nuclear Engineer
Mike	Shea	Webber Fuels
Matt	Smith	Maine Community Action Association
Daniel	Sosland	Environment Northeast
Kit	St John	Maine Center for Economic Policy
Bruce	Stahnke	US Green Building Council
Sharon	Staz	Kennebunk Light & Power District

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Tom	Tietenberg	Colby College
Dylan	Voorhees	Natural Resources Council of Maine
Midge	Vreeland	Vreeland Marketing
Bede	Wellford	Thayer Corporation
Pete	Wofford	Thayer Corporation
Joshua	Wojcik	Upright Frameworks LLC
Shelby	Wright	Maine Green Energy Alliance
Samuel	Zaitlin	Thermal Energy Storage of Maine