INCREASING ENERGY EFFICIENCY IN NEW HAMPSHIRE:

REALIZING OUR POTENTIAL

FINAL REPORT

Prepared by:

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in collaboration with

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**All photos from New Hampshire, courtesy of Jeffrey H. Taylor & Associates, Inc.*

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GDS Associates, Inc. served as subcontractor with Scott Albert, Principal leading the GDS Team and directing analysis of energy efficiency savings potential and costs, bill impacts and New Hampshire specific energy efficiency options assessment. Scott was joined by GDS team members Sam Alpert, Autumn Curilla, John Hutts, Mark Iacocca, Matt Siska, and Jacob Thomas.

Jeffrey H. Taylor and Associates, Inc. also served as subcontractor with Jeffrey Taylor, President providing stakeholder engagement services, policy and legislative insights, and deep knowledge of New Hampshire planning and economic development initiatives.

Views expressed in the document are those of the study authors, consistent with the commissioning of this work as an independent study. The final report is posted on the website of the New Hampshire Office of Energy and Planning at www.nh.gov/oep. For further information, contact:

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Executive Summary

New Hampshire citizens rely on energy to heat and cool homes, operate businesses and industries, and fulfill transportation needs. In 2011, New Hampshire citizens, businesses, and industries spent almost $6 Billion on energy. Previous estimates performed by the Office of Energy and Planning indicate that approximately 65% of energy spending immediately leaves the state as payment for imported fuels. In 2011, that would have amounted to $3.9 Billion. This outflow of energy dollars is a drain on the state economy and is equal to nearly 6.5% of the state Gross Domestic Product (GDP). This study addresses the potential for increasing energy efficiency in buildings, which accounts for about 52%, or $3.1 Billion, of total energy costs in the state.[1]

The Energy Efficiency and Economic Development Potential in New Hampshire

Research and analysis conducted for this study indicate that the potential for cost-effective reductions in energy use in New Hampshire buildings is equivalent to 715.4 Million kilo-Watt-hours per year (kWh/yr), when both electrical and thermal savings are expressed in a common energy unit. This is more than 10 times the savings being achieved through the energy efficiency programs currently in place, and could be achieved at an average lifetime cost of $0.031/kWh of energy saved.

Since expenditures on energy efficiency improvements create cost savings for consumers, they can be considered an investment in the future. In addition, since energy efficiency improvements typically involve the purchase of local goods and services and often offset the use of imported fuels, energy efficiency can also be considered a local economic development opportunity. Analysis conducted for this study indicates that if all cost-effective energy efficiency improvements were made in New Hampshire, the size of the capital investment required to achieve the savings would equal $941 Million. This would save New Hampshire's building owners $195 Million per year over the life of the measures purchased with the investment. Assuming a 15 year life for the investments, the cost savings from the investment in energy efficiency improvements accumulate to $2.9 Billion.

In addition, as shown in Table 1, this investment would create over 2,300 jobs and add $160 Million per year to the New Hampshire Gross Domestic Product (GDP). For comparison, this represents nearly 35% of all new jobs created between 2010 and 2011,[2] and 7.3% of income growth during the same period.

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[1] *It is important to note that although transportation energy use is not addressed in this report, it is strongly recommended that building heating and electricity as well as transportation be addressed in future state energy assessments. More than 35 million miles are driven on NH roads each day and over 2 million gallons of transportation fuel are purchased daily in the state. This results in a daily expenditure of $7.5 Million for transportation fuels, much of which leaves the state and national economy to pay for foreign oil. NH has the potential to reduce this economic drain by integrating transportation into future state energy initiatives and by focusing investment and policy decisions in ways that reduce the need for travel and improve the efficiency of travel modes.*

[2] *These are the most recent years from which data is available.*

Table 1: Achieving all Cost-Effective Energy Efficiency Can Creates Job & Increase GDP[3]

Economic Impact	Impact in 2017	Growth in 2010-2011	% of Growth 2010-2011
Incremental Jobs (Actual)	2,380	6,996	34%
Incremental GDP (Million $)	$160	$2,186	7.3%

Barriers to Achieving the Energy Efficiency Potential in New Hampshire

There are a variety of barriers to achieving the full energy efficiency potential in New Hampshire (and in many other states) and include, among others, the:

- **Lack of an over-arching state-level policy** stating a commitment to energy efficiency and providing direction and guidance for further development, oversight, and implementation of energy efficiency programs and services;

- **Unrealized opportunities to use the existing authority of the State** during review, approval, and oversight of energy efficiency programs offered by regulated utilities serving New Hampshire consumers;

- **Lack of funding** that is sustained and scale-able and that effectively leverages both public and private investment and that is resulting in an increasingly mature and competitive marketplace.

The Need for a New Policy and Regulatory Push in New Hampshire

The fact that 10 times the amount of cost-effective energy efficiency is still available in New Hampshire than has been achieved after more than a decade of energy efficiency programs suggests that continuation of business-as-usual is not sufficient. A new policy and regulatory "push" is recommended to help stimulate investments in energy efficiency and further develop a competitive marketplace in the state.

The push should include development of a state-level policy that sets specific energy savings targets, establishes a timeline for achieving the targets, and assigns authority and oversight to the appropriate public entity. Such a policy, if enacted through legislation, would provide much needed direction and focus for ongoing and future energy efficiency programs and initiatives in the state. Referred to as an Energy Efficiency Resource Standard (EERS), it is recommended that:

New legislation be enacted at the state level that: specifies that all cost-effective energy efficiency be procured in New Hampshire; establishes a specific energy savings target for the state (recommended in the study to be 6.6% of 2012 electric sales); identifies a timeline for

[3] *Dollar values are nominal and are not adjusted for inflation*

achieving the target (recommended in this study to be five years); and delegates authority and resources for overseeing achievement of the goal to the appropriate public entity (recommended in this study to be the New Hampshire Public Utilities Commission [NH PUC]).

The new legislation should:

- ***Require that a portion of all cost-effective energy efficiency be acquired through the utilities serving New Hampshire so that by the end of 2017, at least 1.6% energy savings are achieved from a baseline of 2012 electric energy sales;***

- ***Note that the energy savings target may be different for electric and gas utilities, and consideration should be given to establishing a target for other heating fuels as well;***

- ***Acknowledge the additional cost-effective savings available from state and local government lead-by-example initiatives, including expansion of efficiency objectives within State-owned and State-leased facilities;***

- ***Reinforce a desire to achieve at least 90% compliance with building energy codes by 2017; include a focus on tracking, reporting, benchmarking, and promoting energy savings;***

- ***Emphasize the need to establish market-based progress indicators and to track progress and results; and***

- ***Specify a desire to move towards a voluntary, competitive private marketplace for energy efficiency in the state over time.***

Finally, the legislation should direct the NH PUC to implement and oversee a collaborative process during the development of multi-year and annual goals plans, and budgets for the regulated utility energy efficiency programs. The collaborative process should involve utility representatives, representatives of the NH EESE Board, other key stakeholders, and market actors and should be carried out in a non-adjudicatory setting proceeding managed by an outside, independent facilitator. The process should develop both energy savings and market development-based metrics for the programs and should include evaluation, measurement, and verification by independent, third parties evaluators reporting the NH PUC, rather than to the program administrators.

Strategies Recommended for Achieving an EERS in New Hampshire

Overall, six major strategies are recommended for achieving an EERS in New Hampshire including:

- **State and local governments lead by example** with increasing energy savings goals over time.
- **Modify and enhance the existing regulated energy efficiency programs** and increase coordination between the regulated programs and market-based initiatives that are being, or could be, implemented by local companies and other efficiency program providers.

- **Develop new opportunities for direct investment in energy efficiency improvements** by regulated utilities (and potentially other efficiency program providers) as a way to expand the pool of funding sources available for energy efficiency.
- **Achieve 90% compliance (or more) with the International Energy Conservation Code** (IECC), consistent with the commitment made by the State of New Hampshire when accepting federal American Resource Recovery Act (ARRA) funding in 2009.
- **Track, report, benchmark, and promote** the benefits of and demand for energy efficiency savings from all programs and within/across all sectors in the state (residential, commercial, industrial, municipal, and state government).
- **Accelerate and scale-up competitive private investment** activity including incorporation of market development targets and objectives within regulated energy efficiency programs' design, delivery, and performance mechanisms.

These strategies are discussed in detail in the full report. They provide a blend of public- and private-sector activity, leverage the successes and lessons learned from more than a decade of energy efficiency program offerings in New Hampshire thus far, and are specifically designed to create a more sustainable blend of public, ratepayer funded activities with increased private sector investment.

Addressing Lost Revenue as a Key Next Step to Enabling Successful Implementation of an EERS in New Hampshire

The successful implementation of an EERS in other states has depended, in part, on successfully addressing the issue of lost revenue for energy suppliers whose sales decline as a result of increased energy efficiency savings. This is a valid and important concern across the nation among electric and gas utilities regulated by state Public Utilities Commissions (PUCs) and among heating fuel suppliers who are typically not under the regulatory authority of the PUCs.

For utilities serving New Hampshire, this will likely involve regulatory action by the NH PUC referred to as "decoupling," in which the ability of a utility to earn revenue is "decoupled" from their sales volume, or through other rate-making or other regulatory mechanisms. Successful implementation of decoupling (or other mechanisms) to address lost revenue is a key step to successful implementation of an EERS. When done correctly, this will help ensure there are proper financial incentives in place for utilities to invest in programs and services that reduce energy consumption (and therefore sales).

For heating fuel suppliers not regulated by the NH PUC, this will likely require substantial thought, discussion, and new solutions not yet identified to develop widespread interest in and support for increased efficiency that reduces heating fuel sales.

Section 1: Introduction

Citizens and business owners in New Hampshire have long recognized that energy is the lifeblood of the economy, and that decisions about energy use and supply directly impact individual energy bills and the economy overall. With this in mind, in 2012 the New Hampshire Office of Energy and Planning (NH OEP) responded to a call to action from the U.S. Department of Energy (US DOE) directed at states that were not yet on a path to achieving their total energy efficiency potential, and were therefore not enjoying the full range of economic benefits. New Hampshire was one of seven states funded nationwide to identify new policies, strategies, and actions that could increase energy efficiency across all sectors of the economy. The assignment from US DOE to the states selected through the competitive solicitation was twofold:

1) To assess what it would take to increase energy efficiency savings in the state by 1% per year (or more), when measured on the basis of retail electric sales; and

2) To develop a plan for implementing an Energy Efficiency Resource Standard (EERS) (or other statewide policy mechanism) that establishes a clear and specific state-level goal for achieving cost-effective energy efficiency savings in the future. Such an EERS can be developed through legislation, regulation, or a combination of both.[4]

1.1 Background and History

This report is the result of a six-month study commissioned by NH OEP as part of the state's receipt of the US DOE award. The study was designed to build upon two previous assessments of energy efficiency opportunities in New Hampshire:

- ***Additional Opportunities for Energy Efficiency in New Hampshire*** completed by GDS Associates, Inc. (GDS) for the NH PUC in 2009.[5] Referred to as the "2009 NH Potentials Study," this assessment quantified energy efficiency potential in the state, and identified substantial amounts of cost-effective savings not being achieved through existing policies, programs, and market activities.

- ***Independent Study of Energy Policy Issues*** completed by Vermont Energy Investment Corporation (VEIC) for the NH PUC in 2011.[6] Commissioned by the New Hampshire Legislature in 2010 through Senate Bill (SB) 323, the so-called "SB 323 Study" identified more than 300 policy, regulatory, program design, and implementation recommendations for ways to further increase energy efficiency savings in New Hampshire.

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[4] *State Energy Program (SEP) Strengthening Building Retrofit Markets and Stimulating Energy Efficiency Action Funding Opportunity Announcement, DE-FOA-0000251, CFDA Number: 81.041, U.S. Department of Energy, National Energy Technology Laboratory, April 9, 2010.*

[5] *Additional Opportunities for Energy Efficiency in New Hampshire, Final Report to the New Hampshire Public Utilities Commission, GDS Associates, Inc., 2009, http://www.puc.nh.gov/Electric/GDS%20Report/NH%20Additional%20EE%20Opportunities%20Study%202-19-09%20-%20Final.pdf*

[6] *New Hampshire Independent Study of Energy Policy Issues, New Hampshire Public Utilities Commission, September 30, 2011, http://www.puc.nh.gov/eese.htm*

A detailed review of the SB 323 Study was completed in 2012 by the New Hampshire Energy Efficiency and Sustainable Energy (EESE) Board, a 25-member public entity created by the Legislature and administered by the NH PUC. Membership on the EESE Board consists of a diverse range of utility, business, low-income, weatherization, housing, and conservation interests from throughout New Hampshire. A key finding of the Board was that establishing an EERS is one of the top three policy needs for New Hampshire. According to the EESE Board:

> ***"New Hampshire should develop and establish an EERS as a means to promote cost-effective energy efficiency as the first-priority energy resource for our state. There are a variety of approaches for implementing an EERS. The key requirement is to define an entity and a process for setting energy-efficiency goals and targets and a mechanism for coordinating and evaluating progress. The CORE utility programs could serve as a foundation and, while the PUC could move toward EERS under its current regulatory authority, enabling legislation would be a significantly more powerful tool."***[7]

1.2 Study Purpose and Key Questions Addressed

The primary purpose of this study is to assess what it would take to increase the amount of cost-effective energy efficiency being pursued in New Hampshire, and to propose an approach for a statewide Energy Efficiency Resource Standard that could set a clear and consistent policy direction for the state moving forward. Key questions this study addresses include:

1) Is New Hampshire realizing the full potential of cost-effective energy efficiency savings?

2) What would it take to increase energy efficiency by 1% year (or more) in New Hampshire?

3) What would the economic, employment, and bill impacts be of achieving all cost-effective energy efficiency in the state?

4) Would development of a state-level policy with specific energy savings targets accelerate energy efficiency investments, and what goals should be included in such a policy?

This report provides the results of the quantitative analysis done for this study, and discusses the policy implications of those results, with an eye towards enabling future policy and/or regulatory initiatives for increasing energy efficiency that would provide direct economic benefits to New Hampshire. Six strategies for achieving a substantial increase in energy efficiency are identified, and the potential energy efficiency savings from each strategy are estimated. The employment and income growth that would result from the strategies are quantified and an assessment of the impact on energy bills is provided.

[7] *Final Report on the New Hampshire Independent Energy Study Pursuant to Senate Bill 323 (2010 Session), New Hampshire Energy Efficiency and Sustainable Energy Board, RSA 125-0:5-a, Summary, www.puc.nh.gove/ESSE.htm*

Section 2: Energy Use and the Economic Impacts of Increased Energy Efficiency

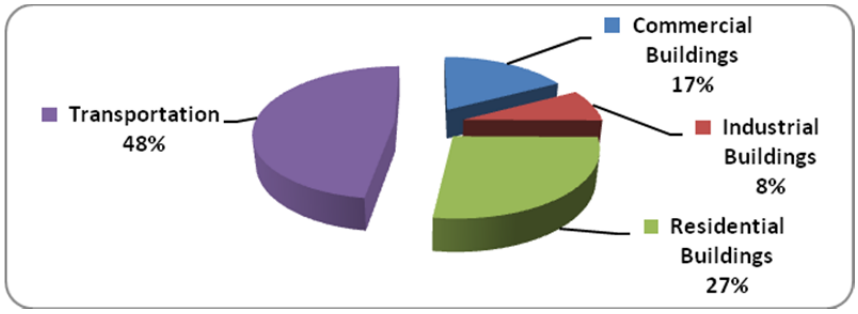
The importance of affordable and reliable energy to the economic well-being of New Hampshire and its citizens, businesses, and industries cannot be underestimated. This section presents information on: current energy use and costs in the state; an estimate of the total amount of cost-effective energy efficiency in New Hampshire; an overview of the economic benefits of achieving all cost-effective energy efficiency; and a discussion of the need to address the issue of lost revenue resulting from decreased sales of energy by utilities and heating fuel suppliers due to increased energy efficiency.

2.1 Current Energy Use and Costs

New Hampshire citizens rely on energy to heat and cool homes, to operate businesses and industries, and to fulfill transportation needs. In 2011, New Hampshire citizens, businesses, and industries spent almost $6 Billion on energy.[8] Of this, it is estimated that $3.9 Billion (65%) left the state immediately to pay for imported fuels.[9] This outflow of energy dollars is a drain on the state economy, and is equal to about 6.5% of New Hampshire's Gross Domestic Product (GDP).

Of the $6 Billion spent on energy in New Hampshire in 2011, approximately $3.1 Billion (or 52%) were spent on electricity and heating fuels. Residential buildings accounted for $1.6 billion while commercial and industrial buildings (including municipal and state government buildings) accounted for $1.0 and $0.5 billion respectively.[10] The remaining balance of $2.9 Billion (or 48%) was spent on gasoline and diesel fuel (primarily) for transportation (see Figure 2.1). This report focuses on building energy use, consistent with the focus for the study commissioned by US DOE and the NH OEP.[11]

Figure 2.1: NH 2011 Energy Expenditures (% of $6 Billion)



[8] *State Energy Profiles, US Energy Information Administration, 2011*
http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_te.html&sid=US
[9] *Based on previously analyses conducted by the New Hampshire Office of Energy and Planning,*
[10] *In this study, state and municipal buildings are included in the definition of commercial buildings.*
[11] *It is recommended that transportation efficiency be explored in future energy policy and planning studies in New Hampshire.*

In 2011, more than one half of New Hampshire's spending on electricity and heating fuel use in buildings was for residential buildings. As show in Table 2.1, of the total of $3.1 billion spent on energy use in buildings, $1.6 Billion (or 52%) was spent for residential buildings, $1 Billion for commercial buildings, and just under $0.5 Billion for industrial buildings.

Table 2.1: NH 2011 Electricity and Heating Fuel Expenditures by Building Type

Building Type	2011 Energy Cost ($ Billion)	% Total
Commercial	$1.03	33%
Industrial	$0.47	15%
Residential	$1.62	52%
Total Building Energy	**$3.12**	**100%**

2.2 The Energy and Economic Benefits of Increasing Energy Efficiency

The goal of energy efficiency policies, programs, and initiatives is to use less energy to provide the same service.[12] As noted in previous energy efficiency assessments for New Hampshire and in other national publications, energy efficiency is typically the least cost energy resource, meaning that the costs and impacts of energy efficiency are typically lower than those for other energy supply resources.

Increasing the efficiency of energy use can provide significant energy-related benefits to consumers, to utilities serving consumers, and to regulators overseeing the utilities.

- For consumers, energy efficiency can result in lower energy bills, increased comfort and safety in buildings, productivity and health (due to improved indoor air quality), as well as reductions in environmental impacts through less use of fossil fuels for energy supply.

- For utilities, increased energy efficiency improves system reliability, decreases stress on the electric grid, delays the need for transmission and distribution (T&D) upgrades, and can reduce peak load requirements.

- For regulators, increased energy efficiency can improve the affordability of energy as well as system reliability, both of which are of importance when serving the public interest.

Energy efficiency can also provide non-energy benefits, such as:

- Improved occupant comfort: more efficient and higher-performing heating and air conditioning equipment create smaller indoor temperature variations, and better insulation stabilizes indoor temperature from one area to the next.

[12] http://eetd.lbl.gov/ee/

- Improved health & well-being; better ventilation systems improve indoor air quality, and outdoor air quality can also improve as energy efficiency reduces emissions from power plants.

- Reduced costs for businesses: improved motors and fans increase production efficiency and help stabilize manufacturing costs.

In addition to reducing energy costs for individual building owners and utilities, investments in energy efficiency also create net increases in employment and income. This is because expenditures on energy efficiency improvements often involve the local purchase of equipment and supplies, and on-site work required to improve the efficiency of buildings is typically conducted by local tradespeople and professionals. As such, money spent on energy efficiency tends to stay in the local economy. As it circulates in the local economy it results in a so-called "multiplier effect" in which the local economic benefits become greater than the initial investment.[13]

2.3 The Total Amount of Cost-Effective Energy Efficiency in New Hampshire

Analysis conducted for this study indicates that the total amount of energy efficiency that is cost effective to achieve in New Hampshire is equal to 715.4 Million kWh energy equivalent, which equates to 6.6% of 2012 retail electric sales. This estimate is based on the study team's review of the 2009 NH Potential Study combined with a review of savings from energy efficiency programs currently offered in the state.[14]

In the regulatory and utility industries, this energy is referred to as the Maximum Achievable Cost Effective (MACE) energy efficiency potential. Using what is referred to as the Total Resource Cost (TRC) test overseen by the NH PUC, these energy efficiency savings are deemed cost effective because they are less expensive than the cost of supplying energy from other sources.[15]

Further explanation of the methodology and assumptions used when reviewing the 2010 study to develop the revised estimate for this study is provided in the Appendices to this report. It is important to note that the revised estimate of cost effective energy efficiency is significantly lower than the 20.5% originally noted in the 2009 Potentials Study.

2.4 The Economic Benefits of Achieving all Cost-Effective Energy Efficiency in New Hampshire

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[13] *An example of a recent quantification of the multiplier effects of energy efficiency investments is presented in the report, Economic Impacts of Energy Efficiency in Vermont – Final Report, August 17, 2011. Optimal Energy, Inc. and Synapse Energy Economics, Inc., page 5-6.*

[14] *Additional Opportunities for Energy Efficiency in New Hampshire, Final Report to the New Hampshire Public Utilities Commission, GDS Associates, Inc., 2009,* http://www.puc.nh.gov/Electric/GDS%20Report/NH%20Additional%20EE%20Opportunities%20Study%202-19-09%20-%20Final.pdf

[15] *In other words, all of the 6.6% of retail electric sales estimated to be cost-effective for purposes of this study have a benefit to cost ratio of 1.0 or greater using the TRC test.*

Analysis conducted for this study indicates that if all cost-effective energy efficiency improvements were made in New Hampshire, the size of the capital investment required to achieve the savings would equal $941 million. For purpose of the study, a five-year ramp up period is envisioned, beginning at a level of $60 Million in 2013 and ending with an investment of $309 Million in 2017.[16] This investment would save New Hampshire's building owners $195 Million per year. Over the 15 year life of the investments, the cost savings from the reduced energy use accumulates to $2.9 Billion, which is a return on investment of about 210%.

This study estimated the economic impact of investing in all cost effective efficiency improvements and found that such investment would create over 2,300 jobs and add $160 Million per year to the New Hampshire GDP (as shown in Table 2.2). This is a 35% increase to the job growth rate when compared to growth from 2010 to 2011,[17] and a 7.3% increase in the income growth rate during the same period (as shown in Table 2.3). More information on the methodology used for this analysis is provided in Appendix B.

Table 2.2: Net Increase in Jobs and Income (GDP) from Energy Efficiency Investments

Economic Impact	2017	2022	2027	2032
GDP (Million $)	$160	$170	$170	$170
Jobs (Actual)	2,380	3,250	4,050	4,790

Table 2.3: An EERS Can Create New Jobs & Increase GDP

Economic Impact	EERS Impact in 2017	Growth from 2010-2011	% of '10–'11 Growth
Incremental Jobs (Actual)	2,380	6,996	34%
Incremental GDP (Million $)	$160	$2,186	7.3%

2.5 Unintended Impacts of Increasing Energy Efficiency

Increases in energy efficiency can reduce or slow the growth in demand for electricity, natural gas, heating oil, propane, and other heating fuels. Under the current policy and regulatory framework in New Hampshire, further increasing energy efficiency will reduce sales, profits, and shareholder earnings for the electric and gas utilities (and potentially heating fuel suppliers) and there are presently no mechanisms in place to fully address this issue. Referred to as "lost revenue" by those in the energy industry, future policy and regulatory initiatives intending to substantially increase energy efficiency will need to address this issue thoroughly and thoughtfully.

Any efforts to develop and institute an EERS in New Hampshire should include parallel efforts to address the issue of lost revenue for energy providers due to increased energy efficiency. This will likely involve regulatory action by the NH PUC referred to as "decoupling," in which the

[16] The five-year ramp up envisioned for purposes of the study is aggressive and may be faster than New Hampshire prefers to go. The ramp up period could readily be modified to a longer time period, should that be preferred.
[17] These are the most recent years from which data is available.

ability of a utility to earn revenue is “decoupled” from their sales revenue. Decoupling (when done correctly) helps ensure there are proper financial incentives in place for utilities to invest in programs and services that reduce energy consumption (and therefore sales). Successful implementation of decoupling will likely be needed to achieve successful implementation of an EERS in New Hampshire. In addition, new approaches and solutions for heating fuel suppliers will likely be needed as well.

Section 3: Progress in Achieving Energy Efficiency in New Hampshire

Recognizing that energy efficiency is good for consumers and good for the economy, New Hampshire has implemented a wide range of policy, regulatory, and programmatic initiatives since the mid-1990's that improve the efficiency of energy use in the state. This section provides an overview of the key energy efficiency policy, regulatory, and programmatic initiatives in New Hampshire to date, as important background information for the context for an EERS.

It is important to note that despite the policy and regulatory initiatives discussed below, New Hampshire does not yet have a state-level policy or goal articulating a clear commitment to achieving all cost-effective energy efficiency savings. This indicates that a new policy and regulatory "push" is needed if the state is serious about realizing the economic benefits of increased energy efficiency discussed in Section 2. With this in mind, guidance is provided at the end of this section for the overall approach and direction for a new policy and regulatory push (in the form of an EERS) in the future.

3.1 Overview of Existing Energy Efficiency Policy and Regulatory Initiatives

Recognizing the importance of reliable and affordable energy to New Hampshire citizens and the economy, the Legislature has passed multiple laws addressing energy efficiency over the past 15 years including the:

- **Electric Utility Restructuring Act** creating the goal of developing a competitive marketplace for wholesale and retail electricity and establishing a Systems Benefit Charge applied to each electric bill that created a pool of funding for utility-administered energy efficiency services[18]

- **Least Cost Planning Act** requiring each electric utility to file a least-cost integrated resource plan (IRP) at least biannually that identifies the blend of energy supply and demand side management (DSM) resources that can be used to meet energy needs in the future.[19]

- **Energy Consumption Reduction Goal Act** requiring state agencies to implement cost-effective measures to reduce fossil fuel consumption 25 percent by 2025 and to increase fleet efficiency.[20]

The legislature has also established various funds that are used to help pay for the delivery of energy efficiency services consumers including (among others) the:

- **System Benefits Charge** (SBC) assessed to all regulated electric utility customers receiving delivery service at a rate of $0.0033 per kilowatt-hour (kWh).[21] A portion of the SBC

[18] *RSA 374-F: Electric Utility Restructuring, 1996.*
[19] *RSA 378:37, New Hampshire Energy Policy, 1990.*
[20] *RSA 21-I:14-c and RSA 21-I:19-a Energy Consumption Reduction Goal Act, 2010.*
[21] *RSA 374-F.4 VIII(c): Electric Utility Restructuring Act, 1996.*

(currently $0.0015/kWh) is allocated by the legislature to the Electric Assistance Program (EAP), which helps low-income customers pay their electric bills. The balance (currently $0.0018/kWh) is used to support regulated energy efficiency programs offered by electric utilities to their customers. In addition, funding for gas efficiency programs is collected through an energy efficiency charge that is included in the Local Distribution Adjustment Charge (LDAC). The charge is adjusted annually in NH PUC Cost of Gas proceedings, and the level is determined based on each gas utility's approved efficiency program budget. The LDAC also includes, among other costs, those related to a Residential Low Income Bill Assistance program and environmental remediation.

- **Greenhouse Gas Emissions Reductions Fund** (GHGERF) which from 2008 through 2012 provided financial support for energy efficiency, conservation, and demand response programs that reduce greenhouse gas emissions through proceeds from the Regional Greenhouse Gas Initiative (RGGI).[22]

- **Energy Efficiency Fund (EEF)** which replaced the GHGERF in 2013 and is used to provide support for the CORE energy efficiency programs offered to electric and gas utility customers. Currently one dollar of auction proceeds for each allowance sold are allocated to the EEF, while the remaining proceeds are provided as rebates to ratepayers.[23]

The State of New Hampshire also:

- **Adopted the 2009 International Energy Conservation Code (IECC) as the statewide building energy code** and made a commitment to the US DOE to develop a plan for achieving 90% compliance with the code for residential buildings as well as 90% compliance with the ANSI/ASHRAE/IESNA Standard 90.1-2007 for commercial buildings by the year 2017.[24]

Furthermore, through Executive Order Number 2011-1, the State of New Hampshire committed to:

- **Benchmark facility energy use** and develop annual energy savings plans for state-owned buildings; and

- **Ensure that all new construction or renovation** exceeding 25,000 square feet or $1 Million in cost meets or exceeds the most current International Energy Conservation Code (IECC).

These policies and laws (as well as others developed during the years) provide the overall policy, legislative, and regulatory framework for energy efficiency programs and initiatives in New Hampshire, as discussed further below.

3.2 Overview of Existing Energy Efficiency Programmatic Initiatives

[22] *RSA-15-O: Regional Greenhouse Gas Initiative: Greenhouse Gas Reduction Fund, 2008.*
[23] *Per House Bill (HB) 1490 passed in 2012.*
[24] *This commitment was made by New Hampshire (and all other states) when accepting federal American Resource Recovery Act (ARRA) funds beginning in 2009.*

As documented extensively in the SB 323 Study, a variety of energy efficiency programs have been offered in New Hampshire over the years through the electric and gas utilities serving the state, the federally-funded Weatherization Assistance Program, and most recently the federally-funded American Recovery and Reinvestment Act (ARRA). As ARRA funds become depleted and the programs created with the funds draw to a close, the majority of energy efficiency programs to be offered in New Hampshire in 2013 and beyond will be the continuation of the energy efficiency programs offered by the regulated electric and gas utilities serving the state, referred to as the "CORE programs." These programs are overseen by the NH PUC and are reviewed and evaluated every two years. Recent achievements, savings results, and a ranking of the CORE programs are noted below:

- A number of the **programs have received national ENERGY STAR® awards** for successful implementation over the years.

- The combined savings of the programs range from 0.6% to 0.8% of retail sales of electricity (depending on the year).

- In 2012**, New Hampshire was ranked 18th in the nation** among states with ratepayer-funded efficiency programs by the American Council of Energy Efficiency (ACEE), a national organization that reviews and assesses program effectiveness across all 50 states.[25]

3.3 Ten Times More Cost-Effective Energy Efficiency Awaiting New Hampshire

Though the above policy, regulatory, and programmatic accomplishments are noteworthy, New Hampshire has a long way to go to achieve its full energy efficiency potential. As noted in the SB 323 study:

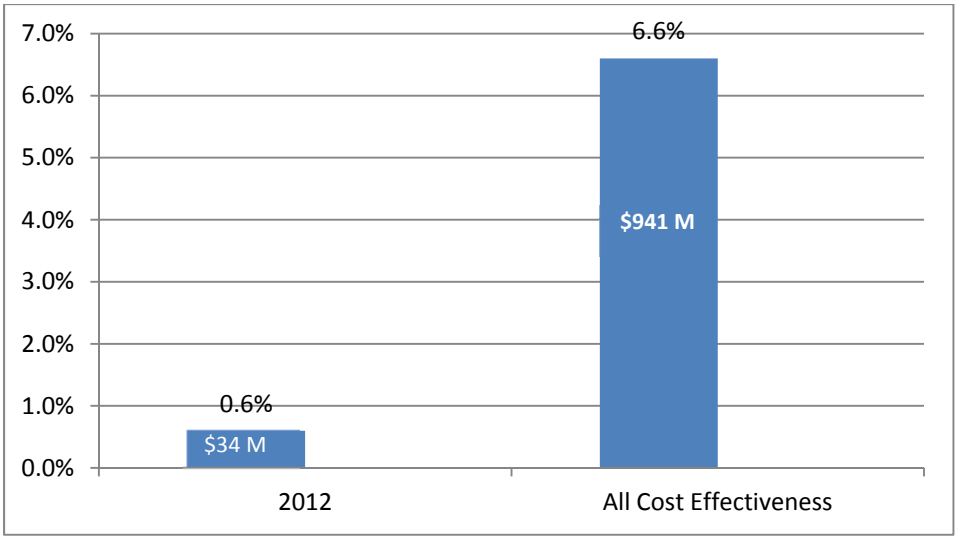
> ***"Despite a long history of legislation and many regulatory dockets concerning energy issues, New Hampshire lacks a clear over-arching policy direction for energy efficiency. While there are a variety of programs and initiatives under way in multiple sectors, the lack of a clearly articulated policy hampers efforts to have a sustained, coordinated, adequately-funded approach that results in full market development and steadily increasing consumer benefits."***[26]

Substantial opportunity exists to maintain and improve energy productivity while reducing consumption through investments in energy efficiency. As discussed in Section 2 and as shown in Figure 3.1, analysis conducted for this study indicates the total amount of energy efficiency savings available in New Hampshire that are deemed cost-effective is equal to 715.4 Million kWh/yr energy equivalent, which equates to 6.6% of New Hampshire's 2012 electric sales.[27] As noted in Section 2 and shown in Figure 3.1, more than ten times the level of savings than is

[25] http://www.aceee.org/energy-efficiency-sector/state-policy/aceee-state-scorecard-ranking
[26] *New Hampshire Independent Study of Energy Policy Issues, New Hampshire Public Utilities Commission, September 30, 2011, page 14-4, http://www.puc.nh.gov/eese.htm*
[27] *For further information about the analysis, see Appendix B.*

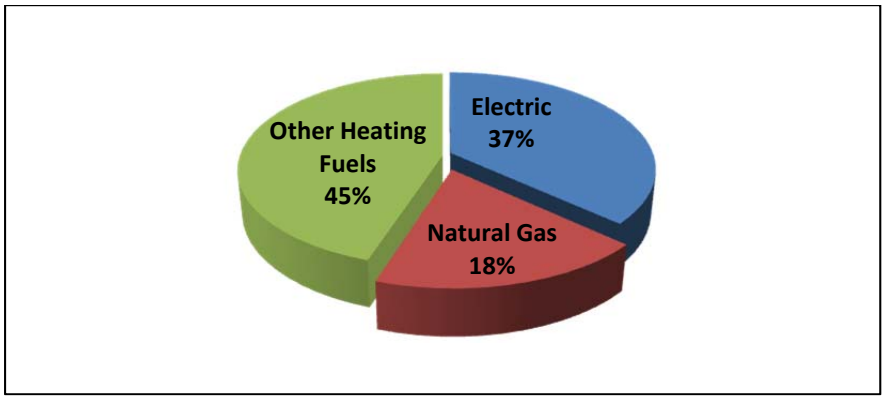
currently achieved from efficiency programs currently offered to utility customers awaits New Hampshire should sufficient funding be made available to make the needed investments.

Figure 3.1: NH Cost Effective Energy Efficiency Potential Compared to 2012 Savings



As shown in Figure 3.2, the unrealized energy savings opportunities in New Hampshire exist across the full spectrum of fuels including electricity, natural gas, and "other heating fuels" including heating oil, propane, and kerosene. Utilities providing electricity and natural gas are regulated by the NH PUC and energy efficiency programs offered by the utilities (referred to the CORE programs) are overseen by the NH PUC. Suppliers of other heating fuels are not regulated by the NH PUC and are therefore referred to as the "unregulated fuel suppliers."

Figure 3.2: NH Energy Efficiency Potential by Fuel Type (%)



As shown in Figure 3.2, the largest opportunity for additional savings is for other heating fuels. Although some CORE programs are designed to be fuel-neutral and are therefore saving not only electricity and natural gas, also other heating fuels, there is some resistance to using more of the ratepayer-funded SBC to support energy efficiency improvements that do not primarily result in electric and/or natural gas savings. This issue is a challenge for New Hampshire (and other states), especially as it relates to paying for energy efficiency programs that decrease use of heating fuels other than electricity and natural gas. Development of an EERS that addresses

both electrical and un-regulated thermal energy efficiency and that specifies a funding source for addressing both could help provide important and necessary policy and regulatory direction that helps alleviate this challenge. This is a challenge for other states as well and thus far Vermont is the only state to begin to address it. Since 1990, Vermont has assessed a 0.5% gross receipts tax on heating oil, propane, and kerosene (in addition to coal, natural gas, and electricity).[28] While the funds from the assessment are dedicated to a specific Weatherization Trust fund for income eligible households, a similar approach could be potentially be used for funding energy efficiency services provided to buildings heated with liquid heating fuels.

[28] *New Hampshire Independent Study of Energy Policy Issues, New Hampshire Public Utilities Commission, September 30, 2011, page 3-14, http:://www.puc.nh.gov/eese.htm*

Section 4: Market Barriers and the Need for a Policy and Regulatory Push

The substantial economic benefits awaiting New Hampshire from achieving all cost effective energy efficiency savings provide a strong rationale for a new policy and regulatory push that helps enable such savings. That said, over the years there has been widespread discussion among policymakers, regulators, and industry thought leaders in the state on what is the appropriate role of government in helping to achieve increased energy efficiency through public policy and regulation. Three questions are at the core of the discussions:

1) What are the key components of a competitive energy market and what are the hallmarks of a successful market delivering cost effective energy efficiency to energy consumers in New Hampshire?

2) When is public investment in the energy efficiency market appropriate and when should private, competitive market forces be relied upon to develop the market?

3) What is the rationale for continued policy and regulatory initiatives directed at the energy efficiency market in New Hampshire?

This section describes the key components of a successful energy efficiency market, provides a summary of key barriers to further development of the energy efficiency market in New Hampshire, and discusses the need for a new state-level policy and goal (in the form of an Energy Efficiency Resource Standard) as a critical next step in further developing the pathway to achieving all cost-effective energy efficiency in New Hampshire.

4.1 Key Components of a Successful Competitive Energy Efficiency Market

Key components needed for a successful competitive energy efficiency market in any state are depicted in Figure 4.1.

Figure 4.1: Key Components of a Successful Energy Efficiency Market

When all of these components are in place, a well-functioning and competitive market for investments in energy efficiency improvements will develop and thrive. In such a market setting:

- Policymakers recognize the societal benefits of energy efficiency and support increased energy efficiency through clear and consistent state-level policy and regulation.

- Consumers understand the value of energy efficiency and seek energy efficient products and services.

- High quality and affordable energy efficient products and services are available, and a well-developed network of industry trade allies and market actors is in place to supply them.

- There is widespread access to accurate information on the availability and benefits of such products and services.

- Officials enforce existing codes and standards for energy efficiency, and buildings are constructed and retrofitted to maximize energy efficiency.

- Real estate professionals, lenders, and appraisers recognize that more energy efficient buildings are more cost effective to operate and recognize the value of energy efficient buildings when pricing and/or financing them.

4.2 Key Barriers in the Energy Efficiency Market in New Hampshire

As noted in the utility restructuring legislation that passed in New Hampshire in the 1990s and inspired the first generation of regulated energy efficiency programs in the state:

> ***"Restructuring should be designed to reduce market barriers to investments in energy efficiency and provide incentives for appropriate demand-side management and not reduce cost-effective customer conservation. Utility sponsored energy efficiency programs should target cost-effective opportunities that may otherwise be lost due to market barriers."***[29]

This statement provides a reminder of the appropriate roles of, and the need for, a blend of policy and regulatory approaches to help address energy efficiency market barriers in New Hampshire. While many policymakers, energy professionals, and citizens in New Hampshire support increased energy efficiency in the state, there are currently significant market barriers affecting the development of a successful, competitive energy efficiency market in the state. As noted in detail in the SB 323 study, these include (among others):

- **Uncertainty about the commitment of the State to developing a successful and competitive energy efficiency market** due to the lack of a clear over-arching state-level policy guiding energy efficiency regulation, public investments, and market development;

[29] *RSA 374-F:X Electric Utility Restructuring, 1996.*

- **Unrealized opportunities to use the regulatory authority of the State** during review, approval, and oversight of existing regulated energy efficiency programs; and

- **Lack of funding** that is adequate, sustained, scale-able, and focused on investments that will fully develop and ultimately transform markets for energy efficiency.[30]

Ideally, the goal of future policy and regulatory activity will be to continue to encourage the formation of a competitive market that is operating without market failures or barriers. This should generally be accomplished by focusing on creating policies and regulatory approaches that overcome barriers to the competitive market, such as those outlined above.

4.3 The Need for a New Policy and Regulatory Push in New Hampshire

The fact that more than 10 times the amount of cost-effective energy efficiency awaits New Hampshire despite more than a decade of various policy, regulatory, and programmatic initiatives, suggests that continuation of business as usual is not sufficient. A new policy and regulatory "push" is strongly recommended to help stimulate investments in cost-effective energy efficiency in New Hampshire. This push should result in an improved policy and regulatory framework that sends a clear message that:

- New Hampshire is serious about achieving all cost-effective energy efficiency;

- New Hampshire recognizes that increased energy efficiency is an economic development opportunity for the state and can increase jobs and income;

- New Hampshire understands that continued public investment is warranted to address and help alleviate market failures and market barriers to increased energy efficiency; and

- Through continued public investment, enables New Hampshire to shift the balance over time to increased private investment, with public investment focused on unresolved market barriers, underserved markets, emerging technologies and applications, and areas of innovation and advancement not yet attractive to private capital.

4.4 Guidance for a New Policy and Regulatory Push in New Hampshire

The policy and regulatory push recommended for New Hampshire should recognize that energy efficiency markets (as well as most other markets) are always changing, and the specific rules for implementing the policy and for governing the market supported by the policy may need to be adjusted over time. In addition, the rules may become complex overtime and will likely warrant administration by an oversight body. As a result, it is recommended that a new, over-arching policy be enacted as legislation. The legislation should play an enabling role, should establish the broad scope and outline for the policy and the energy efficiency market supported by the

[30] *New Hampshire Independent Study of Energy Policy Issues, New Hampshire Public Utilities Commission, page 14-1, September 30, 2011, http://www.puc.nh.gov/eese.htm*

policy, and should delegate implementation and administration of the policy and the rules for implementing the policy to the appropriate regulatory body.

In addition, the policy and regulatory push should recognize that any new over-arching enabling legislation needs to remain stable and unchanged for a period of time. The regulatory oversight enabled by the law also needs to remain consistent and clear so that key market actors experience a level of certainty both in terms of overall direction and in terms of regulatory process and oversight. This certainty enables businesses and individuals to plan ahead, thereby helping to encourage a healthy and well-functioning market. If an enabling law is subsequently modified or challenged with great frequency and/or if the regulatory process and level of oversight is inadequate or changing frequently, the ability to plan is hindered and the health of the market, as well as the overall effectiveness of the legislation, suffers.

Generally speaking, the greater the complexity and rate of change in a market, the more that enabling legislation combined with more substantial regulatory oversight is appropriate. The balance between setting high level scope and having a "light touch" in the enabling legislation and being sufficiently detailed to direct the regulator (and the market) is often debated. However, it is generally considered best practice to err on the side of writing high-level enabling law and allowing the regulators to oversee the detailed implementation of the law. Because the market for energy efficiency goods and services is complex and constantly changing as new technology enters the market, such an approach provides the necessary and appropriate flexibility for effective regulation, and implementation.

Section 5: The EERS Recommended as a Key Next Step in New Hampshire

A key finding of a year-long review by the NH EESE Board of the SB 323 Study provides important direction for the next policy and regulatory push for increasing energy efficiency in New Hampshire. As noted in Section 1 of this document, one of the top three recommendations of the NH EESE Board based on the SB 323 study was to establish an Energy Efficiency Resource Standard in New Hampshire.[31] An EERS is an increasingly common policy tool across the nation as a way to articulate and establish state policy relative to energy efficiency. Typically, an EERS is established as a statewide, multi-year energy efficiency goal, and it requires utilities or other administrators of energy efficiency programs to save a certain amount of energy each year, typically expressed as a percentage of annual retail energy sales.[32]

Development of an EERS in New Hampshire would provide the opportunity to establish a statewide policy and goal that articulates the level of energy efficiency savings the state is committed to achieving. This clear direction is lacking in previous policies and legislation. Such legislation should also specify the regulatory authority responsible for overseeing implementation of the state policy and goal, and should provide adequate resources for and empower that regulatory authority to oversee administration and achievement of the state policy and goal.

This section provides: an overview of EERS experience in other states and best practices based on that experience; a summary of input received from key stakeholders about the need for an EERS; an explanation of the design criteria used by the study for team when developing the approach for the EERS for New Hampshire; and an explanation of the EERS recommended by the study team.

5.1 An Overview of EERS Activities in Other States

According to ACEEE, the first EERS was established by Texas in 1999. Since then, the idea has gained large popularity, and well over half of states have either an EERS, policies similar to an EERS, or a Renewable Portfolio Standard (RPS) that includes an energy efficiency target. As shown in Figure 5.1, New Hampshire is the only state in the Northeast without an EERS or related state-level energy efficiency goal. The EERS in effect in neighboring Massachusetts and Rhode Island are described in more detail in Appendix A, as examples of the widely varying and state-specific approaches taken across the nation.

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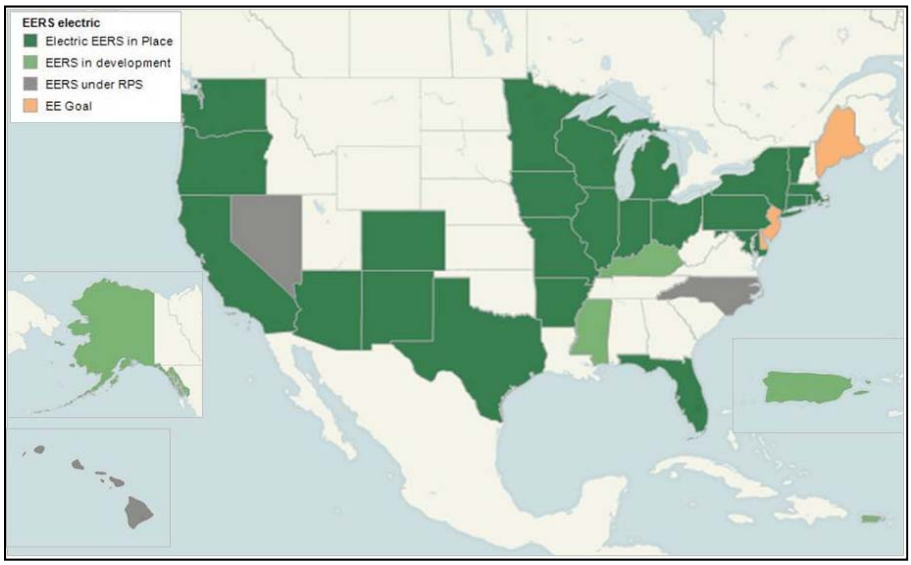
[31] *Final Report on the New Hampshire Independent Energy Study Pursuant to Senate Bill 323 (2010 Session), New Hampshire Energy Efficiency and Sustainable Energy Board, RSA 125-0:5-a, Summary, www.puc.nh.gov/EESE.htm*

[32] *EERS: A Progress Report on State Experience, ACEEE, June 2011, page ii.*

Figure 5.1: Energy Efficiency Resource Standards in Other States



5.2 An Overview of EERS Best Practices Based on Experience in Other States

The value of establishing an EERS in any state is the clear, simple, and unequivocal message that developing and articulating a certain and specific goal sends to the market. As with any standard, a balance needs to be established between being specific enough to be measurable without being overly prescriptive or static. In addition, it is important that an EERS delegate authority for overseeing implementation of the EERS to the appropriate public entity, and that the EERS be both aspirational and directive.

Performance targets established under an EERS vary widely. Some states establish energy-savings targets in three- to five-year increments, while others set long-term cumulative targets. In almost every case, the performance target is expressed as a percentage of energy sales in a baseline year. An energy standard may set a short-term goal such as "A 1% increase in the ratio of energy savings to 2010 electricity sales by 2012." Similarly, an energy standard may also set a long-term goal such as "A 10% decrease in energy use by 2025 as compared to 2010."

Based on research conducted for this study and by others, the following represent the "best practices" in EERS development and achievement of high levels of savings in regulated energy efficiency programs[33] and form the basis for recommendations for New Hampshire:

- Establish an EERS through legislation, and ensure the legislation directs the appropriate regulatory body to oversee implementation of the EERS and provides adequate funding and authority to do so.

[33] *Energy Efficiency Resource Standards: A Progress Report on State Experience, Report Number U112, ACEEE, June 2011.*

- Ensure the EERS provides a specific energy efficiency savings target over a defined period of time and require third party, independent evaluation, measurement, and verification (EM&V) of savings. Ensure the EERS requires (at a minimum) that all cost-effective energy efficiency be acquired (referred to as "least cost procurement"), that it enables both regulated and unregulated fuels to be addressed through implementation of the EERS, and that it include focus on competitive market development.

- Ensure the EERS provides for a structured planning, goal-setting, and budgeting process for programs to be implemented for achieving the EERS. The process should involve key stakeholders and market actors in the design, review, and assessment of energy efficiency programs supported with public monies, and should be conducted in a non-adjudicatory, professionally managed collaborative process overseen by a public body that has clear roles and authority and has been given the necessary resources to undertake this work. The objective would be to achieve broad support for the programs, budgets and measurement metrics before they are submitted for regulatory review and approval through formal regulatory dockets. This should streamline the approval process and reduce litigation costs for both the State and the Program Administrators.

5.3 Stakeholder Input for the EERS Proposed for New Hampshire

As part of the research for this report, the study team sought input from a range of public policy, utility, industry, regulatory, and non-profit representatives as it related to the possible development of an EERS in New Hampshire. The following is a summary of key input provided by the stakeholders:

- **The need for legislative certainty**. All stakeholders emphasized that whatever standard is adopted, it should be designed so that it remains substantially unchanged and in effect for an extended period of time. In addition, stakeholders emphasized the need to study the experience in other states and apply the lessons learned to New Hampshire.

- **The need to address the large opportunity for energy savings from heating fuels such as oil and propane** (in addition to the current focus on electricity and natural gas savings). Stakeholders emphasized the need to create a standard that applies to all energy sources, not just electricity and natural gas. This would require a high level of coordination across many vested interests, ranging from the State, municipalities, utilities, retailers, contractors, fuel dealers, and others. The need to reward joint action toward achieving a standard was recognized. For example, utilities should receive energy savings credit for working toward building code compliance with municipalities and other stakeholders.

- **The need to address the residential, C&I, and transportation sectors individually**. It was noted that not all sectors have equal potential for cost-effective energy savings and therefore goals and strategies should vary by sector.

- **The need to continue serving constituents from all income levels.** Stakeholders stressed the importance of ensuring delivery of energy efficiency services to customers of all incomes and continuation of the Electric Assistance Program supported by the System Benefits Charge.

- **The desire for simplicity, clarity, and flexibility in how to achieve an EERS**. It was noted that a vague definition or overly prescriptive rules could hinder implementation and overall effectiveness of a standard.

- **The ability to measure results and reward high performance**. The standard should be designed to result in substantial and meaningful cumulative energy savings and a reduction in total energy use compared to the baseline. Performance should also be focused both on energy savings and on other key metrics that assess development of a successful, competitive market (i.e., increases in awareness, increases in number of customers served, increases in number of qualified contractors compared to baseline, etc.).

- **The valid concern of utility stakeholders about lost revenue as energy efficiency savings increase**. The study team heard this concern "loud and clear," and it is consistent with the experience of the national organization, ACEEE, that has found that having a mechanism to deal with this issue is a key trait of successful Energy Efficiency Resource Standards in other states.[34] As noted in other sections of this report, the study team recognizes that it will be necessary to address to the issue of lost revenue in order to achieve successful implementation of an EERS in New Hampshire. While the study team recommends this be achieved through a docket initiated by the NH PUC related to decoupling, the study team recognizes that other ratemaking or regulatory mechanisms may be favored by regulators and/or utilities in the state instead.

5.4 Design Criteria for the EERS Proposed for New Hampshire

Given the experience in other states and the thoughts and concerns expressed by stakeholders, presented in Table 5.1 are the "Top 7" Design Criteria used when developing the approach for an Energy Efficiency Resource Standard in New Hampshire.

Table 5.1: Top 7 Design Criteria for the EERS Proposed for New Hampshire

#	Design Criteria	Implication for a NH EERS
1	**Make use of Best Practices**	The EERS should be informed by experience and success in other jurisdictions.
2	**Be Tailored to New Hampshire**	The EERS should build upon and compliment New Hampshire's existing laws and regulations.
3	**Build on Existing Success**	The EERS should build upon the success to date with existing in-state programs (CORE, state government leading-by-example, Building Energy Code Collaborative Project, etc.)

[34] *Energy Efficiency Resource Standards: State and Utility Strategies for Higher Energy Savings, ACEEE Report Number U113, June 2011, page 8.*

4	**Promote Competitive Market Activity**	The EERS should enable a blend of policy and regulatory initiatives that help stimulate competitive market activity, and can scale up with increased private investment over time.
5	**Create Sustainable Funding**	The EERS should create a mechanism for sustainable investments in energy efficiency.
6	**Increase Certainty**	The EERS should articulate a stable and predictable set of policies and rules that endure over time.
7	**Recognize and Address the Issue of Lost Revenue**	The EERS should recognize that lost revenue due to increased energy efficiency savings is a serious issue for utilities and fuel dealers. Successful implementation of an EERS will likely require a regulatory activity that addresses this issue through decoupling of revenue from sales for regulated utilities (or some other ratemaking or regulatory mechanism). Ideally the issue of lost revenue would be addressed for heating fuel providers, as well.

5.5 Overview of the Approach Recommended for an EERS in New Hampshire

The approach recommended by the study team for an EERS in New Hampshire is unique and innovative as it addresses both electricity and heating fuels and it highlights benchmarking and market development as key strategies for achieving energy savings. The proposed approach includes an annual energy savings target (which is commonly included in an EERS) and a new benchmarking target for helping to drive energy efficiency investments (that focuses on the intensity of energy use.

Drawing upon the design criteria noted above, the approach recommended for New Hampshire captures the benefits of using four complimentary performance metrics over a five-year and a longer-term time horizon. Key elements of both the five-year and the long-term standard proposed for New Hampshire are summarized in Table 5.2. It is important to note that two metrics are recommended for assessing progress towards each standard. The first is an energy-savings based metric (as is commonly used already) and the second is a market development-based metric (which is recommended by the study team to ensure program expenditures are directed towards continued development and transformation of the energy efficiency market).

Table 5.2: Overview of the Proposed Approach for an EERS in New Hampshire

#	Element	Description	
1	**Five-Year Energy-Efficiency Standard**	**Metric:** **Base Year:** **Ramp Up:** **Applicability:**	Ratio of energy savings to energy sales in % Calendar 2012. Three years; 2015 thru 2017 (CORE Programs) Electric & thermal energy expressed in kWh
2	**Immediate Market Progress Indicator**	**Metric:** **Base Year:** **Applicability:**	Program awareness, # of projects, workforce development, # of contractors, training & skill level, etc. 2014, measured every 2 years Electric & thermal customers, contractors, & general public
3	**Long-Term Energy Benchmarking Standard**	**Metric:** **Deadline:** **Applicability:**	Top quartile as measured by intensity of use (IOU) kWh/sq. ft. per capita 2025 Electric & thermal energy expressed in kWh

5.6 A Five-Year Energy Efficiency Standard Proposed for New Hampshire

It is proposed that a five-year EERS be established in New Hampshire that accomplishes the following:

> ***By 2017, New Hampshire will invest in all cost effective energy efficiency in its building stock, as measured by the Total Resource Cost Test. This is expected to be equal to at least 6.6% of 2012 electric energy sales.***

As noted above, this standard would rely on a legislatively defined energy saving target expressed as a percentage of base-year energy sales. This is similar to the approach used in many other states, and has been proven to create results. Such a five-year (2013-2017) standard makes use of best practices in other states, and is similar in timing and structure to the standards that have already been implemented in 25 other states.

As discussed in detail in Section 6, six key strategies are envisioned and recommended for achieving this goal including: Expanding and Enhancing the CORE Programs; State and Local Government Lead-By-Example; Establishing Supportive Regulatory Policies and Utility Behind-the-Meter Investment; Private Market Investment; Building Energy Code; and Statewide Energy Efficiency Tracking, Reporting, Benchmarking, and Promotion. It is important to note that although a single savings target is specified as a percent of 2012 electric energy sales, only 1.6% of 2012 electric sales energy equivalent is recommended for achievement through expanded CORE program activities through the year 2017. The balance would be achieved through the other five strategies. For purposes of the study, a three-year ramp up period is assumed for CORE programs (from 2015 – 2017) and associated program design, evaluation, measurement, and verification improvements are recommended as part of the ramp up.

5.7 A Long-Term Energy Benchmarking Standard Proposed for New Hampshire

It is also proposed that an EERS for New Hampshire seek to accomplish that:

> ***By 2025, the New Hampshire building stock will be among the most energy efficient in the nation, and will be ranked in the top quartile as measured by kWh/sq. ft. per capita.***

This long-term standard would establish a requirement to benchmark and report the energy efficiency of New Hampshire's building stock and to track improvements in efficiency over time on intensity of energy use per capita (where available and applicable, similar climate zones, etc., comparisons with other states could also be done). This standard could be applied at the level of a utility service territory and/or at the municipal level. The information that it provides could improve program delivery and penetration under the five-year standard, and could leverage experience from current programs offered by utilities to their municipal utility customers or through other competitive market delivery mechanisms.

The concept of benchmarking was one of the most frequently discussed ideas during stakeholder outreach conducted for this study, and is already occurring both in state government and some municipal buildings in New Hampshire. Many cities and towns in the state are benchmarking their building stock using an intensity of use metric (kWh/sq. ft.) with the help of the US EPA's Portfolio Manager Program.

This component of the standard recognizes high achievement based on an objective measure of building performance. By making use of utility energy usage information and building square footage from municipal grand lists,[35] utilities or their regulator can readily calculate intensity of use by dividing building energy use by square footage.[36] By incorporating the concept of benchmarking into an EERS, the opportunity is created to capture both the simplicity and proven effectiveness of a percentage target, and the continuous improvement that can result from benchmarking. This metric can be used to compare (or "benchmark") New Hampshire buildings to each other and to buildings in other states, and is expected to encourage continuous improvement of (and investment in) the energy performance of the state's existing and new building stock as the value of energy efficiency becomes more apparent to buyers, appraisers, and lenders.

Over time, the availability and use of this information through outreach and education campaigns could help stimulate private investments in energy efficiency by consumers and building owners, and would further scale up the private investment in energy efficiency. Continued public investment would focus on unresolved market barriers, underserved markets, emerging technologies and applications, and areas of innovation and advancement not yet attractive to private capital.

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[35] *Grand lists are a list of all real estate parcels within a municipality.*

[36] *Refer to Section 7.5 for more discussion on Tracking, Reporting, Benchmarking, and Promoting Energy Efficiency Savings.*

Section 6: Top 6 Strategies for Achieving an EERS in New Hampshire

The U.S. Department of Energy's call to action for states with unrealized energy efficiency potential asked states to address the following key question:

> ***When contemplating potential savings targets for an EERS, what would it take to increase energy efficiency savings from energy efficiency programs in your state by at least 1% per year, measured on the basis of annual retail electric sales?***[37]

Initially, NH OEP was focused on assessing the achievement of such savings through just the regulated energy efficiency programs delivered by the utilities. However, upon discussion with stakeholders and within the study team, it was agreed that a broader assessment would be done that looked at a range of strategies for achieving increased energy efficiency savings in New Hampshire. This enabled the study to: explore additional strategies (above and beyond the CORE programs) for achieving the full 6.6% savings that is cost-effective according to the Total Resource Cost overseen by the NH PUC; to address both electric and thermal savings; and to explore the impacts of competitive market activity and private investment. The top six strategies recommended by the study team for achieving an EERS in New Hampshire include:

1) State and local governments lead-by-example;

2) Expand and enhance the regulated energy efficiency programs (i.e., the CORE programs);

3) Establish supportive regulatory policies and enable utility behind-the-meter investment;

4) Implement key recommendations within the *New Hampshire Energy Code Compliance Roadmap* for achieving 90% compliance with the building energy code by 2017;[38]

5) Track, report, benchmark, and promote statewide energy efficiency activities; and

6) Accelerate and scale-up competitive private investment activity.

These strategies are presented as a "menu of options" in Table 6.1 that one can pick and choose among, based on policy and/or regulatory priorities. Together, they represent a cost-effective opportunity to reduce energy use by 6.6% compared to 2012. These efforts come at an estimated average cost of $0.031/kWh, which is well below the cost of traditional supply side alternatives. And, as described in Section 2, they will result in economic and employment growth in the state in addition to the associated energy and environmental benefits.

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[37] *State Energy Program (SEP) Strengthening Building Retrofit Markets and Stimulating Energy Efficiency Action Funding Opportunity Announcement, DE-FOA-0000251, CFDA Number: 81.041, U.S. Department of Energy, National Energy Technology Laboratory, April 9, 2010.*

[38] *New Hampshire Energy Code Compliance Roadmap, GDS Associates, April 2010.*

Table 6.1: Overview of the Cost-Effective Investment Opportunity in New Hampshire by 2017

Strategy	% of 2012 Electric Sales	Total Cost / Year ($M)	Lifetime Average $/kWh
1. State & Local Governments Lead-by-Example	0.1%	$7	$0.034
2. Expand & Enhance the CORE Programs	1.7%	$94	$0.034
3. Enable Behind-the-Meter Investments	0.73%	$38	$0.031
4. Implement Roadmap to 90% Code Compliance	1.14%	$13	$0.087
5. Track, Report, Benchmark, & Promote EE	0.0%	$28	N/A[39]
6. Accelerate & Scale-Up Private Investment Activity	2.9%	$129	$0.027
Total Investment Opportunity	**6.6%**	**$309**	**$0.031**

Presented below is a discussion of each strategy including:

- An overview of the amount of energy to be saved and the costs associated with the savings;
- The rational and mechanics for the strategy;
- Next steps to implement the strategy;
- What entity would implement the strategy;
- Financing options for the strategy; and
- The timeline for the strategy.

Information on the methodology used for calculating savings and costs for each strategy is provided in Appendix D.

6.1 State and Local Governments Lead-by-Example

State government is the largest energy consumer in New Hampshire, and the total energy use across the state's municipal-owned (local) government buildings is also large. These buildings are among the most visible in the state, and our analysis indicates that state and local government buildings can reduce energy use 0.1% compared to 2012 electricity sales. While this is a relatively small amount of total energy use in New Hampshire, the leadership demonstrated by state and local governments by making investments in these buildings and publicizing the reduced energy use and cost savings annually can help build momentum for achieving an EERS goal.

Table 6.2 provides a more detailed breakout of State and Local Governments Lead-by-Example program areas, targeted savings, and budgets by year during the five-year period (2013-2017). These figures are based only upon buildings that are owned by state and local governments. Leased building space (especially within state government facilities) represents substantial

[39] *There are no kWh savings estimated for or directly associated with Strategy #5. Therefore, a lifetime average $/kWh value has not been calculated.*

additional investment and energy savings opportunities that can be realized if government were to "lead by example" by requiring a minimum level of energy efficiency from its lessors.[40]

Table 6.2: Menu of 'Lead-by-Example' Energy Savings & Cost

	% of Statewide 2012 Electricity Use					Cost Estimate ($M)				
Program	**2013**	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
State Electric	0.01	0.02	0.01	0.01	0.01	$0.1	$4.1	$2.1	$2.2	$2.2
State Gas	0.00	0.06	0.02	0.02	0.02	$0.1	$6.1	$1.6	$1.7	$1.7
State Other Fuels	0.00	0.00	0.01	0.02	0.02	$0.1	$0.1	$1.5	$1.6	$1.6
Muni. Gas	0.00	0.01	0.01	0.01	0.01	$-	$0.3	$0.3	$0.3	$0.3
Muni. Other Fuels	0.00	0.04	0.04	0.04	0.04	$-	$1.3	$1.3	$1.3	$1.3
Total	**0.0%**	**0.1%**	**0.1%**	**0.1%**	**0.1%**	**$0.3**	**$11.9**	**$6.8**	**$7.1**	**$7.1**

Rationale for the Strategy

- State government is the single largest energy consumer in New Hampshire and due to Executive Order 2011-1, RSA 21-I:14-c , and other policies, it is well along in increasing the energy efficiency of its buildings.
- Municipal governments collectively consume large amounts of energy statewide, and are increasingly aware of the opportunity to reduce their building energy costs and thereby reduce the cost burden on their taxpayers.
- Many public buildings represent highly visible institutions in their communities, and lead by example efforts by government help address information and other market barriers. By promoting the successful investments that are being made in public buildings, private citizens and business owners will become more aware of and comfortable making similar investments in their own buildings.

Mechanics of the Strategy

- Document energy savings from existing legislation and Executive Orders to form an accurate baseline of energy usage from which improvements from increased compliance can then be attributed to the EERS.
- Track, report, benchmark, and promote the results annually to executives, legislative bodies, and the general public.[41]

[40] Another significant state lead-by-example energy savings opportunity related to state vehicle fleet improvements. The state government represents the largest vehicle fleet owner in the state. Although not included in this report's quantitative analysis, the state could build upon current fuel economy requirements, make them more stringent, and require compliance with Fleet Best Management Practice (BMP) guidance.

[41] Given the significant role that tracking, reporting, benchmarking, and promotion play in helping to achieve an EERS, in addition to the write-up provided in Section 7.5 below, an identical bullet point is presented for each Program Area recommended in Section 7.2 through 7.6.

Next Steps to Implement the Strategy

- The EERS can provide the policy framework that results in direction to state government to achieve higher energy use reduction goals in the buildings that the state already owns.
- Similarly, the EERS can provide the policy framework that directs to state government to require minimum energy performance standards for the buildings that the state leases.
- In addition, establishment of an EERS at the state level can help stimulate policy support at the local level for municipal governments to investment in building energy efficiency for municipally-owned and leased buildings.

What Entity Would Implement the Strategy?

- While energy efficiency upgrades are occurring at Hazen Drive, the New Hampshire Department of Administrative Services (NH DAS) should promote and publicize the work that is accomplished.
- After the Hazen Drive project is underway, the NH DAS should replicate contracts for energy efficiency projects at other selected buildings.
- The NH DAS should establish minimum energy standards for the properties that the state leases and create partnerships with building owners to achieve the required energy goals prior to the state leasing the properties.
- The NH EESE Board should continue to work with key stakeholders, including the NH Community Development Finance Authority (CDFA), NH Local Energy Working Group and Regional Planning Commissions, etc., to support availability and provision of technical assistance, financing options, and other resources to municipal and local government buildings.

Financing the Strategy

- For state buildings, a combination of Energy Service Company (ESCo) financing and participation in CORE utility program rebates should be used to finance the strategy. The role of the ESCo would be to recommend and oversee the energy efficiency improvements and to reimburse the building owner with a guaranteed payment that represents a portion of the value of the energy savings. Traditionally, ESCo's have operated as for profit businesses. Recent work in Vermont has resulted in development of a business model for a "public purpose" ESCo which may have potential in New Hampshire in the future.
- For municipal buildings, an allocation of RGGI of currently about $2 Million/year may be used and implemented through the CORE utility programs in addition to traditional municipal bonding, Qualified Energy Conservation Bonds (QECBs), CDFA funding, and potentially other sources of loan or grant funding.
- If savings can be achieved in reduced operating costs at specific buildings/departments, the savings should be made available for use to invest in additional energy efficiency improvement projects, rather than used to lower future year budget requirements.

Timeline for the Strategy

- The Hazen Drive project should be completed before the end of 2014. Projects within other state-owned buildings should be identified and completed in a ramped up manner over the 2015-2017 period.
- Requirements for efficiency minimums within state-leased facilities should be developed in 2014 so that they are included within lease documents starting with any new leases entered into in 2015 and beyond.
- Municipal and local government building project identification and implementation support strategies should be in place by the end of 2014 (consistent with an ongoing CDFA study that is expected to provide additional guidance and next steps once it is completed).[42]
- Some shovel ready projects should be completed during 2014 and case studies and outreach conducted to develop a pipeline of additional projects for ramp up in 2015-2017.

6.1.1 Specific Recommendation: Use Benchmarking to Continue Leading-By-Example

Since State government is well along in addressing both building and fleet efficiency, it is recommended that the State of New Hampshire document associated energy savings, continue to expand its efforts, and seek recognition for its achievements under the ENERGY STAR program led by the U.S. Environmental Protection Agency (US EPA).[43] The US EPA already recognizes individual building achievement under the ENERGY STAR program. Furthermore, the State is already using EPA's Portfolio Manager benchmarking tool for individual buildings.

A natural next step would be to benchmark the State's entire public building stock against energy usage of similar buildings in other states. This would set New Hampshire on a path towards having an even more energy efficient State government, and could provide a long-term, ongoing sense of urgency for investing in the overall energy efficiency of State government. It could also result in New Hampshire becoming the first 'ENERGY STAR State Government' in the nation. A similar effort should be developed for municipal and other local government buildings.

What Agency Would Implement the Recommendation?

- The NH DAS for outreach within state government.
- The NH Local Energy Working Group for outreach to municipal governments.

Financing the Recommendation

- For State buildings, financing could be made part of NH DAS staff responsibilities. Alternatively, it could potentially be outsourced to qualified contractors if the cost is equal to or lower than the fully loaded cost of having state employees lead the effort.

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[42] *Through a competitive bidding process, in August 2013, the CDFA hired a consultant to evaluate the feasibility and sustainability of a Municipal Energy Efficiency Program.*

[43] *Quantification of savings associated with the state's leased properties or vehicle fleet improvements have not been included in the analyses conducted for this report.*

- For municipal buildings, part of the RGGI funding could be utilized through CORE utility programs, or through technical assistance support staff (interns or contractors) funded through local, regional, or federal grant opportunities.

Timeline for the Recommendation

- State building benchmarking should be in place before the end of 2014. 100% of all existing state buildings should be benchmarked by the end of 2017, with annual updates conducted as part of standard practice.
- Local government building benchmarking should be in place by the end of 2014. At least 50% of all municipal buildings should be benchmarked by the end of 2017, with annual updates conducted as part of standard practice going forward.

6.2 Enhance and Expand the CORE Energy Efficiency Programs

The electric and gas utilities' existing CORE programs have achieved noteworthy energy savings, given the annual budgets and regulatory requirements currently in place in New Hampshire. However, there is considerable room to increase their accomplishments and capture more of the cost-effective energy efficiency potential remaining in New Hampshire. In 2012, the CORE programs resulted in energy use reductions of approximately 0.6% of 2012 electricity sales. As shown in Table 6.3, with a ramp-up in annual investment to $93.6 million[44] by 2017, analysis conducted for this study indicates that the CORE programs could reduce energy use by an additional 1.1% per year (to a total yearly savings of 1.7%) compared to 2012 electricity sales.

Table 6.3: Menu of 'CORE Program' Energy Savings & Costs

	% of Statewide 2012 Electricity Use					Cost Estimate ($M)				
Program	**2013**	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
C&I Electric	0.32%	0.31%	0.38%	0.46%	0.53%	$20.6	$19.8	$24.5	$29.6	$34.4
C&I Gas	0.16%	0.17%	0.22%	0.28%	0.33%	$4.9	$5.1	$6.7	$8.4	$10.1
C&I Other	0.04%	0.04%	0.04%	0.05%	0.06%	$1.4	$1.1	$1.4	$1.6	$1.9
RES Electric	0.14%	0.15%	0.18%	0.21%	0.24%	$13.9	$13.3	$16.4	$19.7	$23.0
RES Gas	0.11%	0.12%	0.16%	0.20%	0.24%	$5.2	$5.6	$7.4	$9.3	$11.1
RES Other	0.17%	0.17%	0.20%	0.25%	0.29%	$8.1	$7.6	$9.4	$11.3	$13.1
Total	**0.9%**	**0.9%**	**1.2%**	**1.4%**	**1.7%**	**$54**	**$52**	**$66**	**$80**	**$93.6**

The proposal for a five-year component of the EERS is intended to enable a continuation, enhancement, and expansion of the existing CORE programs and potentially the addition of new CORE programs and services not possible within the existing two-year funding and budgeting cycle for those programs. The additional funding (which would increase the energy efficiency portion of the SBC from its current $0.0018/kWh to $0.0036/kWh) could be paid for by a combination of:

[44] Note that this investment represents the total, 'societal' investment. We have assumed that the energy efficiency portion of the SBC and the LDAC would essentially be doubled and could potentially be offset by funds from the FCM, RGGI, and other sources, if the decision were made to direct such funds in that way. Please refer to Appendix B: Calculation Methodology for the Energy Savings and Cost Analysis for further details.

- An increase in the System Benefits Charge assessed on electric utility bills;
- An increase in the Local Distribution Adjustment Charge assessed on natural gas at the distribution level; and/or
- Proceeds from the Forward Capacity Market, RGGI, and/or other sources.[45]

Prior to substantially increasing funding of the CORE programs, a variety of enhancements and improvements are recommended, as noted in more detail in Appendix E.

Rationale for the Strategy

- Continue, enhance, and potentially expand upon the existing, cost-effective portfolio of regulated energy efficiency programs and thereby continue addressing the market barriers for lack of information and lack of funding for energy efficiency improvements.
- Follow the example of other states that have leveraged significant existing experience and relationships to achieve more ambitious EERS targets through expanded energy efficiency programs.

Mechanics of the Strategy

- Ensure the issue of lost revenue is thoughtfully and thoroughly addressed through design and implementation of decoupling and/or other mechanisms.
- Double the energy efficiency portion of the SBC by 2017.
- Ramp up funding from approved 2013-2014 levels, over the subsequent three years; 1/3, 1/3, 1/3.
- If desired, offset the proposed SBC funding increase for expanded and enhanced CORE programs with revenues received from the Forward Capacity Market, RGGI, and/or other sources.
- Track, report, benchmark, and promote the results annually to executives, legislative bodies, and the general public.

Next Steps to Implement the Strategy

- The Electric Utility Restructuring Act passed by the New Hampshire Legislature in 1996 established the SBC. While the legislation specifies the value for a portion of an SBC for purposes of programs for low income customers, the legislation is silent on the value of the remaining portion of the SBC, thereby leaving the establishment of that value to the NH PUC. As such, regulatory action by the NH PUC (rather than legislative action) could be taken to modify the $/kWh rate of the current SBC that is allocated for energy efficiency programs not specifically or solely targeted at low income customers.[46]

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[45] *Further information on the economic and ratepayer impacts of RGGI is provided in the study, Economic Impacts in New Hampshire of the Regional Greenhouse Gas Initiative (RGGI): An Independent Assessment, published by the University of New Hampshire, Whittemore School of Business and Economics, January 2008. That study concluded that the most cost-effective use of RGGI funds is for energy efficiency.*

[46] *RSA 374-F (VII): Electric Utility Restructuring, 1996.*

- NH utilities review existing CORE Programs to determine where additional funding would be best appropriated. This could include an expansion of the CORE program offerings.
- The utilities should establish interim goals via a CORE program planning report (on an annual basis during the funding ramp up period) to ensure that additional funds have clearly defined goals to increase program participation and energy savings, and in a manner that results in a measurable increase in competitive market development.

What Entity Would Implement the Strategy?

- The regulated electric and gas utilities and the New Hampshire Electric Cooperative, under the regulatory oversight of the NH PUC.

Financing the Strategy

- An increase in the SBC assessed on electric utility bills;
- An increase in the LDAC assessed on natural gas at the distribution level; and/or
- Proceeds from the Forward Capacity Market, RGGI, and/or other sources.

Timeline of the Strategy

- Planning during 2014 leading to phased in budget increases from 2015 through 2017 (1/3 increase each year so that by 2017 the budget is double what it is for 2014).

6.3 Establish Supportive Regulatory Policies & Enable Utility Behind-the-Meter Investment

6.3.1 Specific Recommendation: Establish Supportive Regulatory Policies that Address the Issue of Lost Revenue

In its 2011 report on Energy Efficiency Resource Standards, ACEEE identified "establishing supportive utility regulatory policies" as one of four key strategies[47] that states are using to increase investment in energy efficiency.[48] In practice, this means that leading states have adopted policies that address the issue of lost revenue by 'decoupling' the volume of energy sales from utility revenues, or through other ratemaking or regulatory mechanisms. This is in direct response to growing concerns about lost revenue for distribution utilities, which occurs when increases in energy efficiency reduce their energy sales. According to the Regulatory Assistance Project (RAP), there are four general approaches to decoupling that can address the issue of lost revenue:

[47] *The other three strategies are (1) increase program funding, (2) establish complementary policies to capture non-program savings, and (3) involve stakeholders in collaborative processes for program development and implementation.*

[48] *Energy Efficiency Resource Standards: State and Utility Strategies for Higher Energy Savings, ACEEE Report U113, Nowak et. al, June 2011.*

1) **Accrual Revenue Per Customer** - Whose key elements are (1) allowed revenues that are computed on a revenue-per-customer (RPC) basis and (2) one rate adjustment per year.

2) **Current Revenue Per Customer** - Whose key elements are (1) allowed revenues that are computed on an RPC basis, and (2) rates that are adjusted in each billing cycle to avoid deferred charges on subsequent utility bills.

3) **Accrual Attrition** - Whose key elements are (1) allowed revenues that are determined in periodic general rate cases, (2) changes to this that are based on specified factors determined in annual attrition reviews, and (3) rates that are adjusted once a year.

4) **Distribution Only** - Whose key elements are (1) that only distribution costs are included in the mechanism, and (2) all power costs are recovered outside of the decoupling mechanism.[49]

These policies have been implemented from California, Washington, Oregon, and Utah in the west to Massachusetts, Maryland, and Washington, DC in the east.[50] In each case, the underlying rationale and motivation for adopting decoupling mechanisms is to remove the risk and disincentive that utilities experience when faced with higher levels of investment in energy efficiency. Decoupling mechanisms enable utilities to maintain their financial health even as investments in energy efficiency reduce their sales. As a result, it is recommended by the study team that NH establish a decoupling mechanism as part of any expanded investment in energy efficiency. That said, the study team recognizes that NH regulators and/or utilities may prefer to address the issue of lost revenue via ratemaking or other regulatory mechanisms instead.

Rationale for the Strategy

- Utilities must maintain their financial health as investment in energy efficiency reduces their sales, and it is increasingly recognized that decoupling is a primary strategy for accomplishing this outcome. This would help ensure the proper policy and regulatory framework is in place to support utility investments in energy efficiency.

Mechanics of the Strategy

- Choose one of the variations to decoupling so that utilities can maintain their financial health as investments in energy efficiency reduce their sales.

Next Steps to Implement the Strategy

- The NH Legislature should direct the NH PUC to initiate a proceeding(s) to address the issue of lost revenue. This could be done through decoupling, ratemaking, or some other regulatory mechanism.

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[49] *"Revenue Regulation and Decoupling: A Guide to Theory and Application", The Regulatory Assistance Project, June 2011, Section 3.2, page 8, Table 2.*
[50] *Ibid*.

What Entity Would Implement the Strategy?

- The NH Legislature would direct the NH PUC to undertake a proceeding to address the issue of lost revenue.
- If decoupling (or some other mechanism) is instituted, the regulated electric and gas utilities and the New Hampshire Electric Cooperative would then operate within it, under the regulatory oversight of the NH PUC.

Financing the Strategy

- Not applicable. Addressing the issue of lost revenue through decoupling or through some other mechanism is in itself an approach to financing for utilities.

Timeline for the Strategy

- Such a proceeding can begin at any time that state policy makers and regulators choose.

6.3.2 Specific Recommendation: Enable Behind-the-Meter Investment

Another approach that would support the financial health of utilities is to enable behind-the-meter investments in energy efficiency by utilities. Such an approach is basically a modification of long-standing cost of service practices and it represents a new and fifth option in addition to the four approaches noted above by RAP. This approach extends cost-of-service regulation and cost recovery to infrastructure investments that are behind the meter, and allows the utility (or other program providers) to recover those costs using an on-bill financing mechanism.

The difference between the behind-the-meter mechanism and on-bill financing is that the utility invests its own equity, and therefore has a positive incentive (i.e. a profit motive) to make long-term, ongoing investments in the energy efficiency of the building stock within its service territory. This is the primary advantage that a behind-the-meter approach has over the other four approaches noted above. It does not simply stop at neutralizing a disincentive, but in addition provides an ongoing and *positive incentive* to make investments in more energy efficient buildings.

The key elements of a Behind-the-Meter Investment approach to decoupling are:

1) Investments in HVAC, hot water, and building shell improvements (or any real asset that is permanently affixed to the building) would be included in any revenue requirement agreed to for the utility. This would allow utilities to increase their rate base even as energy sales decline.

2) The regulatory agency would apply the same 'used and useful' or 'prudency' tests that it currently applies when allowing cost recovery in transmission and distribution investments.

3) The utility would recover the cost of individual building improvements from whoever the building owner is over the life of the investment, and earn a regulated rate of return on the investment. This is a variation of the Pay As You Save (PAYS) approach to behind-the-meter

investment. It would have no impact on electric rates because each building owner would be paying an individually assessed charge that is directly and solely related to the behind the meter investment that was made in the building.

This strategy for behind-the-meter investments can open up a cost-effective investment opportunity estimated for this analysis to be approximately $38 Million per year by 2017, which represents 0.7% of 2012 retail electric sales, as shown in Table 6.4.

Table 6.4: Menu of 'Behind-the-Meter Investment' Energy Savings & Costs

	% of Statewide 2012 Electricity Use					Cost Estimate ($M)				
Program	**2013**	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
C&I Electric	0.00%	0.05%	0.10%	0.13%	0.15%	$-	$3	$6	$9	$10
C&I Gas	0.00%	0.02%	0.04%	0.02%	0.00%	$-	$1	$1	$1	$-
C&I Other Fuels	0.00%	0.08%	0.16%	0.22%	0.27%	$-	$3	$5	$7	$8
RES Electric	0.00%	0.04%	0.08%	0.12%	0.15%	$-	$4	$8	$11	$13
RES Gas	0.00%	0.02%	0.03%	0.03%	0.02%	$-	$1	$1	$2	$1
RES Other Fuels	0.00%	0.05%	0.10%	0.13%	0.13%	$-	$2	$5	$6	$6
Total	**0.0%**	**0.3%**	**0.5%**	**0.7%**	**0.7%**	**$-**	**$14**	**$26**	**$34**	**$38**

Rationale for the Strategy

- Utilities already invest in energy infrastructure; poles, wires, power plants and pipelines.
- Utilities have a direct relationship with the customer.
- Cost-of-service regulation coupled with on-bill financing represent existing investment pathways that could create a win-win for the utility and building owners / customer.
- Direct investment in infrastructure can help keep utilities financially healthy in the event that energy use (sales) decline.
- ACEEE and others have identified 'establishing supportive utility regulatory policies' as a key strategy that enables higher levels of energy saving achievement. Enabling behind-the-meter investments is one way to achieve that.[51] This would ensure a supportive regulatory approach in NH and would address a key barrier to utility investment behind the meter absent such a policy.

Mechanics of the Strategy

- Expand electric and gas utility investments in energy infrastructure to include behind-the-meter investments in energy efficiency (i.e., permanent building shell, HVAC, and lighting system improvements).
- Establish voluntary tariff riders that provide on-bill financing (using utility equity) to building owners.

[51] *Energy Efficiency Resource Standards: State and Utility Strategies for Higher Energy Savings, ACEEE June 2011, Report Number U133, page iii.*

- Tie the repayment of the investment to the meter instead of the building owner. This enables building owners to realize the benefits of the investment without the risk of mandatory repayment when the building is sold.
- Track, report, benchmark, and promote the results annually to executives, legislative bodies, and the general public.

Next Steps to Implement the Strategy

- An EERS enacted by legislation could require the NH PUC to open a docket to set the rules for behind-the-meter investments in energy efficiency.
- Utility companies should leverage existing knowledge of customer base and building stock to develop a program through which they directly invest in energy improvement measures.
- Utility companies should track the annual energy savings that are occurring from direct investment in the efficiency equipment.

What Entity Would Implement the Strategy?

- NH regulated electric and gas utilities and the New Hampshire Electric Cooperative, under regulatory oversight of the NH PUC.

Financing the Strategy

- Financing would come from utility balance sheets with rate recovery through a voluntary tariff.
- On-bill financing options could also be considered, and potentially funded through utility capital sources, CDFA, or other revolving loan funds or sources.

Timeline for the Strategy

- The programmatic and measure details, tariffs, and other funding strategies would be developed during 2014, and could be phased-in from 2015 through 2017.

6.4 Implement Key Recommendations in the NH Roadmap for Achieving 90% Compliance with the Building Energy Code by 2017

Barriers to complying with the Building Energy Code are substantial, including a lack of manpower and financial resources. With a ramped up investment of $13.2 Million by the year 2017, analysis indicates that implementing key recommendations from the *NH Roadmap for Achieving 90% Compliance with the Building Energy Code* could reduce energy use by an additional 1.14% by 2017, compared to 2012 electricity sales (as shown in Table 6.5).[52]

Table 6.5: Menu of 'Code Compliance' Energy Savings & Cost

	% of Statewide 2012 Electricity Use					Cost Estimate ($M)				
Program	**2013**	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
C&I Electric	0.00%	0.00%	0.00%	0.04%	0.08%	$-	$1.4	$1.5	$1.6	$1.6
C&I Gas	0.00%	0.01%	0.03%	0.26%	0.36%	$-	$2.8	$3.0	$3.1	$3.3
C&I Other Fuels	0.00%	0.01%	0.01%	0.13%	0.27%	$-	$1.4	$1.5	$1.6	$1.6
RES Electric	0.00%	0.00%	0.00%	0.02%	0.04%	$-	$1.4	$1.5	$1.6	$1.6
RES Gas	0.00%	0.00%	0.01%	0.06%	0.13%	$-	$1.4	$1.5	$1.6	$1.6
RES Other Fuels	0.00%	0.01%	0.01%	0.13%	0.27%	$-	$2.8	$3.0	$3.1	$3.3
Total	0.00%	0.03%	0.06%	0.65%	1.14%	$-	$11.4	$11.9	$12.5	$13.2

Rationale for the Strategy

- According to the U.S. Department of Energy, the single most important step to reducing energy use in buildings is to implement and enforce compliance with building energy codes.[53] This strategy addresses the important issue of lack of compliance with building energy codes.
- The CORE programs are already collaborating with municipalities and other stakeholders on energy code compliance.
- By including explicit language within the EERS to recognize the need to achieve at least 90% compliance with the building energy code by 2017, other responsible agencies and stakeholders will be enabled to include support for code compliance as a component of their program design and implementation responsibilities.

Mechanics of the Strategy

- Use building permit applications, and other secondary and primary data collection protocols to gather important baseline information about current levels of code compliance, and to track/monitor changes over time.

[52] *New Hampshire Energy Code Compliance Roadmap, GDS Associates, Inc., April 12, 2012.*
[53] *U.S. Department of Energy, Building Energy Codes Program 2011 Annual Report "Development, Adoption, Compliance –Building Greater Energy Efficiency", page 9.*

- Strengthen CORE program and other stakeholder collaboration with municipalities through expansion of existing code training workshops with contractors and code officials.
- Develop additional, targeted code workshops for other key market actors including: building designers, realtors, lenders, appraisers, and the general public in an effort to increase awareness of requirements, use of compliance/enforcement tools, and demand for code/beyond code buildings.
- Attribute the savings to achieving the EERS and (as appropriate) to the CORE programs.
- Track, report, benchmark, and promote the results annually to executives, legislative bodies, and the general public.

Next Steps to Implement the Strategy

- Conduct a baseline study on current code compliance in New Hampshire. This could be accomplished through a partnership of several stakeholder groups including the NH OEP, New Hampshire Energy Code Collaborative, and the NH utilities. Such a study should be conducted immediately.
- Implementation of an EERS could be done in such a way that energy savings associated with meeting the code are counted towards the savings goals, as long as a baseline assessment of NH Energy Code Compliance shows that the state is not fully compliant with the current statewide energy code.[54]
- Implementation of an EERS could also be done in a way that assists local and municipal governments in achieving at least 90% compliance with the building energy code through practices such as working collaboratively with the utilities, and allowing the utilities to claim the energy savings.[55]
- Consider, if deemed appropriate by the NH Building Code Review Board, requesting the legislature to adopt the IECC 2012 Codes by no later than 2014 (or IECC 2015 by 2017), and clarify or re-establish the Building Code Review Board's authority as a body that can make recommendations on new codes and can pass new codes.
- Utilities should establish a framework for a program that allows them to work with New Hampshire municipalities on increasing code compliance.
- Utilities should work with the New Hampshire Building Energy Code Collaborative to establish a methodology for utilities to claim additional savings from an increase in energy code compliance.

Prior to specifying individual code-related strategies as part of expanded energy efficiency program planning, it is strongly recommended that input from the existing New Hampshire Building Energy Code Collaborative be sought out. This existing collaborative has reviewed recommendations from the *New Hampshire Energy Code Compliance Roadmap* and prioritized in 2013, short, intermediate, and longer term action items for implementation that could use CORE program and other funding support.

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[54] *The New Hampshire Energy Code Compliance Roadmap found the compliance rate to be about 45%. A baseline study would be necessary to more accurately determine the current level of compliance.*

[55] *By allowing the utilities to claim energy savings from their support of code compliance efforts, additional code-related program components and CORE program funding will be able to be allocated to these efforts under current regulatory program design and performance incentive constraints.*

What Entity Would Implement the Strategy?

- A collaboration among NH PUC (building energy codes enforcement staff), DPS (fire marshal's office), NH Building Code Review Board, NH Energy Code Collaborative, local / municipal code officials, regulated electric and gas utilities, and other market actors should implement the strategy.

Financing the Strategy

- The strategy could be financed by a combination of fees from building permits, utility CORE Program funds, grants, and regional or federal support.

Timeline for the Strategy

- The baseline study should be completed in 2014.
- Technical support and other Code Collaborative activities should be implemented during 2015 through 2017.
- 90% compliance should be achieved by the end of 2017, and verified by a code compliance study in 2018.

6.5 Track, Report, Benchmark, & Promote Energy Efficiency Savings

Tracking, reporting, benchmarking, and promoting statewide energy efficiency activities are critical to the achievement of energy savings and market development goals. For this strategy, it is envisioned that the existing and expanded CORE and other energy efficiency program components listed in Table 6.1 would collaborate with municipalities and other stakeholders to track, report, benchmark (where applicable), and promote results from the portfolio of energy efficiency programs and related activities being implemented statewide.

As shown in Table 6.6, with a ramped up investment to $28 Million by 2017 (based on 10% of the funding for all other strategies),[56] New Hampshire would have sufficient resources to thoroughly survey and benchmark the energy performance of its building stock statewide, and make that information widely available to the marketplace. Furthermore, it would have the resources to evaluate, measure, and verify (EM&V) individual program/project results to quantify savings and achievement of other important market progress indicators from all of the activity that is taking place under the EERS (i.e., Lead-by-Example, CORE Program Expansion, Behind-the-Meter Investment, Energy Code Compliance, and Private Investment).

[56] *Nationwide, typical budgets set aside for energy efficiency program EM&V alone range from 2% to over 10% of annual efficiency program budgets. The 10% amount included for this report's analyses would allow for robust EM&V of all NH CORE programs, plus assessment and documentation of progress associated with the other strategies specified in this report. In addition, the funding would be needed to ensure proper benchmarking, reporting, and ultimate promotion of results from all the state's associated program activities.*

Table 6.6: Costs of Tracking, Reporting, Benchmarking, & Promoting Energy Efficiency Savings ($M)

Cost of Tracking, Reporting, etc.	2013	2014	2015	2016	2017
10% of Funding for all other strategies	$5.4	$11.3	$17.8	$22.9	$28.1

Rationale for the Strategy

- Timely, accurate information forms the foundation of all investment decisions and more broadly, helps to increase awareness among key stakeholders, encourage discussion/debate, and promote replication where appropriate.
- Lack of quality information is a long-standing barrier to forming a competitive market in building energy efficiency investments, yet information is easier and less expensive to collect than ever before due.
- Evaluation, measurement, verification, benchmarking, reporting, and promoting results from energy efficiency activities is essential and provides the basis for education and outreach.

Mechanics of the Strategy

- Work with regulatory staff, state and local government representatives, energy efficiency program administrators, and other key energy efficiency market actors in New Hampshire to identify and prioritize program-specific progress and measurement indicators.
- Develop tracking, reporting, benchmarking, and results dissemination (promotional) strategies and ensure sufficient budgets are available for implementation of the strategies in a manner that yields valid/credible results.
- Ensure regular (minimum every two years) review, update, and reporting of key energy savings and market progress indicators in a manner that strengthens collaboration with municipalities and helps increase awareness of and demand for energy efficient construction practices and associated products and services throughout the state.

Next Steps to Implement the Strategy

- Implementation of an EERS should result in (and provide funding and/or incentives for) the collection, reporting, benchmarking, and promotion of the energy productivity of buildings.
- The EERS should direct the NH PUC to oversee such activities through implementation of a collaborative process, perhaps with input and guidance provided through the existing EESE Board.
- Both the State and utilities would be primarily responsible for the tracking, promoting, and benchmarking of energy efficiency activities. The State should continue to benchmark its building stock and track and promote any trends in energy reduction. The utilities would be best suited to benchmark the New Hampshire building stock, as they already have access to consumption data. Metrics could be developed to keep consumption information private and to ensure data is only reported in aggregate (thereby maintaining customer privacy).
- Third party evaluators should be responsible for tracking and evaluation of utility programs and savings, working for the regulators and maintaining independence from the administrators of the programs being evaluated.

- Promotion of success should be done by both the State and the utilities for achievements made toward the EERS. This can be achieved through websites, newspapers, public service announcements, etc.

What Entity Would Implement the Strategy?

- NH PUC with guidance from the NH EESE Board, dissemination and promotional support from the EESE Board Outreach and Education Committee, and input and assistance from the electric and gas Utilities.

Financing the Strategy

- The 10% funding level could be set aside from the current and anticipated increase in the System Benefits Charge assessed on electric utility bills and from the Local Distribution Adjustment Charge currently assessed on natural gas at the distribution level.

Timeline for the Strategy

- Evaluation planning and priorities would be identified during 2014, with implementation and dissemination of results occurring from 2015 - 2017.

6.5.1 Specific Recommendation: Benchmark Buildings Statewide and Increase Building Code Compliance

When accepting ARRA funding from the federal government several years ago, each state agreed to develop a plan that could achieve 90% compliance with the IECC 2009 building energy code by 2017. However, in some states there has been a lack of resources and a general inability to ensure consistent enforcement and verify compliance with the building energy code.

New Hampshire is currently one of the leading states in the country to have developed code compliance roadmap strategies in an attempt to address this issue, and prioritization and implementation of the strategies is yielding slow, yet steady progress. To help accelerate the process, it is recommended that through an EERS, New Hampshire adopt a complimentary benchmarking strategy as a mechanism to encourage voluntary compliance with the IECC building energy code (and the ASHRAE standard) and to encourage/increase awareness of the values associated with and demand for energy efficient buildings statewide.

This benchmarking effort is important because despite the current era of nearly-free and easily-available information, data on building energy performance remains difficult to come by. This is problematic not only for the real estate industry, which frequently buys and sells buildings absent substantive information about energy costs, but also for the existing CORE programs that have to conduct primary data collection in order to evaluate the impact of their programs. A goal to benchmark the energy use of all buildings and to compile that information so that aggregated results can be reported annually could change this situation.

By combining utility energy usage (billing) data with building square footage information available from municipal grand lists, electricity intensity of use could be calculated by dividing building energy use by building square footage. Such calculations could be done directly by the

utilities serving the buildings (since utilities already have energy usage information on a customer/building-specific basis), or by the NH PUC, Department of Resources and Economic Development, Office of Energy and Planning, or other authorized state agency. Building-specific results could potentially be incorporated by realtors as a data field in the Multiple Listings Service (MLS) used for selling real estate. Or, to protect the privacy of individual building owners, this information could be aggregated to the municipal or utility level by building type, and divided by census data on population to arrive at a measure of energy intensity per capita. This metric (or a variation of it) could then become an objective measure of the energy intensity of the New Hampshire building stock. By reporting this metric annually and making the data available to the public, continuous improvement and ongoing investment could be accelerated.

This approach would be relatively straightforward for electricity, which is used presumably in nearly 100% of New Hampshire buildings. However, data on the use of natural gas and unregulated heating fuels (such as heating oil and propane) would have to be collected and reported in a way not currently in place in order to create a similar metric for non-electric energy use. While such information is currently collected by the U.S. Energy Information Administration at the state-wide level, it is not collected at the customer or building level. This would require new effort and work to achieve as part of state, municipal, and/or utility activities in New Hampshire. Ideally, this information could be gathered at a level that enables benchmarking by zip code or municipality.

Finally, intensity of use (IOU) metrics could be used as a way to give credit to the CORE programs for working on building energy code compliance and broader tracking, reporting, and promotion of statewide energy efficiency activities. In addition to rigorous EM&V, IOU metrics could be used to track and document trends in IOU over the course of three to five years. After trends are identified, the CORE programs could be funded to collaborate with municipalities and other stakeholders to achieve greater building energy code compliance and increased awareness of and demand for efficient buildings statewide. In addition to tracking key market indicators (such as changes in awareness of and demand for energy efficient products and services, increased number of qualified local contractors and service providers, and uptake in energy efficiency product and service offerings), progress could be measured by observing changes in the trend of IOU leading up to 2025. By publishing the trends at the zip code or municipal level, friendly competition could be encouraged across the state.

What Entity Would Implement the Strategy?

- For the commercial and industrial sectors - NH Department of Resources and Economic Development (NH DRED).
- For residential and low income properties – NH OEP and other stakeholders (i.e., Local Energy Working Group)

Financing the Strategy

- Part of the 10% set-aside from an increased SBC charge and other potential local, regional, or federal grant opportunities could fund the strategy.

Timeline for the Strategy

- The strategy should be in place before the end of 2014 with reasonable targets set for ramping up benchmarking for commercial and other relevant properties between 2015 and 2017, with annual updates conducted as part of standard practice going forward.

6.6 Accelerate and Scale-Up Competitive Private Market Investment Activity

One of the goals of energy efficiency policymaking is to achieve a transition to a competitive marketplace for commercially proven and viable energy efficient goods and services. In this study, emphasis is placed on developing a strategy that reflects the energy savings and costs associated with a significant scaling-up of competitive private market investment activity in New Hampshire. The acceleration and scale-up of private market activity envisioned in this study will not likely be fully realized until the first five strategies are successfully implemented with an eye towards overcoming the market failures and barriers discussed in Section 4. Assuming those barriers are overcome, this analysis envisions private market investments occurring throughout implementation and ramp up of the first five strategies. By 2017, it is estimated that 2.9% of remaining maximum achievable cost effective savings could be achieved compared to 2012 retail electric sales, resulting in $129 Million of in-state private market investment, as shown in Table 6.7.[57]

Table 6.7: Menu of 'Competitive Private Market Activity' Energy Savings & Costs

	% of Statewide 2012 Electricity Use					Cost Estimate ($M)				
Program	**2013**	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
C&I Electric	0.00%	0.11%	0.30%	0.44%	0.61%	$-	$5	$15	$22	$31
C&I Gas	0.00%	0.05%	0.13%	0.08%	0.00%	$-	$2	$4	$3	$-
C&I Other	0.00%	0.17%	0.49%	0.75%	1.09%	$-	$5	$16	$25	$36
RES Electric	0.00%	0.09%	0.25%	0.40%	0.60%	$-	$5	$16	$25	$37
RES Gas	0.00%	0.04%	0.10%	0.11%	0.09%	$-	$1	$4	$4	$4
RES Other	0.00%	0.10%	0.30%	0.42%	0.53%	$-	$4	$12	$17	$21
Total	0.0%	0.5%	1.6%	2.2%	2.9%	$-	$24	$67	$96	$129

Rationale for the Strategy

- Private market investment can capture the remaining percentage of the total 6.6% cost-effective energy efficiency savings potential not otherwise realized through the five other strategies discussed above, and can help offset reliance on public funding over time.

Mechanics of the Strategy

- Achieve market transformation by stimulating new private investment.

[57] *This determination was reached by summing the % savings contributions provided through all other strategies discussed in this report, than subtracting that total from the 6.6% MACE value.*

- Develop metrics associated with competitive, private market investment activities to assess participation levels, engagement of market actors, innovation in program offerings, incorporation of emerging technologies, etc.
- Achievement through competitive market activity requires encouragement through increased awareness of and demand for energy efficiency products and services resulting from active tracking, reporting, benchmarking, and promotion of all the other strategies.
- Track, report, benchmark, and promote the results annually to executives, legislative bodies, and the general public to highlight progress in maintaining and effectively expanding New Hampshire's small-government, pro-market values.
- Recognize, reward, and promote initiatives that engage key market actors and result in long-term market activity not reliant on public subsidy. Such recognition and promotion will help stimulate private market activities and results.

Next Steps to Implement the Strategy

- Adopt and implement each of the first five strategies.
- Ensure the EERS includes a clear policy statement and results in reporting metrics that assess the extent of private market activity resulting in energy efficiency investments.

What Entity Would Implement the Strategy?

- The private marketplace ideally stimulated in part by the momentum in energy efficiency investments created by the ongoing activities of the NH PUC, NH EESE Board, other energy efficiency services providers in NH, and other key stakeholders.

Financing the Strategy

- Private capital

Timeline of the Strategy

- Private investments in energy efficiency are already occurring in NH, although there is not a readily available way to measure it. Ideally, a methodology would be developed for tracking progress and results would be monitored annually. This information could help inform the extent of public subsidy needed to achieve the balance of the EERS goal or target not being met through private market activity.

6.7 Overview of Energy Savings

Table 6.8 provides an overview of the combined electric and thermal energy savings and costs that result from successful implementation of the six strategies discussed above.

Table 6.8: Total Cost-Effective Energy Efficiency & Costs Available in NH by Strategy[58]

	% of Statewide 2012 Electricity Use					Cost Estimate ($M)				
Strategy	**2013**	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
1 Lead-by-Example	0.0%	0.1%	0.1%	0.1%	0.1%	$0	$12	$7	$7	$7.1
2 CORE Programs	0.9%	0.9%	1.2%	1.4%	1.7%	$54	$52	$66	$80	$93.6
3 Behind-the-Meter	0.0%	0.3%	0.5%	0.7%	0.7%	$-	$14	$26	$34	$38
4 Code Compliance	0.0%	0.0%	0.1%	0.7%	1.1%	$-	$11.4	$11.9	$12.5	$13.2
5 Track, Report, Etc.	0.0%	0.0%	0.0%	0.0%	0.0%	$5.4	$11.3	$17.8	$22.9	$28.1
6 Comp. Pvt. Mkt.	0.0%	0.5%	1.6%	2.2%	2.9%	$-	$24	$67	$96	$129
Grand Total	**1.0%**	**1.9%**	**3.4%**	**5.0%**	**6.6%**	**$60**	**$124**	**$196**	**$252**	**$309**

The achievement of this level of energy efficiency savings in New Hampshire would require a substantial and sustained public policy and regulatory push well beyond continuation of business-as-usual. In addition, it would require keen interest in the private sector for investing in energy efficiency in the state as a way to make money. Improvements in energy efficiency at the scale that is deemed to be cost-effective in this study would reduce energy costs for consumers and would provide other economic and employment benefits, as discussed in the next section.

Table 6.9: Total Cost-Effective Energy Efficiency & Costs Available in NH by Sector[59]

	% of Statewide 2012 Electricity Use					Cost Estimate ($M)				
	2013	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
C&I Elec.	0.3%	0.5%	0.8%	1.1%	1.4%	$21	$34.1	$49.4	$63.9	$78.7
C&I Gas	0.2%	0.3%	0.5%	0.7%	0.7%	$4.9	$16.6	$17.5	$16.9	$15.4
C&I Other Fuels	0.0%	0.3%	0.8%	1.2%	1.7%	$1.4	$11.9	$26.8	$37.7	$50.6
Res Elec.	0.1%	0.3%	0.5%	0.8%	1.0%	$14	$24.1	$41.2	$56.6	$74.9
Res Gas	0.1%	0.2%	0.3%	0.4%	0.5%	$5.2	$9.3	$14.2	$16.8	$17.6
Res Other Fuels	0.2%	0.3%	0.6%	0.9%	1.2%	$8.1	$17.0	$29.1	$37.1	$43.9
Track, Report, Etc.						$5.4	$11	$17.8	$22.9	$28.1
Grand Total	**1.0%**	**1.9%**	**3.4%**	**5.0%**	**6.6%**	**$60**	**$124**	**$196**	**$252**	**$309**

Based on information in Tables 6.8 and 6.9:

- By 2017, New Hampshire could achieve annual cost-effective energy efficiency equal to 6.6% of 2012 electricity sales at a total cost of $941 Million. For purposes of this study, a

[58] *Please note, some totals may not add up due to rounding*
[59] *Ibid.*

five-year ramp up period is assumed, beginning with $60 Million in 2013 and ending with $309 Million in 2017.

- 57% of the energy savings would be from the C&I sector, and 43% would be from the residential sector.
- 59% of the energy savings would be from thermal (i.e., natural gas and other fuels) energy and 41% of the saving would be from electricity.

Residential Customer Bill Impacts[60]

Based on analysis done for this study, it is estimated that residential customers who choose to participate in the ramped-up CORE energy efficiency programs will see energy savings and associated lower energy bills ranging from $20 to $100 per year (which is a 1 to 10% savings of their total annual energy bill). Looking more broadly, across all residential electric and gas customers (both participants and non-participants in the programs), the impact on the bill of the average customer will range from about a $5/year decrease for electric customers to a $7/year increase for gas customers by 2017. This represents less than 1% of the average customer's total annual utility costs. More detailed information on residential customer bill impacts analysis and the methodology used for the analysis is provided in Appendix D.

C&I Customer Bill Impacts[61]

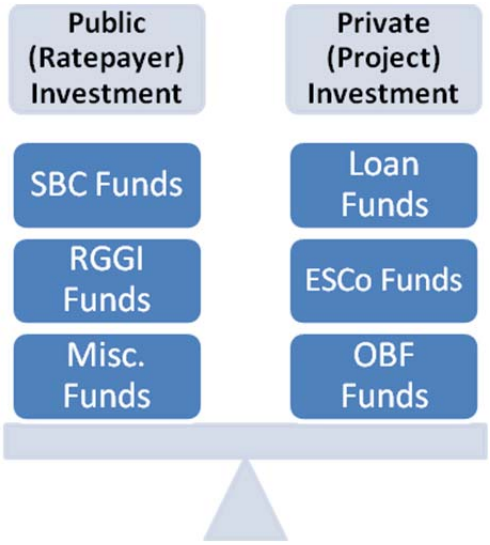
Similarly, commercial and industrial customers who choose to participate in ramped-up CORE energy efficiency programs will see energy savings and associated lower energy bills ranging from $650 to $2,000 per year (which is a 7 to 26% savings of their total annual energy bill). Looking more broadly, across all C&I electric and gas customers (both participants and non-participants in the programs), there will be no noticeable impact on the bill of the average customer, representing less than 1% of the average customer's total annual utility costs. More detailed information on the C&I customer bill impacts analysis and the methodology used for the analysis is provided in Appendix D.

[60] *Please refer to Appendix C for details.*
[61] *Ibid.*

Section 7: Funding Mechanisms and Choices

At a high level, the funding mechanisms for achieving an EERS are two-fold: public, broad-based sources such as ratepayer funds; and private, project-based funds such as loans. Currently, the System Benefits Charge and the first dollar of the CO_2 allowance clearing price from the Regional Greenhouse Gas Initiative auctions are the policy pillars that provide ratepayer-based funding in the form of rebates, incentives, and technical support for investments in energy efficiency. In terms of private, project-based funding, there is an array of loan programs, Energy Service Company (ESCo), and utility on-bill financing (OBF) funding options.

Figure 7.1: Today's Funding Mechanisms

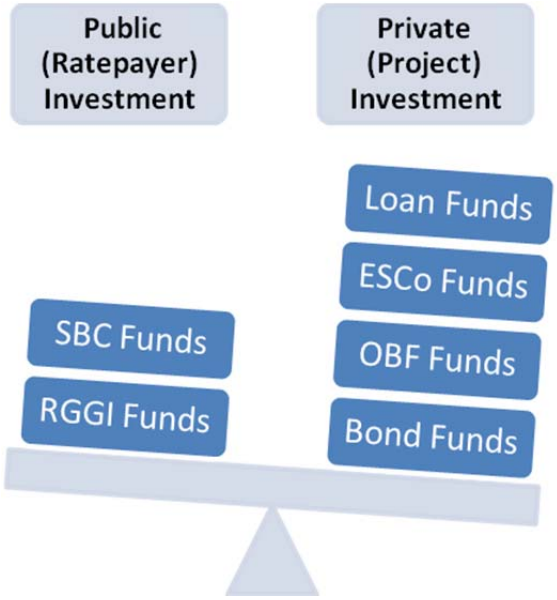


In a successful and well-performing energy efficiency market, investments should continue to move toward a place where private, project-based funding is increasingly common compared to public, broad-based funding. Unfortunately, much of the private, project-based funding carries the expectation for a relatively short term return (less than 10 years) and a higher interest rate than conventional (long-term) mortgages. This is one of the primary reasons why public, broad-based funding will continue to be necessary until full market transformation is realized.

As the market becomes more competitive, more customers should have additional choices for project-based funding, and many would be using more of their own funds. One way that additional project funding can be provided is by making use of bonding authority that already exists in New Hampshire, in the Business Finance Authority for instance. More choices can also be provided by implementing property assessed clean energy (PACE) which makes use of municipal bonding authority to provide finance for investments in energy efficiency. Like on-bill financing programs, PACE ties the repayment of a loan to the building receiving the energy efficiency improvement, which allows the building owner to make the investment without fear of losing the investment when the building is sold.

If these choices were available in the market and were given priority when implementing an EERS, as shown in Figure 7.2, the balance can be tipped toward more private and project-based funding in the future.

Figure 7.2: Tomorrow's Funding Balance



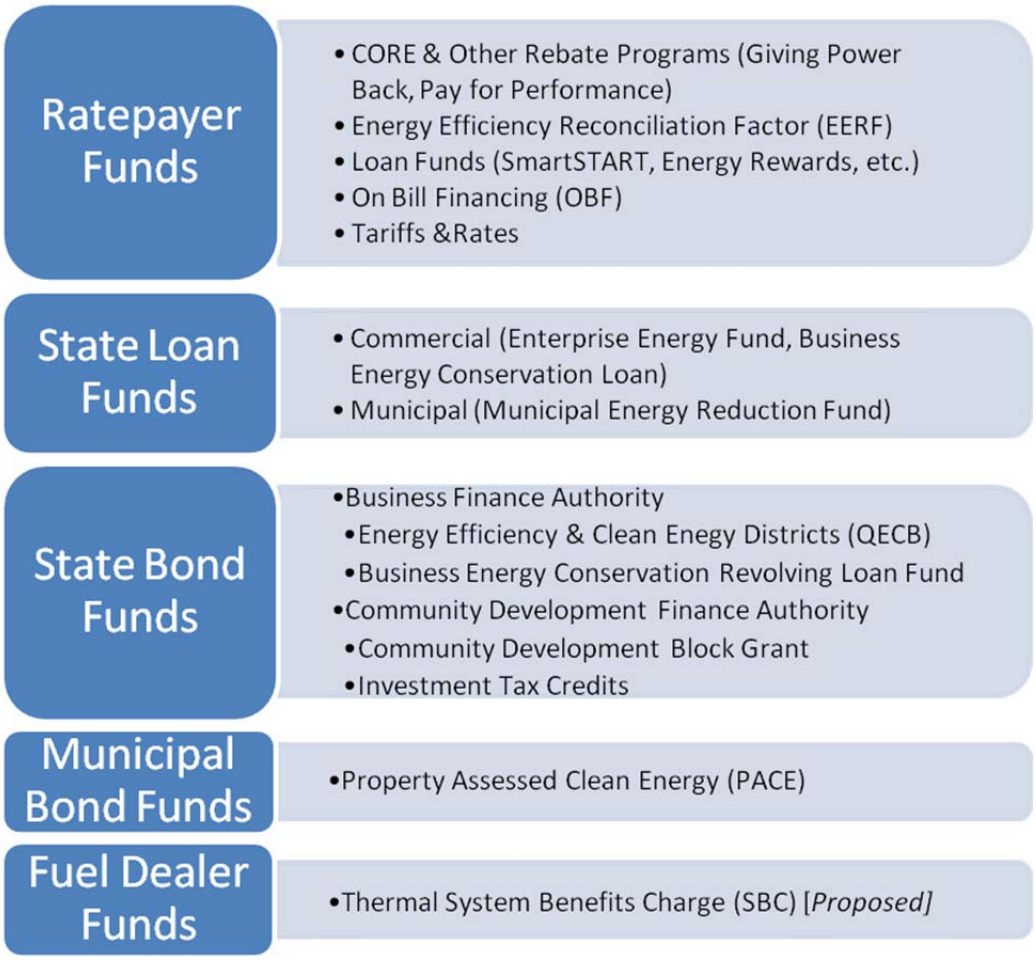
In the long-run, project-based funding could be obtained by private individuals. Then the need for broad-based (particularly miscellaneous) funding could be reduced. Alternatively it could be directed to unresolved market barriers, underserved markets, and to new emerging technologies that are not yet widely available in the competitive marketplace.

7.1 An EERS as Economic Development Policy

An EERS can be considered both a statement of energy policy as well as a statement of economic development policy. As a result, it becomes important for policy makers and regulators to begin to consider financial resources from outside of the traditional energy policy sources. Fortunately some such resources already exist within state government.

There are a wide variety of sources available to fund the strategies proposed in this study for achieving an EERS. Many are already employed in New Hampshire, and Figure 7.3 lists the major sources of funding that already exist. It also covers funding sources that are not currently employed, including funds from the State's economic development agencies, municipalities, and fuel dealers.

Figure 7.3: Potential Funding Sources & Options



An annotated list of potential funding sources in New Hampshire is provided in Appendix F as additional background information for this study.

Section 8: Conclusion

Research and analysis conducted for this study confirm that substantial opportunity exists in New Hampshire to significantly increase energy efficiency savings while also reducing business, residential, municipal, and state government customer energy costs, and developing new business infrastructure, creating new jobs, and retaining and growing state income. Presented below are the key conclusions resulting from the study, organized in response to the four key questions the study was designed to address.

Question 1:

"Is New Hampshire Realizing the Full Potential of Cost Effective Energy Efficiency Savings?"

Energy efficiency programs currently offered by electric and gas utilities serving New Hampshire are achieving energy savings equivalent to 0.6 to 0.8% per year (when measured on the basis of retail electric sales), while the total amount of cost-effective energy savings available in the state is estimated to be equal to or greater than 6.6% per year. This indicates that potential exists for New Hampshire to achieve 10 times the amount of savings than is currently being achieved through existing programs and initiatives, should sufficient funding become available for the investment. Of these savings, 57% would be from the C&I sector, and 43% would be from the residential sector. In addition, 59% of the savings would be from thermal energy and 41% of the savings would be from electricity.

It is important to note that these estimates only include savings that would be deemed cost-effective using the Total Resource Cost test currently used in New Hampshire (and many other states) for determining allowable measures and approaches for energy efficiency programs overseen by the NH PUC. The fact that such a sizable portion of cost-effective savings is not yet being achieved in the New Hampshire economy is an indication that the energy efficiency market is not yet fully mature in the state, and that net societal benefits can be achieved by continued public intervention in the market with the intent of increasing competitive private market activity over time. Although the CORE programs continue achieving cost-effective energy efficiency savings in New Hampshire, numerous barriers remain to realizing all cost-effective savings that require clear and consistent state-level policy, additional funding, and strategic attention.

Question 2:

"What would it take to increase energy efficiency savings by 1% per year (or more)?"

Based on analysis conducted for this study, it is estimated that overall, cost-effective energy saving opportunities totaling 6.6% of New Hampshire 2012 electric sales could be achieved from the combined effect of the six overarching strategies, summarized below. Of this total, it is estimated that a 1% increase in annual energy savings could be achieved mainly through continued state and local government lead-by-example activities and a ramp up to a doubling of the CORE programs by 2017.

- **State and Local Governments Lead-by-Example -** With support from Executive Orders as well as legislation, NH state government is well along in reducing energy use in State-owned buildings and fleet vehicles. It is recommended that State Government continue and

advance these goals by expanding their efforts to address leased building space and by benchmarking progress compared to other states, and pursuing recognition as the first 'ENERGY STAR State Government' in the nation. In addition, the existing efforts to assist local/municipal governments with benchmarking, identification, and implementation of efficiency improvements within their town/city/county-owned buildings should be expanded. Such efforts could achieve 0.1% energy savings per year.

- **Enhance and Expand the CORE Programs** - Analysis conducted for this study indicates that an additional 1% per year of cost-effective energy savings[62] could be captured by the regulated energy efficiency programs in New Hampshire with a doubling of the energy efficiency portion of the SBC (or the use of FCM or RGGI funds, if preferred). The savings can be achieved through increased funding over the next five years and should be contemplated once further advancements in program planning, implementation, and regulatory oversight improvements are made (as noted in Appendix E).

- **Establishing Supportive Regulatory Policies and Enabling Behind-the-Meter Investments** - New Hampshire already has shown leadership by piloting and then institutionalizing an on-bill financing program. Enabling utilities to make direct investments in the building shell, HVAC systems, and related permanent energy improvement projects on buildings owned by their customers (who chose voluntarily to accept such an offering from their utility) and to recover these costs through a tariff (on a voluntary basis), could better align utility financial incentives with achieving ongoing reductions in energy use, resulting in an additional 0.73% energy savings per year. Addressing the issues of lost revenue will be key to achieving this.

- **Implement Key Recommendations from the NH Roadmap for Building Code Compliance –** Increasing awareness of and the need for complying with the State's building energy codes is a proven and effective way to capture energy savings. Implementation of an EERS should encourage a collaborative process between the New Hampshire Energy Code Collaborative and local and municipal governments and the utilities. By pursuing a prioritized list of activities, the likelihood of achieving at least 90% code compliance will be increased. Resulting energy savings of 1.14% could then be claimed under the EERS by the utilities.

- **Track, Report, Benchmark, & Promote Energy Efficiency Savings -** To achieve continuous and voluntary improvement in the energy efficiency in buildings in New Hampshire, it is recommended that New Hampshire adopt a requirement to benchmark and report on the energy intensity (kWh per square foot per capita) of New Hampshire building stock annually. In addition, collaboration between the energy efficiency program administrators, state and local government, and other stakeholders should be encouraged to help track, report, and promote results from the portfolio of energy efficiency programs and related activities being implemented statewide. The NH PUC is an example of a state agency that could potentially be tasked with the responsibility for overseeing and compiling results from these efforts in an effort to monitor progress toward achievement of EERS goals.[63] While such

[62] *As measured by the ratio of annual energy savings to annual (utility) energy sales.*
[63] *Similar to the NH PUC's role in administering the state's Renewable Portfolio Standard requirements, and their already existing responsibilities for EM&V of the utilities' CORE programs.*

collaboration, tracking, promoting, and dissemination of results will require a substantial effort, it is critical for ensuring increased awareness of the economic and savings benefits associated with and demand for energy efficient buildings throughout the state.

- **Scale Up Competitive Private Market Activity** – Substantial opportunity exists to encourage unsubsidized, market-based solutions that result in ongoing private investment in the energy efficiency of New Hampshire buildings and the transportation infrastructure. The role of this competitive market activity cannot be under stated. And the development of the market will not likely evolve as contemplated in this report without the development and implementation of the policies and strategies recommended above. Should such policies and strategies be implemented, the state could realize an additional 2.9% energy savings annually.

The combination of these findings and recommendations, if adopted, will result in: lower overall energy bills and increased employment across the state; a more stable business climate resulting in businesses that are more productive and competitive; citizens who enjoy more comfort, safety and energy security; and a lighter environmental footprint.

Question 3:

"What are the economic, employment, and bill impacts of achieving all cost-effective energy efficiency in New Hampshire?"

Overall, implementation of an EERS in New Hampshire that calls for all cost-effective energy efficiency in the state will result in more jobs and increased economic prosperity for the state.

Employment Impacts[64]

Investments in energy efficiency create local contracting jobs and increase the sales of a range of energy saving equipment, appliances, and building materials. The results of the economic analysis conducted for this study confirm that both employment and state income increase. Specifically:

- 2,400 to 4,800 new energy efficiency-related jobs would be created over the 20-year time horizon of the study, and

- The state's Gross Domestic Product would increase by about $170 million per year.

Residential Customer Bill Impacts[65]

Based on results from this study, residential customers who choose to participate in ramped-up CORE energy efficiency programs will see energy savings and associated lower energy bills ranging from $20 to $100 per year (which is a 1 to 10% savings of their total annual energy bill).

[64] *Please refer to Appendix B for details.*
[65] *Please refer to Appendix C for details.*

Looking more broadly, across all residential electric and gas customers (both participants and non-participants in the programs), the impact on the bill of the average customer will range from about a $5/year decrease for electric customers to a $7/year increase for gas customers by 2017. This represents less than 1% of the average customer's total annual utility costs.

C&I Customer Bill Impacts[66]

Commercial and industrial customers who choose to participate in ramped-up CORE energy efficiency programs will see energy savings and associated lower energy bills ranging from $650 to $2,000 per year (which is a 7 to 26% savings of their total annual energy bill). Looking more broadly, across all C&I electric and gas customers (both participants and non-participants in the programs), there will be no noticeable impact on the bill of the average customer, representing less than 1% of the average customer's total annual utility costs.

Question 4:

"Would development of a state-level policy with specific energy savings targets (referred to as an Energy Efficiency Resource Standard) help accelerate energy efficiency investments in New Hampshire, and what goals should be included in such a policy?"

The achievement of the level of energy efficiency savings, economic growth, and job creation described above for New Hampshire would require a substantial and sustained public policy and regulatory "push" well beyond continuation of business-as-usual. In addition, it would require keen interest in the private sector for investing in energy efficiency in the state as a way to make money. If New Hampshire is serious about further pursuing all cost-effective energy efficiency, it is strongly recommended that:

New legislation be enacted at the state level that: specifies that all cost-effective energy efficiency be procured in New Hampshire; establishes a specific energy savings target for the state (recommended in the study to be 6.6% of 2012 electric sales); identifies a timeline for achieving the target (recommended in this study to be five years); and delegates authority and resources for overseeing achievement of the goal to the appropriate public entity (recommended in this study to be the New Hampshire Public Utilities Commission [NH PUC]).

The new legislation should:

- ***Require that a portion of all cost-effective energy efficiency be acquired through the utilities serving New Hampshire so that by the end of 2017, at least 1.6% energy savings are achieved from a baseline of 2012 electric energy sales;***

- ***Note that the energy savings target may be different for electric and gas utilities, and consideration should be given to establishing a target for other heating fuels as well;***

[66] *Ibid.*

- ***Acknowledge the additional cost-effective savings available from state and local government lead-by-example initiatives, including expansion of efficiency objectives within State-owned and State-leased facilities;***

- ***Reinforce a desire to achieve at least 90% compliance with building energy codes by 2017; include a focus on tracking, reporting, benchmarking, and promoting energy savings;***

- ***Emphasize the need to establish market-based progress indicators and to track progress and results; and***

- ***Specify a desire to move towards a voluntary, competitive private marketplace for energy efficiency in the state over time.***

Finally, the legislation should direct the NH PUC to implement and oversee a collaborative process during the development of multi-year and annual goals plans, and budgets for the regulated utility energy efficiency programs. The collaborative process should involve utility representatives, representatives of the NH EESE Board, other key stakeholders, and market actors and should be carried out in a non-adjudicatory setting proceeding managed by an outside, independent facilitator. The process should develop both energy savings and market development-based metrics for the programs and should include evaluation, measurement, and verification by independent, third parties evaluators reporting the NH PUC, rather than to the program administrators.

Such legislation would enable development and implementation of an EERS that is unique and customized to New Hampshire, further clarify the appropriate blend of legislative and regulatory oversight and action, and better enable the engagement of the EESE Board as the basis for a more collaborative and effective process for establishing and continuously improving energy efficiency programs in the state.

Finally, the issue of lost revenue for energy suppliers whose sales decline as a result of increased energy efficiency savings should be addressed thoughtfully and thoroughly, as part of future activities to develop and implement an EERS in New Hampshire.

Appendix A: Energy Efficiency Resource Standard Experience in Neighboring States

Presented below are case studies of EERS experience in Massachusetts and Rhode Island. These case studies were completed as background information for this study and are provided for use by others in New Hampshire, as appropriate.

A.1 Case Study of EERS Experience in Massachusetts

Massachusetts has a restructured utility industry with competitive generation and regulated retail markets. Distribution utilities are required to offer energy efficiency and demand-side management programs through a collaborative process under the oversight of the Massachusetts Department of Energy Resources (MA DOER) and the Massachusetts Department of Public Utilities (MA DPU). There are five electric energy efficiency program administrators (PAs) and seven gas PAs in the state, implementing energy efficiency programs under a single statewide energy efficiency brand, *Mass Save*. Massachusetts is currently implementing decoupling for all of its gas and electric utilities and utilities must include decoupling proposals as a component of their rate cases.[67]

Regulations

Three Acts signed into law in 2008 guide the implementation and continued evolution of the State's long-term savings targets: The Green Communities Act, The Green Jobs Act, and The Global Warming Solutions Act. These Acts focus on energy savings and on job creation, and involve a variety of stakeholder groups such as small and large business leaders, low income and consumer advocates, utilities, regulators, unions and independent contractors in energy efficiency program design, review, and modification processes. The most relevant Act for efficiency regulations is the Green Communities Act (Act), which:

Requires Program Administrators to develop energy efficiency plans that will "… provide for the acquisition of all available energy efficiency and demand reduction resources that are cost effective or less expensive than supply."[68]

In connection with these energy efficiency plans, the Green Communities Act established the Massachusetts Energy Efficiency and Advisory Council (MA EEAC) to guide the development of comprehensive, integrated, statewide energy efficiency plans and monitor their implementation. Each efficiency program must be cost-effective under the Total Resource Cost test, with a benefit cost ratio greater than one on both a program and sector basis. The Act's mandate to capture all energy efficiency opportunities that are "cost effective or less than the cost of supply" drove the development of the first Joint Statewide Three-Year Energy Efficiency

[67] *DPU Docket 07-50-A (July 2008)*
[68] *Massachusetts Green Community Act*

Plans for 2010-2012 approved by the DPU in January 2010.[69] The 2010-2012 targets were built on the foundation of PAs already delivering efficiency programs for 20 years.

Utility Incentives

A shareholder incentive provides an opportunity for program administrators (distribution utilities) to earn up to 5.5% of program costs as an incentive for meeting program goals.[70] The incentive is calculated based on metrics including energy savings, net benefits, and market transformation.

Goals and Funding

Annual electricity savings targets in Massachusetts are among the most ambitious in the nation and will achieve cumulative annual energy savings equivalent to 30 percent of retail electricity sales in 2020. The annual statewide savings targets in the second Three-Year Plan, as percent of retail energy sales, are shown in the table below:[71]

Table A.1: Massachusetts Annual Energy Efficiency Savings Targets

Electric	2.5%	2.55%	2.6%
Gas	1.07%	1.13%	1.14%

The electric energy efficiency programs are funded by a variety of sources, the largest of which are a System Benefits Charge, which is approved by the MA DPU, and the Energy Efficiency Reconciliation Factor (EERF), which recovers additional program costs from electric customers in proportion to the costs of programs directed at their sector (i.e., residential, commercial & industrial), with low-income programs receiving subsidies from other sectors. The EERF was created by the Massachusetts Green Communities Act. The Act also requires at least 80% of Regional Greenhouse Gas Initiative funds to be dedicated to energy efficiency programs. In the 2010-2012 plan, the 2011 program spending was in the range of $367 million (annually) and was funded by the following sources:[72]

- The legislatively mandated SBC of $.0025[73] per kWh (resulting in 28 percent of funding)
- The EERF (resulting in 58 percent of funding)
- RGGI auction proceeds (resulting in 11 percent of funding)
- Forward Capacity Market payments from ISO-New England (resulting in 3 percent of funding)

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[69] *Per G.L. c. 25 § 21).*
[70] *Order DPU 08-50*
[71] *DPU 12-100 to DPU 12-111 Three-Year Energy Efficiency Plan 2013-2015 November 2, 2012,* http://www.mass.gov/eea/docs/doer/energy-efficiency/statewide-electric-and-gas-three-year-plan.pdf
[72] *Strategic Investments Yield Energy, Economic, and Environmental Benefits The 2011 Report of the Massachusetts Energy Efficiency Advisory Council, Prepared for the Massachusetts General Court, the Joint Committee on Telecommunications, Utilities and Energy, and the Department of Public Utilities, September 2012*
[73] *Although New Hampshire's SBC appears to be higher at $0.0033 per kWh, only a portion ($0.0018) is dedicated for use in the utility's CORE programs. The rest ($0.0015) is set aside to help low income residents pay their fuel bills.*

The natural gas efficiency programs are funded by an Energy Efficiency Surcharge (EES) on gas customers' bills.

The Role of the Legislature, Public Utility Commission, and Stakeholder Groups

The MA Department of Energy Resources chairs the state Energy Efficiency Advisory Council, which is responsible for working with the PAs to plan energy efficiency programs. While the EEAC is responsible for guiding the PAs in carrying out the requirements of the Act, the PAs are responsible for delivering the programs and taking the actions that result in measurable, verifiable energy savings that meet the savings goals. As regulated entities, the PAs must receive approval from the MA DPU for their efficiency program spending, program cost-effectiveness, and related issues of cost recovery. Program administrators may modify their plan mid-year or annually through a mid-term modification process. The program administration is coordinated through the EEAC, an eleven voting member stakeholder body that works collaboratively with the PAs to oversee the programs implementation and success. Eleven non-voting members are also involved in the EEAC, including PAs from the investor-owned electric and gas utilities, energy efficiency service providers, and other stakeholder groups.

A.2 Case Study of EERS Experience in Rhode Island

Regulations

Rhode Island customers are, in essence, served by one electric and natural gas distribution utility, National Grid. In June 2006, Rhode Island enacted the Comprehensive Energy Conservation, Efficiency and Affordability Act of 2006, which established a "least-cost procurement" (LCP) requirement with the goal of meeting electrical energy needs in Rhode Island in a manner that is "optimally cost-effective, reliable, prudent and environmentally responsible." This strategy is "least cost" because energy efficiency costs approximately $.04 per kWh while electric supply costs between $.08 and $.12 per kWh.[74] Under state statute, electricity and gas revenues are required to be fully decoupled from sales.[75]

Utility Incentives

National Grid receives a performance incentive for meeting program goals. In National Grid's 2013 Energy Efficiency Program Plan, a significant change was made to the company's incentive. This change will provide enhanced motivation for National Grid to attain savings levels near or above 100% of planned goals, by raising the level at which the company begins to earn any incentive from the previous 60% to 75% of the target. The change also makes the percentage of the available incentive earned higher for performance approaching and exceeding 100% of goals.

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[74] *Rhode Island Energy Efficiency and Resource Management Council, Annual Report to the General Assembly, Required Under RIGL 42-140.1-5: April 2013.*
[75] *Rhode Island PUC Statute § 39-1-27.7.1.*

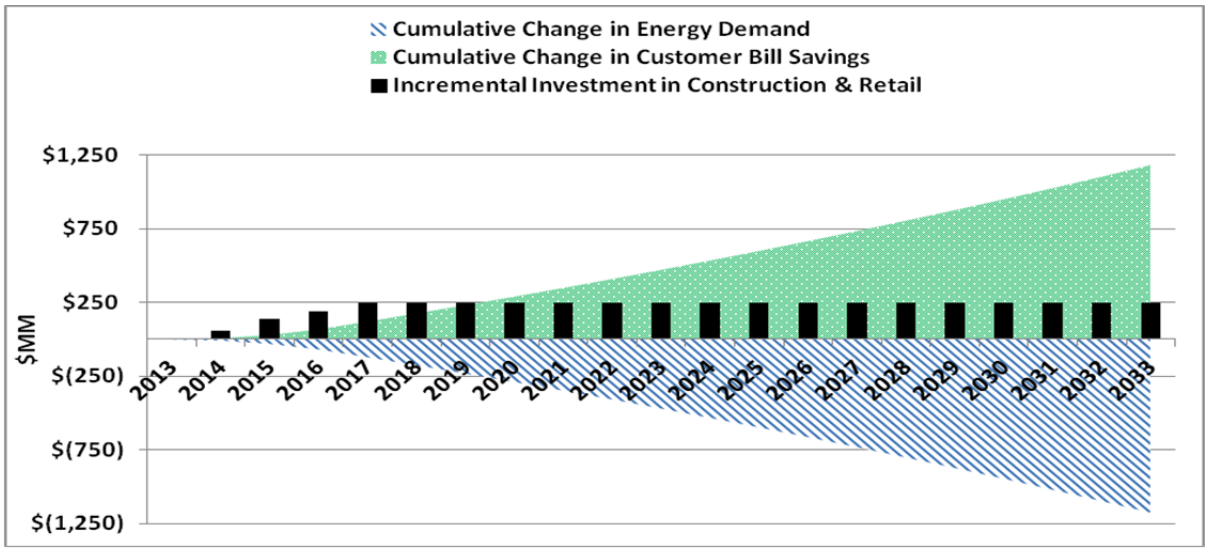
Appendix B: Jobs and Income Analysis and Methodology

Presented below are results from the macroeconomic analysis completed for this study in order to estimate the jobs and income impacts of achieving all cost-effective energy efficiency in New Hampshire. This is followed by a description of the methodology used for the analysis.

B.1 Macroeconomic Analysis Results

The first step in estimating the jobs and income impacts of incremental investments in energy efficiency is to estimate the value of the incremental investment itself. For this analysis, incremental investment in the CORE programs, Utility Direct Investment, Competitive Private Market Activity, and Track, Report and Promote[76] were increased over a three year period to 2017, and held constant thereafter. This money is assumed to flow to the construction (60%) and retail (40%) sectors of the economy in the form of building retrofit projects and retail equipment and product purchases. This stream of investment is represented by the vertical bars in Figure B1, Incremental Investment in Construction and Retail, and accumulates to about $1.2 billion by 2033.

Figure B.1: Change in Productive Investment ($MM)



The energy savings that result from these investments have two primary impacts. First, the utility and fuel distribution industries ('Transportation by Truck') experience reduced sales that accumulate over time. These impacts are represented by the diagonal hashed (blue) area.

[76] *Note that the cash flows that are associated with existing (not incremental) investments in the CORE Programs, State Lead-by-Example, and in Building Energy Code related work have been excluded from this analysis. The job and income creation benefits of these investments are already being realized under existing policies and programs, and this analysis in intended to illustrate the additional (incremental) benefits that are available from new policies (an EERS) and programs.*

Second, residential and commercial building owners experience an increase in disposable income (resulting from energy savings) that also accumulates over time. These impacts are represented by the dotted (green) area.

Because the utility industry is so capital intensive, it creates (and loses) fewer jobs than other sectors of the economy when it experiences a change in investment. The construction and retail industries, on the other hand, are comparatively labor intensive, and create more jobs than other sectors of the economy when they experience a change in investment. The net effect when energy savings are reinvested in other sectors of the economy is a gain in jobs and income (GDP).

Table B.1 shows the total job and total GDP multipliers for each sector that were included in the analysis. When a dollar investment is made in these sectors, the table shows the incremental change to employment and income that result from that expenditure. These differences between the major sectors in the economy explain why investments in energy efficiency are positive for both job creation and income (GDP) in New Hampshire.

Table B.1: Total Job Creation Multipliers by Sector[77]

Sector	Total Jobs / $MM	Total GDP Value Added / $
Electric Utility Sector	3.13	0.74
Gas Utility Sector	1.70	0.34
Construction Sector	12.77	0.99
Retail Sector	4.06	0.35
Transportation by Truck Sector	11.95	0.88
Residential Bill Savings 'Sector'	6.62	0.59
Commercial Bill Savings 'Sector'	11.81	0.85

When the change in investment each year is multiplied by the values in this table, the result is an estimate of the job and income impacts of investments in energy efficiency. These impacts are summarized below (Table B.2), and indicate that GDP would increase by about $160-170 million per year, and about 2,400 to 4,800 jobs would be created over the 5 and 20-year time horizons in the analysis.

Table B.2: Net Increase in Jobs and Income (GDP)

Economic Impact	2017	2022	2027	2032
GDP ($MM)	$160	$170	$170	$170
Jobs (Actual)	2,380	3,250	4,050	4,790

B.2 Macroeconomic Analysis Methodology

[77] *Source: New Hampshire Economic Impact Multipliers, GDS Associates through the Minnesota IMPLAN Group, Inc., Data Copyright 2013.*

Economic Impact (Input/Output) Methodology

The chief aim of an economic impact analysis is to determine the multiplicative effects of a direct change in demand within an industry in the local economy. When a dollar is spent in-state, that dollar has multiplicative impacts on the economy as it is cycled through various industries as they purchase goods and services. An economic input/output model quantifies the effects of this spending within the study area.

Input/output ("I/O") analysis is a means of examining relationships within an economy, both among businesses and between businesses and final consumers. I/O models attempt to capture all of the monetary market transactions for consumption in a given time period. In this instance, the I/O model examines a subset of the New Hampshire economy over a 20-year period (2013 – 2033). Specifically the electric utility, gas utility, construction, retail, trucking (for heating fuels), residential and commercial sectors were modeled. The resulting analysis approximates the effects of a change energy policy (an EERS and the spending that is described in Section 7) on the economic activities in the general economy.

Key Assumptions

There are five key implicit assumptions associated with an input/output model.

1. Constant Returns to Scale – An industry's list of expenditures, called its production function, is considered linear. If additional output is required, constant returns to scale assumes all inputs increase proportionately.
2. No Supply Constraints – Supplies are assumed to be unlimited. An industry has unlimited access to raw materials and its output is only limited by demand.
3. Fixed Commodity Input Structure – This assumption requires that changes in the economy will affect the industry's output, but not the mix of commodities and services it requires for production. In other words, this structure implies that price changes will not force a producer to use a substitute good.
4. Homogenous Sector Output – Some industries produce multiple commodities. Homogenous sector output means that the proportions of all commodities produced by an industry remain the same, regardless of total output. An industry will not increase the output of one product without proportionately increasing the output of all its other products.
5. Industry Technology Assumption – This assumption is that an industry uses the same technology to produce all of its products. An industry is assumed to have a main or primary product and all other products are byproducts of the primary production. This assumption comes into play in the development of a descriptive model when data is collected on an industry-by-commodity basis and is converted to industry-by-industry matrices.

IMPLAN Software

The software used by the project team in conducting I/O analysis is IMPLAN Professional Version 3.1. The software was developed by the Minnesota IMPLAN Group (MIG, Inc.). A database of data required to develop a descriptive model for the state of New Hampshire was purchased from MIG. The data is derived from several federal sources including the Bureau of Economic

Analysis, the Bureau of Labor Statistics, and the U.S. Census Bureau. For this analysis, New Hampshire data for 2011 was the most recent database available.

The IMPLAN software develops the descriptive and predictive models. It then allows the user to conduct impact analyses with the resultant multipliers. IMPLAN has an industry sectoring scheme that roughly tracks both the North American Industrial Classification System (NAICS) and the Bureau of Economic Analysis (BEA) 1997 commodity classifications. To perform an impact analysis, the user enters an impact to a selected industrial sector and analyzes the multiplier effects of that change.

Impact Analysis Results

An I/O predictive model uses direct impacts on an industry and runs it through the set of multipliers to calculate the additional value associated with increased economic activity. There are three impacts measured in the I/O output.

- Direct Demand Effects – The impacts that directly impact an assigned industry. In the New Hampshire analysis, these are the in-state expenditures in the Electric, Natural Gas, Construction, Transportation by Truck, and Retail Trade sectors.
- Indirect Effects – The impacts caused by the iteration of industries purchasing from industries resulting from direct demand changes.
- Induced Effects – The impacts on all local industries caused by the expenditures of new household income generated by the direct and indirect effects.

The total economic impact, as expressed for the purposes of this analysis, is the sum of the direct plus indirect and induced effects.

Detailed Methodology

Spending & Investment

The incremental change in the investment and spending on energy efficiency was calculated from the analysis of energy savings potential and costs. The incremental change in CORE program spending was calculated with 2014 as the base year. Because the 'State and Local Governments Lead-by-Example' investment is already required by existing policy, it is not considered incremental spending, and is not a part of the macroeconomic analysis as a result. The Direct Utility Investment, Private Market Activity, & Energy Codes/Statewide Energy Efficiency Activities Track, Report and Promote investments are all considered incremental, and directly feed into the macroeconomic analysis. All of the spending patterns are modeled on a nominal (not real) dollar basis.

Valuation of Energy Savings

Consistent with the incremental spending and investment methodology, the incremental (1st year) MWH of energy savings were calculated using the analysis of energy savings potential and costs, and are assumed to remain constant after 2017. The entire stream of energy savings is valued at the average $/kWh rates implied in the base case of the bill impact analysis. After 2017, the unit value of energy is inflated by the national-level, nominal inflation rates in EIA's AEO 2013 for electricity and natural gas. The first year value of energy savings is then accumulated year over year to arrive at the cumulative impact on the utility sector and the

cumulative impact of the bill savings for commercial and residential customers. The valuation of the energy savings was modeled on a nominal (not real) dollar basis.

Input/Output Analysis

The job and income multipliers for seven sectors of the economy are applied to the changes in spending and investment to arrive at the estimated change in job creation and income. The negative impact on the utility sector is matched dollar for dollar by the positive impact on the residential and commercial customer bills. The difference in the job and income multipliers between these sectors explains a large portion of the job and income effects of this model. The remaining impacts result from incremental efficiency program spending in the construction and retail sectors, which are arbitrarily split 60/40 to account for investments in retrofits to the building stock and rebates for efficient end-use devices.

The 'Transportation by Truck' sector is a proxy for the negative impact on the fuel distribution industry that results from reductions in heating oil, kerosene and propane demand. Based on the incremental spending and investment in total thermal savings, 60% of the thermal energy savings were assumed to impact this sector. This percentage assumes that all of the utility investment (CORE and Direct) is invested in gas savings, and that the private market activity is concentrated (100%) in heating oil and propane savings. Finally, the Track, Report and Promote spending is bundled into the impact of the construction and retail sectors, as it will be a net job creating activity. However, it was too small a value to justify modeling within a different sector of the economy.

Job Creation & Income Impacts

The job creation results are net of advances in labor productivity and represent the actual number of jobs that would be created by investments in energy efficiency over time. The income (GDP) results are in nominal millions of dollars.

Appendix C: Bill Impacts Analysis and Methodology

Presented below are results from analysis completed for this study to estimate bill impacts of achieving the portion of all cost-effective energy efficiency in New Hampshire attributed to the CORE programs. This is followed by a description of the methodology used for the analysis.

C.1 Results of Electric Bill Impact Analysis

Residential Bill Impacts

Based on ramp up to a doubling of the energy efficiency portion of the current SBC by 2017, as shown in Figures C.1 (%) and C.2 ($), residential customers who participate in the CORE electric programs would save about $18 per year or 1.4% of their annual electric bill. Nonparticipating customers would contribute about $11 per year more through the System Benefits Charge or a 0.8% increase in their annual electric bill. On average (across participating and nonparticipating customers), bills would decrease by just under $5 per year by 2017, a 0.4% decrease in costs.

Figure C.1: Annual Residential Bill Impacts (%)

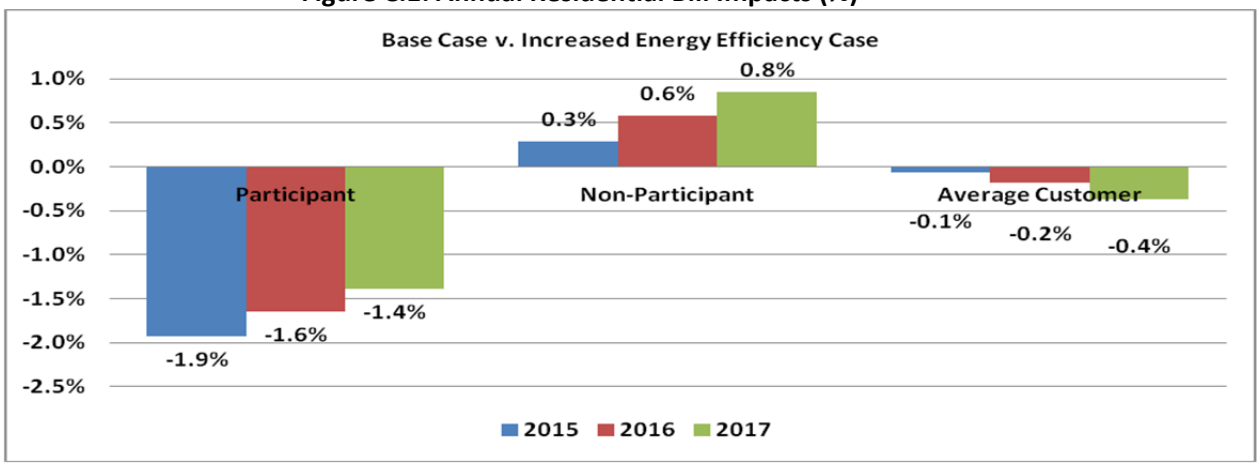
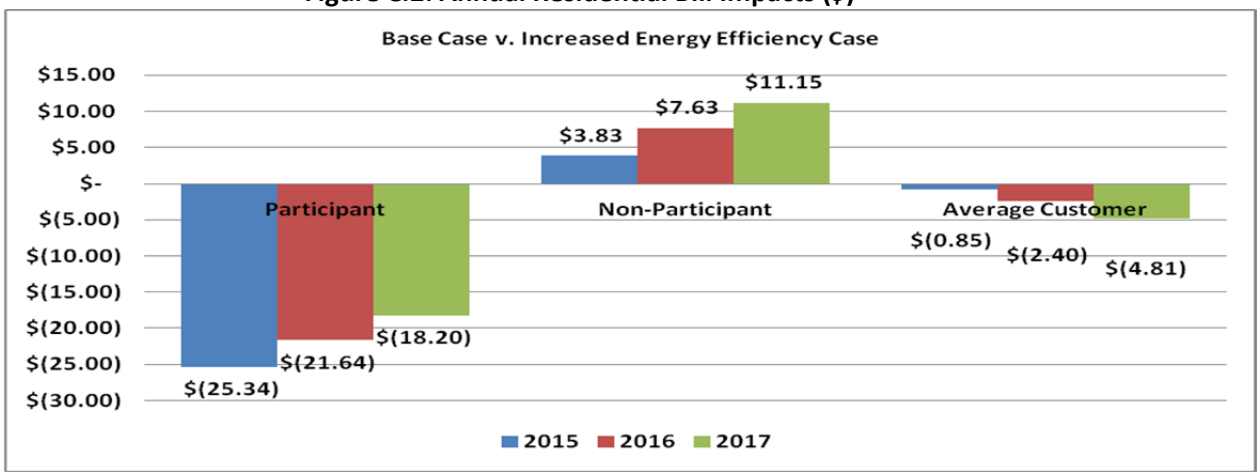


Figure C.2: Annual Residential Bill Impacts ($)



Commercial & Industrial Bill Impacts

Similarly, Figures C.3 (%) and C.4($) show that C&I customers who participate in the CORE electric programs would expect to save almost $2,000 per year or a 26% decrease in their annual electric bill. By 2017, nonparticipating customers would expect to contribute about $80 per year more through the System Benefits Charge or 1.1%. On average, across all combined participating and nonparticipating customers, electric bills would be expected to decrease by approximately $70 per year by 2017, a 0.9% decrease in annual costs.

Figure C.3: Annual C&I Bill Impacts (%)

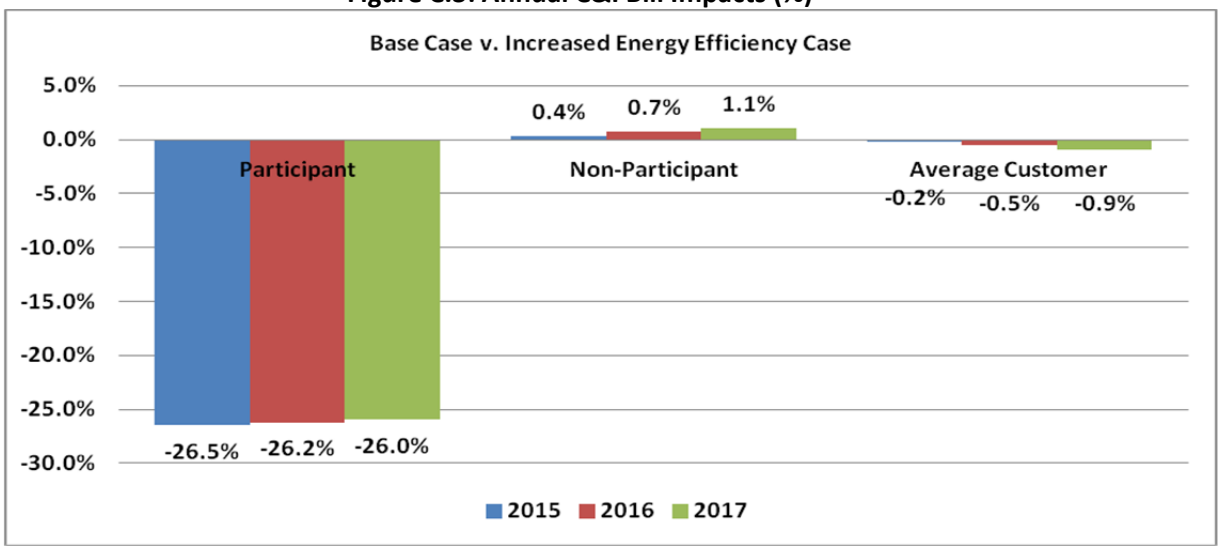
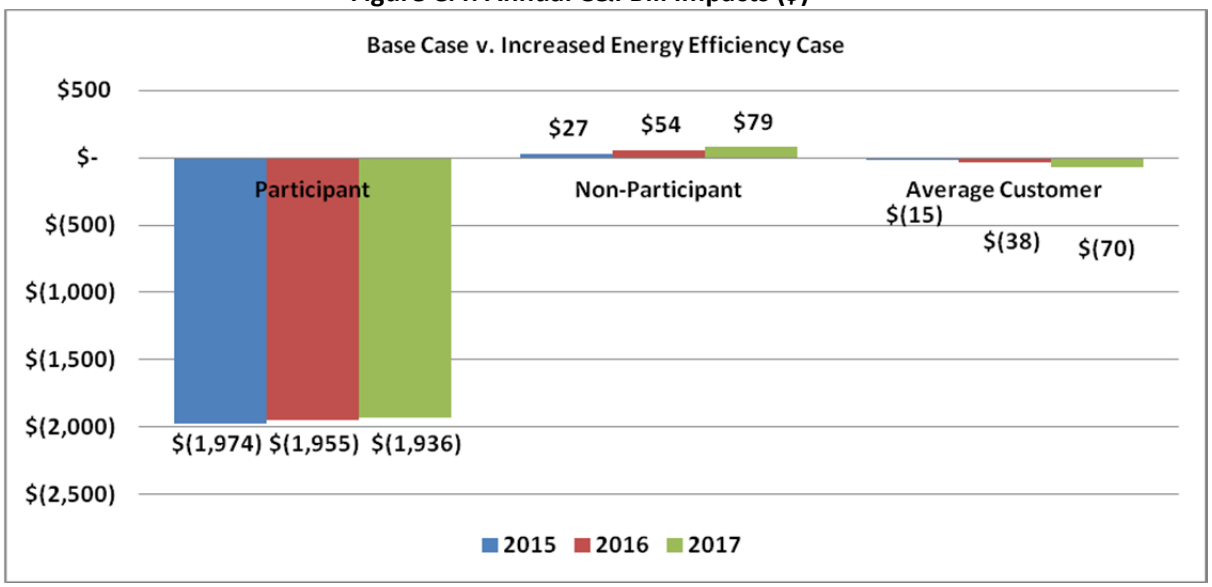


Figure C.4: Annual C&I Bill Impacts ($)



C.2 Result of Natural Gas Bill Impacts Analysis

Residential Bill Impacts

As shown in Figures C.5 (%) and C.6 ($), by 2017 residential customers who participate in the CORE gas programs would expect to save about $97 per year or 10%. Nonparticipating customers would expect to contribute about $30 per year more through the Local Distribution Adjustment Charge (LDAC) or 3.1%. On average, customer bills would be expected to increase by about $6.70 per year by 2017, a slight 0.7% increase in annual costs.

Figure C.5: Annual Residential Bill Impacts (%)

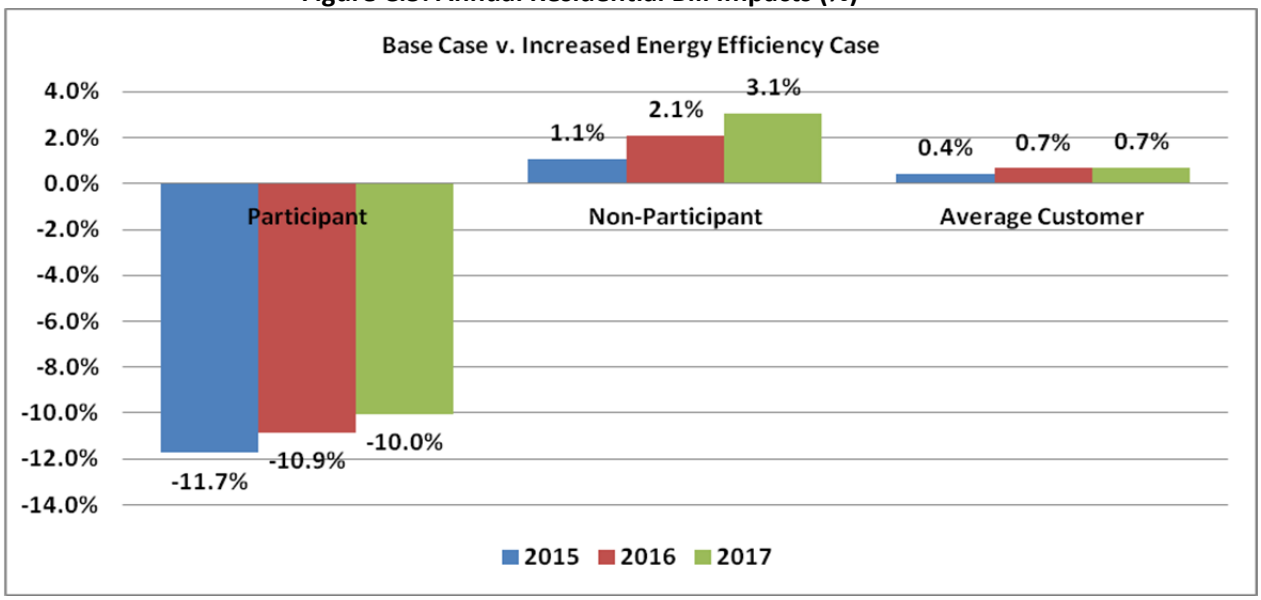
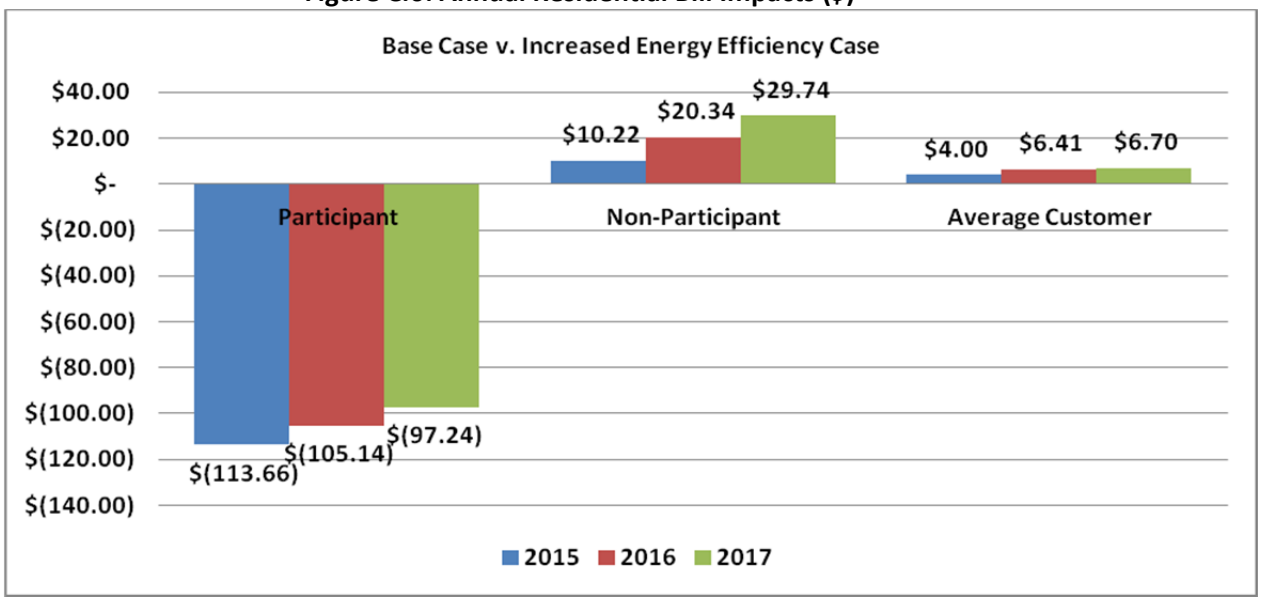


Figure C.6: Annual Residential Bill Impacts ($)



Commercial & Industrial Bill Impacts

Figures C.7 and c.8 show that C&I customers who participate in the CORE gas programs would expect to save about $674 per year or 7.3%. By 2017, nonparticipating customers would expect to contribute about $150 per year more through the Local Distribution Adjustment Charge (LDAC) or 1.6%. On average, customer bills would be expected to remain flat, as the dollar impacts and percentages are negligible in the context of the annual bill.

Figure C.7: Annual C&I Bill Impacts (%)

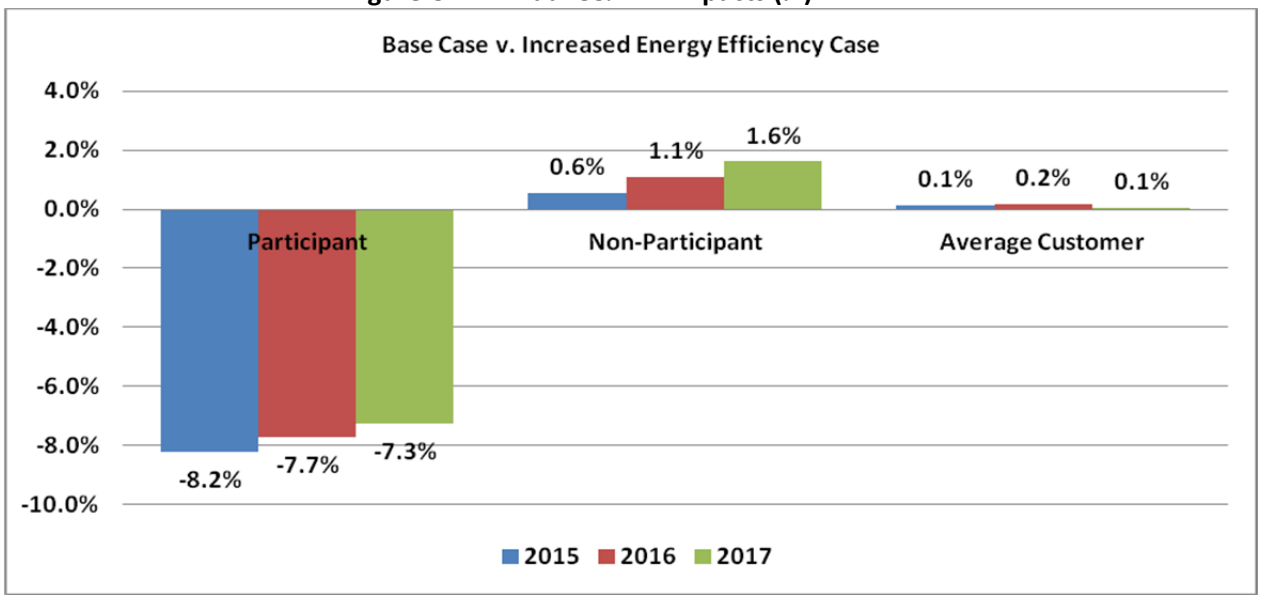
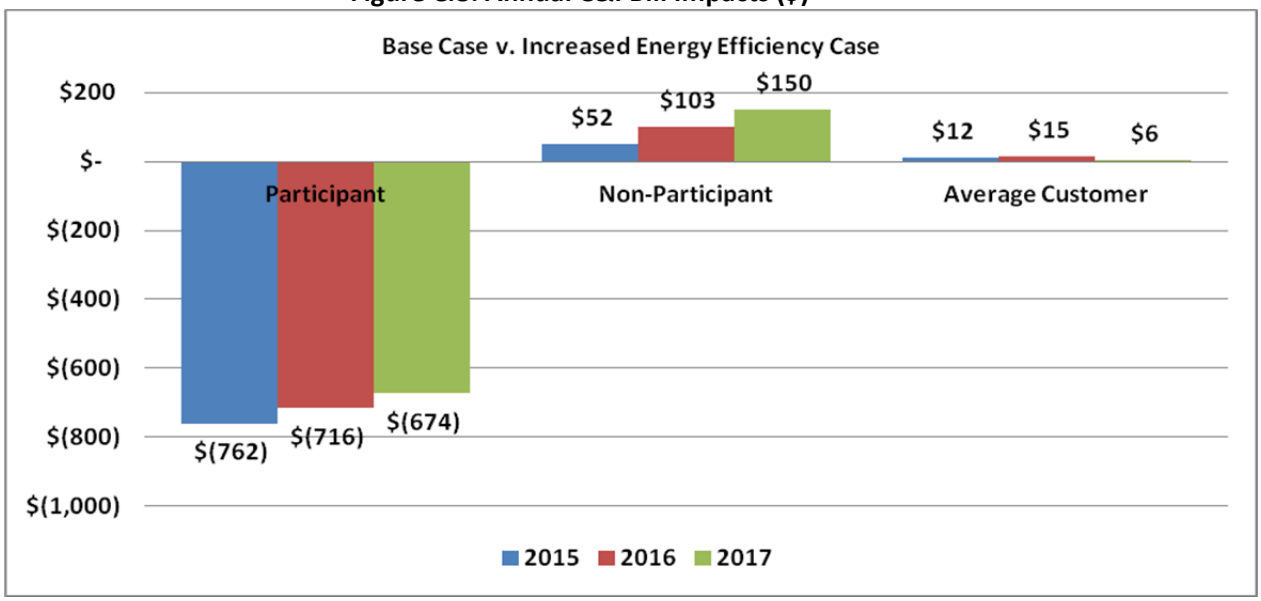


Figure C.8: Annual C&I Bill Impacts ($)



C.3 Bill Impact Calculation Methodology

Electric Bill Impacts

To estimate the energy savings associated with an increase in CORE Electric Programs, the existing 2013-2014 CORE Energy Efficiency Program filings were used to determine the current budget and the cost of savings ($/kWh) for first year savings. It was assumed that the SBC portion of the budget would double by 2017, with a 33% increase in 2015, a 67% increase in 2016, and a 100% increase in 2017, based on the 2014 budget.

Other aspects of the program funding, such as ISO-New England Forward Capacity Market proceeds were held at 2014 levels for the estimation, while RGGI funding was decreased by $2 million for each year, beginning in 2014 to account for Senate Bill 123, which will make up to $2 million available for municipal energy efficiency projects. Rising costs per kWh of savings were assumed for the residential market and a constant cost was assumed for the C&I market. A customer contribution factor was also added to estimate the total Societal Cost of the expansion of the CORE Electric program portfolio.

Gas Bill Impacts

To estimate the energy savings associated with an increase in CORE Gas Programs, the existing 2013-2014 CORE Energy Efficiency Program filings were used to determine the current budget and the cost of savings ($/MMBtu) for first year savings. It was assumed that the Local Distribution Adjustment Charge (LDAC) portion of the budget would double by 2017, with a 33% increase in 2015, a 67% increase in 2016, and a 100% increase in 2017, based on the 2014 budget.

Carry-forward and Interest was assumed to be $0 for the estimation period. Constant costs were assumed for the C&I and Residential markets. A customer contribution factor was also added to estimate the total Societal Cost of the expansion of the CORE Gas program portfolio. Projected MMBtu savings, by sector, were converted to kWh for comparison in the menu of options.

Appendix D: Energy Savings and Cost Analysis Methodology for Top 6 Strategies

Much of the analysis completed for this study was derived from results presented in a previously completed study entitled "Additional Opportunities for Energy Efficiency in New Hampshire," also referred to informally as the NH Technical Potential Study. This study was completed by GDS Associates, Inc. for the New Hampshire Public Utilities Commission. It was a detailed evaluation of additional opportunities for energy efficiency throughout the state. The study estimated technical, maximum achievable potential, maximum achievable cost effective potential, and potentially obtainable potential over a ten year period. The estimates of energy efficiency savings were provided by customer type (residential and C&I) and by fuel types (electricity, natural gas and related propane and fuel oil).

The work commissioned by the NH OEP and DES for this current EERS study was not intended to update, or revise the NH Technical Potential Study. The Technical Potential Study was used as a guide to help "mine out" additional energy savings within the residential, commercial, and industrial sectors and map out where current regulated programs are achieving energy savings. The Technical Potential study results also served as a reasonable benchmark of this study's quantification efforts as a slightly modified maximum achievable cost effective energy savings derived from the Technical Potential was used as an upper limit on the savings calculated for the EERS strategy options.

Calculations and results from the analyses conducted as part of this EERS study are at more of a high level than what was done in GDS' original NH Technical Potential Study. They are being used to verify the reasonableness of broad policy options and recommendations. As such, the following energy and cost savings figures should not be used as the basis for program-level design and/or budgeting without further detailed review of existing program plans, budgets, performance metrics, etc.

D.1 State and Municipal Governments Lead by Example Methodology

Calculation Methodology for State Owned Existing Buildings (State Energy Efficiency Projects & New Construction)

To estimate the energy savings associated with State Energy Efficiency projects, interviews were conducted with the relevant State Officials. 2012/2013 expenditures on energy efficiency projects were provided, and future State spending on energy efficiency was discussed. Detailed information on 2012/2013 budgets and energy projects was also provided to the study team.

Based on this information, it was possible to estimate a funding split between electric saving projects and thermal savings projects and the cost per kWh and cost per MMBtu saved from the projects. The cost per unit of energy savings was applied to the estimated budget for electric and thermal savings projects. It was also assumed that a small percentage of the projects would receive utility program funding and would thus not count as a portion of the energy savings toward the State Government Leads-by-Example strategy. For simplicity, if the utility was estimated to cover 10% of the overall project costs, the energy savings associated with the State

Government Leads-by-Example strategy were reduced by 10%, assuming the utility would claim these savings.

All energy savings (including thermal savings) were converted to kWh for ease of comparison. No information on New Construction (NC) projects was available for estimation. However, modest amounts of energy savings could be achieved through NC if the State follows a high efficiency building standard as required by statute.[78]

Calculation Methodology for State Owned Existing Buildings (ESCO Projects)

To estimate the energy savings associated with proposed Energy Service Company (ESCO[79]) projects for state-owned buildings, interviews were conducted with knowledgeable State Officials.[80] Through the interviews, it was estimated that the total value of ESCO projects that may occur over the five-year period from 2013 thru 2017 would equal roughly $25 million.

The largest project is proposed for the Hazen Drive State office facility (covering 4 buildings in Concord, New Hampshire) with other, smaller projects anticipated after completion of the Hazen Drive project. Knowing the value, it was assumed that in order to recover the costs of the project (to repay the ESCO) over the 20-year project contract, the annual energy cost savings would need to be at least equivalent to the total project cost divided by 20 years. This served as the anticipated energy costs savings. Estimates of electric versus thermal projects were made based on State directives and goals, and energy costs ($/kWh and $/MMBtu) were applied to the project funding to estimate annual energy savings.

Historic energy usage and cost information from the State were used to develop costs for kWh and MMBtu. Again, an estimate of possible utility funding was applied and some energy savings and was not counted towards the State Government Leads-by-Example strategy. All energy savings were converted to kWh for ease of comparison.

Calculation Methodology for State-Leased Property

To estimate the potential energy savings at State-leased property, the total square footage of all non-owned state buildings was provided by State Officials. From that information, an energy use intensity value, based on historic energy consumption, was applied to yield an approximate amount of energy consumed at the leased buildings.

Energy use is not as well tracked in leased buildings, as they vary greatly in size, staff, and responsibility in payment of monthly utility bills. Because no strategic effort has been made to reduce energy consumption in State leased buildings, the energy utilization index used to estimate total energy consumption was from 2005, prior to the States efforts to reduce fossil

[78] *High Performance Design Standard, State Building Code, Section 155-A:13.*
[79] *Energy Service Companies provide a range of comprehensive energy services including designs and implementation of energy savings projects, retrofitting, energy conservation, energy infrastructure outsourcing, power generation and energy supply, and risk management. In this context, the services primarily include the design and implementation of retrofit projects.*
[80] *Rantamaki K and Skoglund C, June 12, 2013. Telephone interview.*

fuel consumption. These buildings have not had the same level of funding or attention provided to them as the State owned buildings, and were assumed to have a greater energy consumption on a per square foot basis.

After an estimate of energy use was calculated, simplifying assumptions about possible energy savings were made. It was assumed that 5% in electric savings was possible through behavioral changes and the existing ENERGY STAR procurement practices with office equipment. A more conservative estimate of 1% thermal savings was assumed through behavior change. The associated cost for these measures was assumed to be zero. Behavior change can occur through existing state efforts and the incremental cost of ENERGY STAR office equipment is extremely low, and was assumed to be no cost.

Calculation Methodology for Municipal Buildings

New Hampshire Senate Bill 123 will allocate up to $2,000,000 annually, from RGGI funds, beginning January 1, 2014, to municipal and local governments to implement energy efficiency projects.[81] Assuming that $2 million is set aside for municipal energy efficiency, a cost per unit of energy savings as reported by the recent *Evaluation of the New Hampshire Green House Gas Emissions Reduction Fund*[82] (GHGERF) was used to estimate how much energy could be saved by local and municipal governments.

First, 20% of the annual $2 million was removed to cover costs for audits, studies, administration, and measurement and verification. With the remaining budget, the cost per unit of energy saved from the GHGERF evaluation was used to approximate energy savings. A simplifying assumption was made that although the CORE utilities will be the recipients of this funding, they would utilize it mainly to reduce thermal fuel use, and the electric savings projects would go through the SBC-funded portion of utility CORE programs. The total energy savings was then converted to kWh for comparison in the menu of programs and initiatives.

D.2 CORE Program Methodology

Calculation Methodology for Energy Efficiency Savings from Electric Programs

To estimate the energy savings associated with an increase in regulated Electric Programs, the existing 2013-2014 CORE Energy Efficiency Program filings were used to determine the current budget and the cost of savings ($/kWh) for first year savings. Programs, such as Home Performance with ENERGY STAR (HPwES) that have thermal savings associated with the program, were counted and converted to a kWh equivalent. Rising costs per kWh of savings were assumed for the residential market and a constant cost was assumed for the C&I market. These assumptions were developed based on discussions with and feedback during stakeholder session. A customer contribution factor was also added to estimate the Total Societal Cost of the expansion of the CORE Electric program portfolio.

[81] *NH SB 123 (2013 Session), relative to the use of proceeds from the Regional Greenhouse Gas Initiative program.*
[82] *'The New Hampshire Greenhouse Gas Emissions Reduction Fund, Year 3 (July 2011-June 2012) Evaluation', The University of New Hampshire, 2012*

In order to achieve the 1% additional savings, it would be necessary to double the SBC portion of the budget by 2017, with a 33% increase in 2015, a 67% increase in 2016, and a 100% increase in 2017, based on the 2014 budget. Other aspects of the program funding, such as ISO-New England Forward Capacity Market proceeds were held at 2014 levels for the estimate, while Regional Greenhouse Gas Initiative (RGGI) funding was decreased by $2 million for each year from the current levels (about $6 million per year), beginning in 2014 to account for Senate Bill 123, which will make up to $2 million available for municipal energy efficiency projects.[83]

Calculation Methodology for Energy Efficiency Savings from Gas Programs

To estimate the energy savings associated with ratepayer Gas Programs, the existing 2013-2014 CORE Energy Efficiency Program filings were used to determine the current budget and the cost of savings ($/MMBtu) for first year savings. Projected MMBtu savings, by sector, were converted to kWh for comparison in the menu of options, and a customer contribution factor was added to estimate the total Societal Cost of the expansion of the CORE Gas program portfolio.

It was assumed that the Local Distribution Adjustment Charge portion of the budget would double by 2017, with a 33% increase in 2015, a 67% increase in 2016, and a 100% increase in 2017, based on the 2014 budget. Carry-forward and interest was assumed to be $0 for the estimation period. Constant costs were assumed for the C&I and residential markets.

D.3 Direct Utility Investment

Calculation Methodology for Direct Utility Investment

The Direct Utility Investment strategy for increasing energy efficiency savings was defined for this study as the total pool of Maximum Achievable Cost Effective (MACE) energy savings that remain available after savings from the CORE Programs, State and Local Government Leads-by-Example, and Track, Report and Promote the Energy Code categories were removed. The figures for MACE savings in the C&I and residential sectors were estimated based on the study, *Additional Opportunities for Energy Efficiency in New Hampshire*. [84]

Once the remaining pool of MACE savings was identified for each sector and fuel type (Residential Electric, Residential Thermal, C&I Electric, C&I Thermal) some simplifying assumptions were made on how much of that energy the utility would directly invest. An assumption was made that by 2017 the utilities would directly invest in 20% of this available remaining energy savings. Costs were then developed using $/kWh figures by sector, (based on the societal cost of energy savings/units of energy saved). These costs were applied to each sector and fuel specific savings amount to yield a cost for the utilities direct investment.

D.4 Follow the Roadmap to 90% Code Compliance

[83] *Per NH SB 123 (from the 2013 Session) addresses use of proceeds from the Regional Greenhouse Gas Initiative program. This money is allocated to the CORE programs for use solely on municipal building projects for projects that result in energy savings.*

[84] *Independent Study of Energy Policy Issues, Vermont Energy Investment Corporation, September 30, 2011.*

Calculation Methodology for Code Compliance

Increased compliance with the IECC was estimated using outputs from a calculator created by the Building Codes Assistance Project (BCAP) and the Alliance to Save Energy (ASE) on energy savings from increased code compliance.[85] The models estimate savings on a Source trillion Btu basis, and were converted back to Site Btu and kWh for summary in the menu of options. Costs associated with increases to energy code compliance were estimated using permits issued in the residential market and the study New Hampshire Residential and Commercial Building Characterization to develop estimates of annual building within the C&I sector and additions/renovations within the C&I and residential sectors.[86] A cost per permit was developed to include cost for tools/resources for additional code enforcement and for the increased cost of building to code. These costs were applied to the estimated number of permits issued to generate a total cost of increasing compliance to the energy code.

The model was populated by a series of assumptions from the GDS Potential Study and supplemented by data from the US Census Bureau and recent NH-specific estimates from the GDS 2011 Report on NH Residential and Commercial Building Characterizations. Using these assumptions, outputs for the C&I and residential sector were generated.

To estimate the total cost of investing in the energy code, a projection of the 2013-2017 new construction activity was made. These are based on a combination of U.S. Census data and a 2011 report completed by GDS entitled, "NH Residential and Commercial Building Characterization." An estimated cost per permit was used ($2,500)- representing the incremental cost of building to a higher code and the added cost of enforcement and tools/resources for towns to enforce the code. This yielded a total cost which was then divided among the sectors of C&I - Electric, C&I - Thermal, Res - Electric, and Res - Thermal.

The total estimated annual cost to increase compliance with the energy code (estimated above) was split equally between the Residential and Commercial sectors, then 25% of the cost was estimated to contribute to the electric savings, and 75% to thermal savings.

D.5 Track, Report, Benchmark, and Promote Energy Efficiency

Calculation Methodology for Enhance, Track, Report and Promote Energy Efficiency

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[85] *Building Code Assistance Project (BCAP) and Nils Peterman (2012). "BCAP Code Calculator." BCAP's* ***Code Calculator*** *is a tool that estimates energy, utility cost (in real 2008 dollars), and carbon emissions (CO_2 equivalent) savings at a state level through the adoption and implementation of residential and commercial energy codes. The Code Calculator compares the desired "target code" scenario to the "business-as-usual" baseline scenario based in part on the Annual Energy Outlook (AEO) reference case published by the U.S. Energy Information Administration (see http://www.epa.gov/cleanenergy/energy-resources/refs.html#houseenergy for more details).*

[86] *New Hampshire Baseline Residential and Commercial Construction Activity and Associated Market Actor Characterization of the New Hampshire Building Energy Code Compliance Roadmap, GDS Associates, Inc., 2012, http://www.nhenergycode.com/live/index.php?go=roadmap*

No energy savings is to be associated with this category. The purpose is to allocate funding to the tracking, benchmarking, reporting, and promoting of energy efficiency activities from the other categories to assess the achievements made toward the selected goal. Ten percent of the total cost from each other menu area was selected as the amount allocated to this activity.

D.6 Competitive Private Market Activity

Calculation Methodology for Competitive Private Market Investment

The Private Market Investment strategy for increasing energy savings was defined for this study as the total pool of Maximum Achievable Cost Effective (MACE) savings that remained available after savings from the CORE Programs, State and Municipal Lead-by-example, Energy Codes, and Utility Direct Investment categories were removed. The figures for MACE savings in the C&I and residential sectors were estimated based on the report, *Additional Opportunities for Energy Efficiency in New Hampshire*.

Once the remaining pool of MACE savings was identified for each sector and fuel type (Residential Electric, Residential Thermal, C&I Electric, C&I Thermal) simplifying assumptions were made on how much of that energy the Private Market would directly invest. The table below shows the maximum savings achievable through Competitive Private Market Activity, if it is assumed that the Private Market directly invests in all remaining cost effective energy savings. Costs were then developed using $/kWh figures (societal cost of energy savings/units of energy saved) by sector, and the GHGERF savings cost figures. These costs were applied to each sector and fuel specific savings amount to yield a cost for the Private Market investment.

Appendix E: Suggested Enhancements Before Increasing CORE Program Funding

A comprehensive and detailed review and assessment was completed for all energy efficiency programs in New Hampshire as part of the *Independent Study of Energy Policy Issues* completed for the NH PUC in 2011.[87] This included the regulated CORE energy efficiency programs offered to C&I and residential customers by utilities serving New Hampshire, as well as weatherization and energy efficiency programs offered by non-profit organizations and other agencies in the state. Key recommendations for further improving the impact and effectiveness of the CORE programs and for further developing the regulatory oversight of the programs included the following:

- Require procurement of all cost-effective energy efficiency savings, as a core component of program design and implementation. Recognizing that achievement of all cost-effective energy efficiency is broader than just what can be done through CORE program implementation (requiring a combination of other strategies including lead-by-example, behind-the-meter and other private investment, etc.)

- Continue to find new opportunities to increase coordination among service offerings and to providing an "all fuels approach" in program services. Unrealized opportunities continue for coordinating utility programs with the delivery of services and programs via municipalities, weatherization agencies, non-profits, and other public/private organizations actively involved in energy efficiency in New Hampshire.

- Develop a single, trusted source of information with a common portal to program offerings, leveraging the lessons learned from the not-fully-leveraged *NH Saves* (CORE program-sponsored) website and the increasing effectiveness of the website, web trainings, etc. offered through the New Hampshire Local Energy Working Group[88] and coordinated through the Outreach & Education Committee of the NH EESE Board.

- Modify the current program planning, success metrics identification, and budgeting process so that key stakeholders and market actors are more directly involved in program planning and budgeting through a structured and professionally managed non-adjudicatory collaborative process.

- Institute program planning and budgeting for a three-year term, consistent with trends in nearby states. This will help enhance continuity in program offerings, reduce administrative costs, and will increase consistency in the planning and budgeting approach for utilities serving New Hampshire that also serve customers in Massachusetts, Maine, Connecticut, and/or Rhode Island.

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[87] *New Hampshire Independent Study of Energy Policy Issues, New Hampshire Public Utilities Commission, September 30, 2011, http://www.puc.nh.gov/eese.htm*

[88] *The Local Energy Working Group is an ad hoc group whose website could be used as a model for how the NHSaves website could become a common portal to all of the CORE program offerings.*

- Emphasize program designs and approaches that focus on creating and expanding market infrastructure, and on local economic/market development and transformation (and not simply on resource acquisition).

- Reward a commitment to fully meeting program goals (both energy savings and market development goals) and the willingness to increase goals over time, making sure that future goals are set at least as high as what was achieved previously.

- Focus on performance (both energy savings and markets development goals) combined with implementation flexibility for achieving said performance goals. Performance incentives should be designed to reward Program Administrators for innovation, and responsiveness to shifting markets, and should not reward the status quo. Implementers should be able to change strategy, alter incentives, or make new offers as long as they are held to demanding savings and market development goals.

- Modify current EM&V practices so that all EM&V work is done by independent, third parties reporting directly to the regulatory authority or oversight board, rather than directly to the utilities who are implementing the programs. EM&V plans should be developed and implemented more aggressively with focus on establishing a baseline for markets, verifying savings, assessing effectiveness of program implementation processes, and tracking market changes over time. Results should be used to help improve program designs and abilities to achieve goals.

Prior to substantially increasing funding for the CORE programs, it is strongly advised that concrete and substantive progress be made in addressing the above recommendations along with the issue of lost revenue.

Appendix F: Annotated List of Funding Options

F.1. Ratepayer Funding

CORE Programs

As noted in PUC documents, initially the CORE Electric Programs in New Hampshire were funded solely by a portion of the SBC on customer's bills. In recent years, the program budgets have been supplemented by funds obtained by the utilities from the ISO-NE's Forward Capacity Market,[89] the Regional Greenhouse Gas Initiative, and the American Reinvestment and Recovery Act. The CORE Natural Gas Utility Programs are funded by a Local Distribution Adjustment Charge (LDAC) on customer's bills. Any unspent funds from prior program years are carried forward to the following year's budget.[90] In total, the CORE programs are budgeted to invest $34.7 million in energy efficiency in 2014[91], and including the matching investments from the customers themselves, a total investment of $52 million is expected in 2014.

According to analysis conducted for this study, the CORE programs could be funded to leverage about $94 million in total investment by 2017. To fund the CORE program's portion of this investment, the energy efficiency portion of the SBC and the LDAC would need to double over the course of three years, from 2015 – 2017. This doubling could be offset somewhat by continued funding from FCM and RGGI revenues. If such a doubling were not feasible, other potential funds might also be tapped including, for example, increasing the RGGI revenues that could go to energy efficiency programs from the current $1 cap.

Energy Efficiency Reconciliation Factor (EERF)

The EERF is an approach developed in Massachusetts as a way to fund investments in (electric) energy efficiency when they exceed budgeted levels. It is necessary because the state requires the utilities to invest in **all** cost effective energy efficiency, and it essentially creates an increase in SBC funding in the event that all other funding sources have been exhausted.

According to the most recent three-year energy efficiency plan in Massachusetts:

> "In the event that program costs exceed other available revenue sources, a fully reconciling funding mechanism, the EERF ensures that the costs for all available cost-effective energy efficiency measures will be funded. The EERF recovers and reconciles

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[89] *In some regions, energy efficiency savings are now significant enough as a result of EERS policies and other initiatives that energy efficiency is now considered a system resource. This is currently the case with the Independent System Operator (ISO) of the transmission grid serving New England, referred to as "ISO-New England." System planners at ISO-New England now anticipate system loads and resource needs based on their projections of supply from traditional energy sources as well as on their projections of energy efficiency savings. As such, energy efficiency is essentially considered a source of supply for the system, and utilities and third party administrators of energy efficiency programs (such as Cape Light Compact, Efficiency Maine, and Efficiency Vermont) bid their energy savings into the Forward Capacity Market (FCM). Revenue from such transactions can then be used to lower customer's energy costs or to help fund additional programs providing energy efficiency services to utility customers.*

[90] *2013-2014 CORE New Hampshire Energy Efficiency Programs, NHPUC Docket No. DE 12-26 ,Sept. 17, 2012, page 6*

[91] *Ibid. Also note that ARRA funding is no longer available, and is not included in the 2014 funding levels.*

energy efficiency costs for a particular program year with the revenue an electric Program Administrator receives through:

(1) the SBC;
(2) participation in the FCM;
(3) proceeds from participation in cap-and-trade programs such as RGGI;
(4) Loss Based Revenue, for electric Program Administrators without a Department-approved decoupling mechanism; and
(5) proceeds available from other private or public funds that may be available for energy efficiency or demand resources. G.L. c. 25, § 21."[92]

A similar mechanism could potentially be employed in New Hampshire, if the state were to adopt an "all cost effective energy efficiency" requirement in its EERS.

Ratepayer-Supported Loan Funds

As of 2011, there were ten loan programs that were administered by the utilities.[93] These programs are listed in Table 8.2 below:

Table F.1. Utility Administered Loan Programs[94]

Utility Programs	Source	Year of Program Inception	Year of Program Expiration	Sector
NHEC Residential EE Loan	RGGI	2010	None	Res.
NHEC SmartSTART	NHEC	2002	None	Comm.
Liberty Residential Loan	RGGI	2010	None	Res.
Liberty Business & Municipal Loan	RGGI	2002	None	Comm., Muni.
PSNH EE Loan	RGGI	2010	None	Res.
PSNH SmartSTART	SBC	2004	None	Muni.
PSNH Energy Rewards	SBC	2004	None	Comm.
Unitil Residential Loan	RGGI	2010	None	Res.
Unitil Municipal Loan	RGGI	2010	None	Muni.
Total				

As noted in the Independent Study, "…finance is one tool that exists to reduce energy consumption. Like any project that requires many tools, the effectiveness of finance programs are largely dependent

[92] *Three-Year Energy Efficiency Plan 2013-2015, DPU 12-111, November 2,2012, Exhibit 1, page 96.*
[93] *Independent Study of Energy Policy Issues, VEIC et. al., September 30, 2011, page 10-1.*
[94] *Independent Study of Energy Policy Issues, VEIC et. al., September 30, 2011, page 10-2. Note that the figure uses 2010 Annual funding amounts for People's United: $420k; Nat. Grid Business Loan: $50k; PSNH Energy Rewards: $508k. Also, Liberty has consolidated the former National Grid Business and Municipal loan programs into a single, RGGI Funded loan program.*

on the effectiveness of state energy policy, marketing and outreach efforts. In New Hampshire's case, it is necessary to develop all of these tools synergistically with each other to make optimal use of funding, and realize the greatest impact from efforts."[95]

The section continues with over two dozen specific recommendations to improve the finance programs in New Hampshire, many of which apply directly to these loan programs.

- "Create umbrella structure with single LLR [loan loss reserve] facility to back commercial and residential loans.
- Coordinate and unify marketing and outreach.
- Unify lending and underwriting terms.
- Increase financial institution participation through greater scale of program size and loan pool
- Reduce operating costs through single, centralized administration.
- In lieu of single centralized program, coordinate programs within all sectors to unify messaging and program terms."[96]

Ratepayer-Supported On Bill Financing (OBF)

OBF programs represent a specific type of loan program that is unique to the utility industry. "On-bill loans and tariff-based financing systems are utility programs designed to help customers pay for energy efficiency upgrades through energy savings programs. These programs are set up so that the utility covers the cost of the energy upgrades and the customers pay the utility back through a charge on their monthly utility bill. Typically the electric and natural gas utilities run these programs, but programs are more successful when state governments adopt legislation or regulations that encourage and enable their adoption."[97]

After receiving state utility commission approval, the Public Service Company of New Hampshire and the New Hampshire Electric Cooperative ran a pilot on-bill financing program based on the Pay as You Save (PAYS) on-bill financing model. The pilot ran from 2002 – 2004, and the program subsequently received approval from the NH PUC to continue. Since then, the on-bill financing option has been expanded and made available to more customers covering a wider array of energy efficiency projects.

Tariffs & Rates

Most utility investments are recovered through their tariff and the rates therein. As a result, tariffs and rates literally represent a form of on-bill financing, and can be used to finance behind the meter investments in energy efficiency. The strategy recommendation in Section 7.3 envisions this kind of mechanism where behind-the-meter investments could be enabled in the future. Specifically, a voluntary tariff rider could be offered to electric and gas customers, who could chose to make investments in energy efficiency through their relationship with their

[95] *Independent Study of Energy Policy Issues, VEIC et. al., September 30, 2011, page 10-36.*
[96] *Ibid.*
[97] *http://www.localcleanenergy.org/State%20On-Bill%20Financing*

utility. These investments would be for permanent efficiency improvements in customers' homes or businesses/buildings (i.e., building envelope, HVAC, lighting fixtures) and would be funded up-front by the utility, with customer payback over time through voluntary, higher tariff rates.

So called "green rates" have also been a source of funding, particularly for investments in renewable energy. Many utilities around the nation offer their customers the choice to pay an adder on their electric bill that enables the electricity provider to supply (or credit) the customer with electricity from renewable sources such as solar, hydro and wind. The same concept could be applied to energy efficiency, and customers could choose to pay more for their electricity to ensure that there is adequate funding for investments in energy efficiency.

F.2 State Loan Funding

As of 2011, there were six loan programs that were overseen by the State.[98] These programs are listed in Table 7.3 below, and the same conclusions and recommendations from the ratepayer funded loan programs in Section 7.1 apply.

Table F.2: Loan Programs Overseen by the State[99]

State Programs	Source	Year of Program Inception	Year of Program Expiration	Sector
Better Buildings	ARRA	2011	2013	Comm. & Res.
Enterprise Energy Fund	ARRA	2010	None	Comm.
Municipal Energy Reduction Fund	RGGI	2010	None	Muni.
Business Energy Conservation Loan	RGGI	2009	None	Comm.
Giving Power Back (RMANH)[3]	RGGI	2009	2013	Comm.
Pay for Performance[3]	RGGI	2011	2012	Comm.

[98] *Independent Study of Energy Policy Issues, VEIC et. al., September 30, 2011, page 10-1.*
[99] *Ibid, page 10-3.*

F.3. State Bond Funding

The following funding sources already reside within existing New Hampshire agencies. Moving forward, the skills and experience in these agencies can provide potential financial and other technical assistance that can support implementation of an EERS.

NH Business Finance Authority - RSA 162-A[100]

Tax Exempt Bonds - New Hampshire annually receives an allocation of tax exempt bonding authority from the federal government. Because the proceeds are exempt from federal taxes, provided the bonds are used to serve a defined public purpose, these bonds are purchased by financial institutions at a lower interest rate. The current NH Business Finance Authority (BFA) allocation is just under $150 million a year. That allocation is presently undersubscribed. It might be that utilities could purchase some of these in bulk, with the proceeds then re-lent to undertake commercial or residential energy improvements. The original notes might then be paid back with dollars saved by the resultant energy savings. As such, the NH BFA could be viewed as a resource to assist in financing the reduction of energy consumption in New Hampshire.

Energy Efficiency and Clean Energy Districts, RSA 53-F[101] - This is a local option, whereby a municipality may establish an energy efficiency district, and then issue Qualified Energy Conservation Bonds (QECBs) to support energy efficiency improvements in that district. When the bond is repaid, the portion that is over and above the bond principle payments is placed into an energy efficiency revolving loan fund, pursuant to RSA 31:95-h (Revolving Funds).[102] Although envisioned as a municipal program, the NH BFA has taken on underwriting responsibility for nine New Hampshire counties because of its complexity. The City of Manchester has taken on similar responsibilities for itself and the remainder of Hillsborough County.

Business Energy Conservation Revolving Loan Fund – "The BFA's Business Energy Conservation RLF provides direct loans to improve energy efficiency in New Hampshire work places. Loans have flexible underwriting standards and loan terms, and they are structured to both reduce energy consumption and immediately save businesses money."[103]

NH Community Development Finance Authority - RSA 162-L[104]

Community Development Block Grant Program, 162-L:17 **-** The State receives an annual allocation of funds from the US Department of Housing and Urban Development for the benefit of low and moderate income individuals. In the past, some of these funds have been used by the NH Community Development Finance Authority (CDFA) for economic development projects, in which businesses borrow Community Development Block Grant (CDBG) funds to expand

[100] http://www.gencourt.state.nh.us/rsa/html/xii/162-a/162-a-mrg.htm
[101] http://www.gencourt.state.nh.us/rsa/html/iii/53-f/53-f-mrg.htm
[102] http://www.gencourt.state.nh.us/rsa/html/iii/31/31-95-h.htm
[103] http://www.nhbfa.com/Biz-Energy-Loan-Program.html
[104] http://www.gencourt.state.nh.us/rsa/html/xii/162-l/162-l-mrg.htm

employment opportunities for lower income individuals. There could be a focus here on economic development activities that emphasized a reduction in energy costs so as to increase employment, in addition to their more traditional use of assisting with the insulation and weatherization of the homes of lower income individuals.

Investment Tax Credits, 162-L:10 - NH CDFA is currently authorized to award up to $5 million in tax credits annually against the NH Business Profits Tax and/or the NH Business Enterprise Tax for projects that meet certain public purpose guidelines. Perhaps a similar tax credit program could be established for efforts that meet established energy goals/guidelines.

F.4 Municipal Bond Funding

An emerging and potentially important way for a municipal government to help create new funding opportunities for energy efficiency investments is through a Property Assessed Clean Energy (PACE) offering. As noted by PACE Now, a national organization promoting PACE nationwide,

> "PACE is a way to finance energy efficiency and renewable energy upgrades to buildings. Interested property owners evaluate measures that achieve energy savings and receive 100% financing, repaid as a property tax assessment for up to 20 years. The assessment mechanism has been used nationwide for decades to access low-cost long-term capital to finance improvements to private property that meet a public purpose. By eliminating upfront costs, providing low-cost long-term financing, and making it easy for building owners to transfer repayment obligations to a new owner upon sale, PACE overcomes challenges that have hindered adoption of energy efficiency and related projects in our nation's buildings."[105]

According to the Database of State Incentives for Renewables and Efficiency (DSIRE) New Hampshire enacted legislation in June 2010 (H.B. 1554) authorizing the state's cities, towns and village districts to establish energy efficiency and clean energy districts. To create such a district, a local government may incur debt (including through issuance of municipal revenue bonds, Qualified Energy Conservation Bonds or Clean Renewable Energy Bonds), establish revolving funds, provide financing and collect assessments to implement the program. Legislation enacted in July 2011 (H.B. 144) specified that PACE liens are junior to any existing liens.

Owners of private property (zoned for residential, commercial, industrial or "other" uses) may opt in to an energy financing district after such a district has been created and may obtain funding for a broad array of energy efficiency upgrades and/or renewable energy investments that are permanently affixed to the property. Energy improvements must be installed by qualified contractors after an energy audit is conducted.

The minimum total amount of assessments for a single-family property is $5,000, and the maximum is $35,000 or 15% of the assessed value of the property multiplied by the municipality's current equalization ratio, whichever is less. For other properties, the maximum is

[105] http://pacenow.org/about-pace/

$60,000 or 15% of the assessed value of the property multiplied by the municipality's current equalization ratio, whichever is less."[106]

F.5 Fuel Dealer Funding & the Thermal System Benefits Charge (SBC)

A 'thermal' SBC is a way to finance investments in energy efficiency that reduce heating oil and propane use. Buildings heated with unregulated fuels represent about 45% of the cost effective thermal energy savings opportunity in the state, and a thermal SBC could complement and supplement the existing SBC and LDAC that all electric and natural gas customers currently pay respectively.

A thermal SBC is typically assessed on unregulated heating fuels, and would need to be collected through fuel dealers (or some other wholesale distributor mechanism) instead of utilities. As a result, the proceeds are often directed at buildings that use heating fuels other than natural gas, but in New Hampshire's case, the funding generated from a thermal SBC could be directed through the existing CORE programs or through another programmatic channel.

F.6 Private Investment Funding

The ultimate goal of the first five strategies and funding options discussed above is to create a competitive market in which more individual building owners invest in energy efficiency improvements, independent of state or ratepayer funded programs. Similar to the market for mortgages and mortgage refinancing, buildings owners who are unable to self-finance these projects would have an array of public and privately sponsored choices to finance investments in energy efficiency.

Importantly, underwriting practices would be such that the potential investor would benefit from the investment immediately and without the risk of losing their investment if they were to sell the building. This is perhaps the largest barrier to investments in energy efficiency, and it is why PACE, ESCO and on-bill financing-style programs are evolving to overcome it.

There is a range of private investment funding choices.

Building Owner Funding

- Building owner pays out-of-pocket.
- Building owner borrows out of building equity.

ESCo Funding

- ESCo financing for large commercial buildings.
- Public Purpose ESCo for public buildings.

[106] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NH42F

These include building owner funding (self-financing), which can be accessed on an out-of-pocket basis or can be borrowed against the equity in the building. Large commercial building owners can often gain access to private financing by entering into a contract with an Energy Services Company (ESCo), who will typically guarantee the energy savings and make the up-front investment in energy efficiency themselves. Similarly, large public buildings may soon be able to access private financing through a Public Purpose ESCo that specializes in offering comprehensive energy retrofits and financing to underserved buildings that serve a public purpose, such as low income housing.

By establishing a state and ratepayer sponsored track record of successful investments in energy efficiency projects, privately funded alternatives like these will expand their roles and availability in the market and offer building owners more choice. Ultimately, greater choice will lead to greater competition, lower prices, and a more mature market for investments in energy efficiency improvements.