


Rhode Island Thermal Working Group Report

July 2015





This report is the result of a collaborative effort by members of the Rhode Island Thermal Working Group during 2014. Report authorship was jointly led by staff from the Rhode Island Office of Energy Resources (OER) and consultant staff to the Rhode Island Energy Efficiency and Resource Management Council (EERMC). Primary contributors included: Richard Faesy (Energy Futures Group), Jim Grevatt (Energy Futures Group), Mike Guerard (Optimal Energy), Sam Huntington (Optimal Energy), and Danny Musher (OER). Members of the Thermal Working Group who assisted in the development of this report included representatives from:

- Office of Energy Resources (OER)
- Commerce RI, Renewable Energy Fund (REF)
- Energy Efficiency and Resource Management Council (EERMC)
- Acadia Center
- Delivered fuels companies
- Oil Heat Institute of Rhode Island
- National Grid
- People's Power & Light (PP&L)

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List of Acronyms

ACS	American Community Survey
AHS	American Housing Survey
ARRA	American Reinvestment and Recovery Act
BCR	Benefit Cost Ratio
C&I	Commercial & Industrial
CAP	Community Action Program
CHIF	Connecticut Housing Investment Fund
C-PACE	Commercial Property Assessed Clean Energy
DFSBC	Delivered Fuels System Benefits Charge
DHS	Department of Human Services
DHW	Domestic Hot Water
DOE	Department of Energy
DOER	Department of Energy Resources
DRIFE	Demand Reduction Induced Price Effect
EEO	Energy Efficiency Obligation
EEU	Energy Efficiency Utility
EIA	Energy Information Administration
EMT	Efficiency Maine Trust
FCM	Forward Capacity Market
HES	Home Energy Solutions
HESP	Home Energy Savings Program
IE	Income Eligible
LCP	Least-Cost Procurement
LIHEAP	Low Income Home Energy Assistance Program
NHEC	New Hampshire Electric Co-op
NORA	National Oilheat Research Alliance
NYSERDA	New York State Research and Development Authority
OER	Office of Energy Resources
OHI	Oil Heat Institute
RASS	Residential Appliance Saturation Survey
RCS	Residential Conservation Services
RECS	Residential Energy Consumption Survey
RGGI	Regional Greenhouse Gas Initiative
RISEP	Rhode Island State Energy Plan
RPS	Renewable Portfolio Standard
SBC	System Benefits Charge
SEDS	State Energy Data System
SRP	System Reliability Procurement
SSI	Supplemental Security Income
TAFDC	Transitional Aid to Families with Dependent Children
TRB	Total Resource Benefits
WAP	Weatherization Assistance Program

Executive Summary

INTRODUCTION

Delivered fuels¹ play a central role in the thermal sector² of Rhode Island's energy economy. Over one-third of Rhode Island homes use delivered fuels for heating. These fuels supply nearly 40% of Rhode Island's overall heating needs. Despite the prevalence of delivered fuels, little dedicated energy efficiency program funding exists to serve delivered fuels customers³—even though the state currently ranks as a national leader in energy efficiency⁴. This gap creates recurring uncertainty in funding availability and scope, and precludes the ability to plan and offer energy efficiency services for delivered fuels customers at levels comparable with “Least-Cost Procurement”⁵ electric and gas programs.

To address these challenges, the Rhode Island Office of Energy Resources (OER) established a Thermal Working Group in 2014 with the purpose of evaluating how the state can better extend the full benefits of energy efficiency to delivered fuels heating customers. The working group's final report presents research, analysis, and recommendations for achieving a cleaner and more efficient energy system for the delivered fuels heating sector.

BACKGROUND AND CONTEXT

Throughout 2013 and 2014, OER developed a ten-year update to the Rhode Island State Energy Plan (RISEP). This process helped illuminate important gaps in Rhode Island's energy policy. In particular, the RISEP highlighted the thermal sector as a key area of opportunity for diversifying the state's energy supply, providing economic benefits to consumers and businesses, and achieving greenhouse gas reductions. Rhode Island's thermal sector accounts for approximately one-third of the state's total energy consumption, and delivered fuels currently supply about 38% of the thermal sector's energy needs. Delivered fuels are higher cost and more carbon intense relative to other heating fuels used in Rhode Island such as natural gas. Furthermore, reliance on delivered fuels exposes the state to potential fuel supply chain constraints and challenges because no petroleum products are produced or refined in New England. For the same reason, the vast majority of expenditure on delivered fuels leaves the state and regional economy.

Despite the energy security, economic, and environmental risks associated with delivered fuels, Rhode Island lacks a comprehensive strategy to invest in the least-cost solution available to delivered fuels customers—energy efficiency. For electricity and natural gas, Rhode

¹Delivered fuels refer to petroleum-based heating fuels, chiefly home heating oil, propane, and kerosene.

²Rhode Island's thermal sector comprises energy consumed in residential and commercial buildings primarily for space and water heating, and industrial sector fuel consumption to generate process heat.

³Existing dedicated program funding includes federal DOE and LIHEAP low-income funds that support fuel assistance and energy efficiency program funding that supports fuel-neutral weatherization and direct install measures.

⁴As of 2014, ACEEE ranked Rhode Island 3rd in the nation for energy efficiency:

<http://aceee.org/files/pdf/state-sheet/rhode-island.pdf>

⁵Rhode Island's Least-Cost Procurement mandate requires electric and natural gas distribution companies to invest in “all cost-effective energy efficiency” before the acquisition of additional supply:

<http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-1/39-1-27.7.HTM>

Island’s “Least-Cost Procurement” policy requires investment in all cost-effective energy efficiency before the acquisition of additional supply. No comparable mandate exists for the delivered fuels sector.

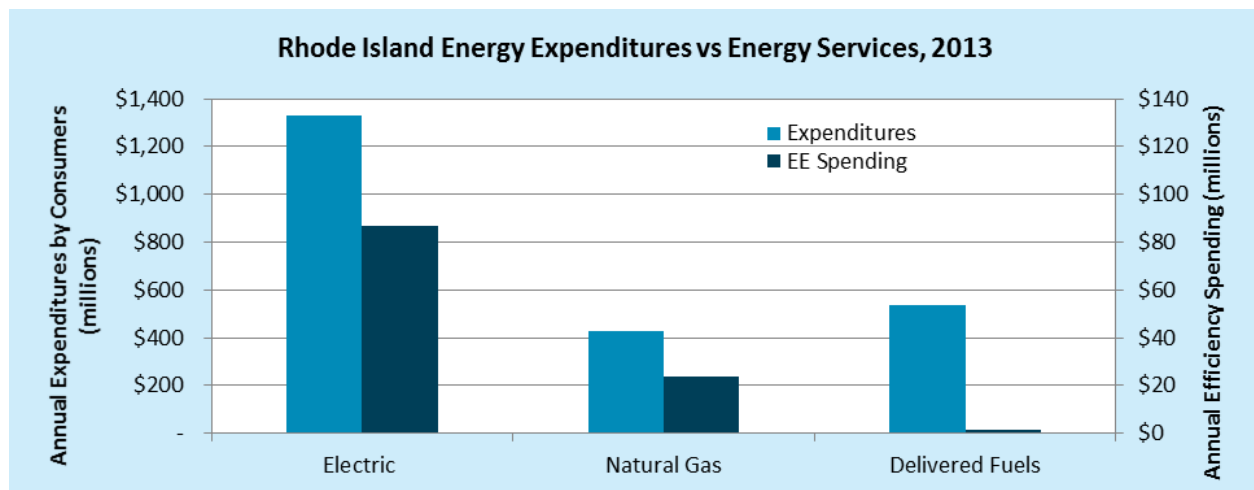
Although the state has been able to secure limited funding for delivered fuels energy efficiency over the past several years, demand for efficiency services has outstripped supply, leaving a significant portion of Rhode Islanders with minimal support or even no access to efficiency services for their thermal needs. This disparity is clearly illustrated through a simple comparison of Rhode Island’s annual energy expenditures relative to efficiency spending across fuels, as in Figure 1.

To address the need for a comprehensive strategy to invest in delivered fuels energy efficiency in Rhode Island, OER established the Rhode Island Thermal Working Group in early 2014 as part of its Regional Greenhouse Gas Initiative (RGGI) funded initiatives. The Working Group included key stakeholders representing:

- Office of Energy Resources (OER)
- Commerce RI, Renewable Energy Fund (REF)

- Energy Efficiency and Resource Management Council (EERMC)
- Acadia Center
- Delivered fuels companies
- Oil Heat Institute of Rhode Island
- National Grid
- People’s Power & Light (PP&L)

Given the significant and proven consumer, economic, and environmental benefits of electric and natural gas Least-Cost Procurement, the Thermal Working Group sought to better understand the potential design and benefits of a more comprehensive Least-Cost Procurement investment strategy in Rhode Island’s delivered fuels sector. During a series of bimonthly meetings over the course of 2014, the Working Group assembled the best available analysis and information to assess the potential size of the market, models for delivering the efficiency services, and strategies to provide adequate funding. The findings of this Working Group report are intended to inform future policy and programs for investing in all cost-effective delivered fuels energy efficiency in Rhode Island.



Source: EIA SEDS, National Grid 2013 Annual Report. Total delivered fuels EE funding in 2013 was estimated at \$1.6 million.

Figure 1. Energy efficiency for delivered fuels in Rhode Island is underfunded compared to electricity and natural gas, despite expenditures on delivered fuels accounting for nearly a quarter of all energy (electric and thermal) spending.

Objectives

The Thermal Working Group was charged with developing a roadmap for a “cleaner and more efficient energy system for homes and businesses using delivered fuels for heat.” Elements of a “cleaner and more efficient energy system” for delivered fuels were defined as the following:

- Increased building efficiency (weatherization) to reduce the amount of energy needed for heating/cooling;
- Higher efficiency delivered fuels equipment to require less fuel to create heating; and/or
- A transition to cleaner burning delivered fuels (biofuels, ultra-low sulfur diesel).

The Thermal Working Group conducted three information-gathering efforts to support the development of potential strategies to achieve a cleaner and more efficient delivered fuels sector:

1. ***Rhode Island Delivered Fuels Market Assessment:*** The purpose of the Market Assessment was to (1) better characterize

the current delivered fuels market in Rhode Island, and (2) to understand the costs, savings, and economic benefits of improving energy efficiency services for delivered fuels customers.

2. ***Delivered Fuels Jurisdictional Comparison for the Northeast:*** The purpose of the Jurisdictional Comparison was to evaluate delivery and funding mechanisms for delivered fuels energy efficiency services that are planned or active in other states.
3. ***Delivered Fuels Policy and Funding Options:*** The purpose of the Policy and Funding Options analysis was to explore potential opportunities for establishing a more stable, long-term funding stream for cost-effective investments in delivered fuels energy efficiency.

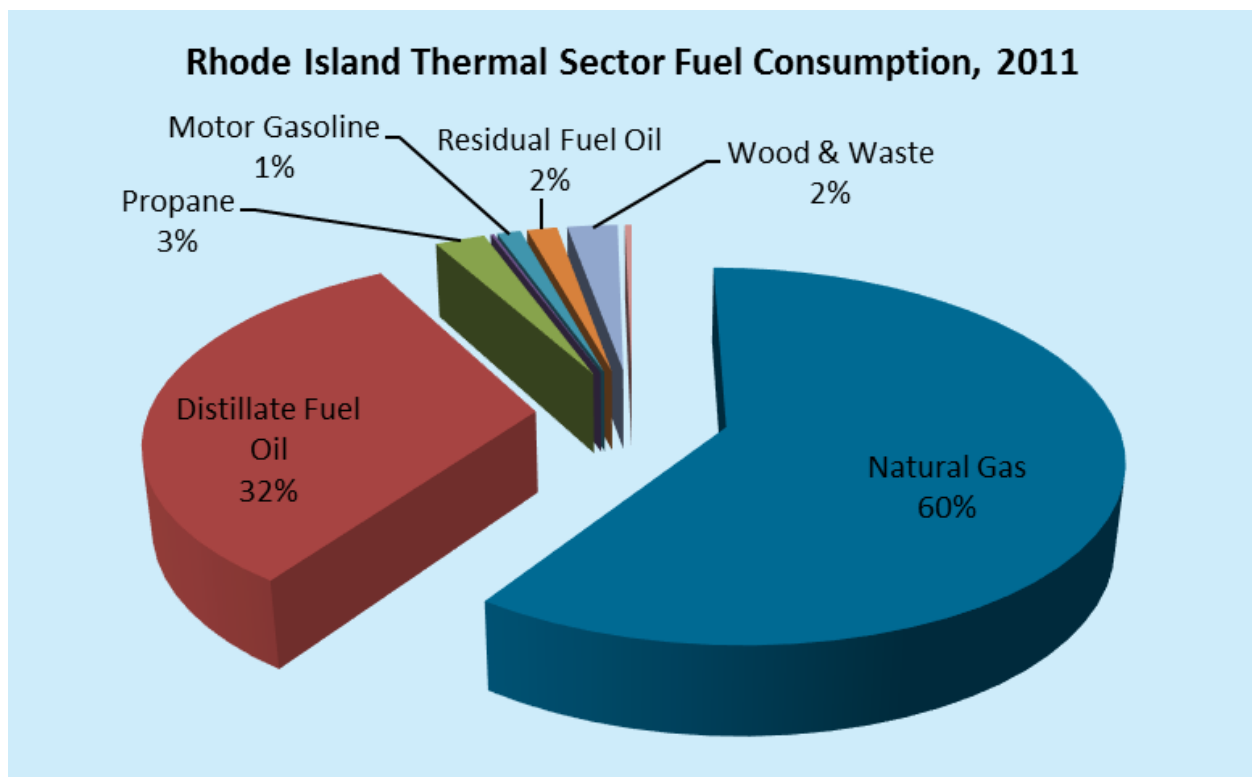
The research and findings of these efforts are contained in three appendices at the end of this report. The Executive Summary of this report contains overview information on the more detailed results contained in those appendices.

SUMMARY OF FINDINGS

Delivered Fuels Market Assessment

The purpose of the Delivered Fuels Market Assessment (“Market Assessment”) was to: (1) better characterize the current delivered fuels market in Rhode Island, and (2) to understand the costs, savings, and economic benefits of improving energy efficiency services for delivered fuels customers. Detailed results and findings may be found in Appendix 1.

Delivered fuels play a significant role in Rhode Island’s thermal sector. The major fuels used in Rhode Island’s thermal sector include natural gas and a variety of petroleum-based delivered fuels—chiefly distillate fuel oil⁶, propane, kerosene, motor gasoline⁷, and residual fuel oil. In total, delivered fuels consumption comprises approximately 38% of Rhode Island’s thermal sector fuel portfolio (Figure 2).



Sources and Notes: see Appendix 1 - Delivered Fuels Market Assessment

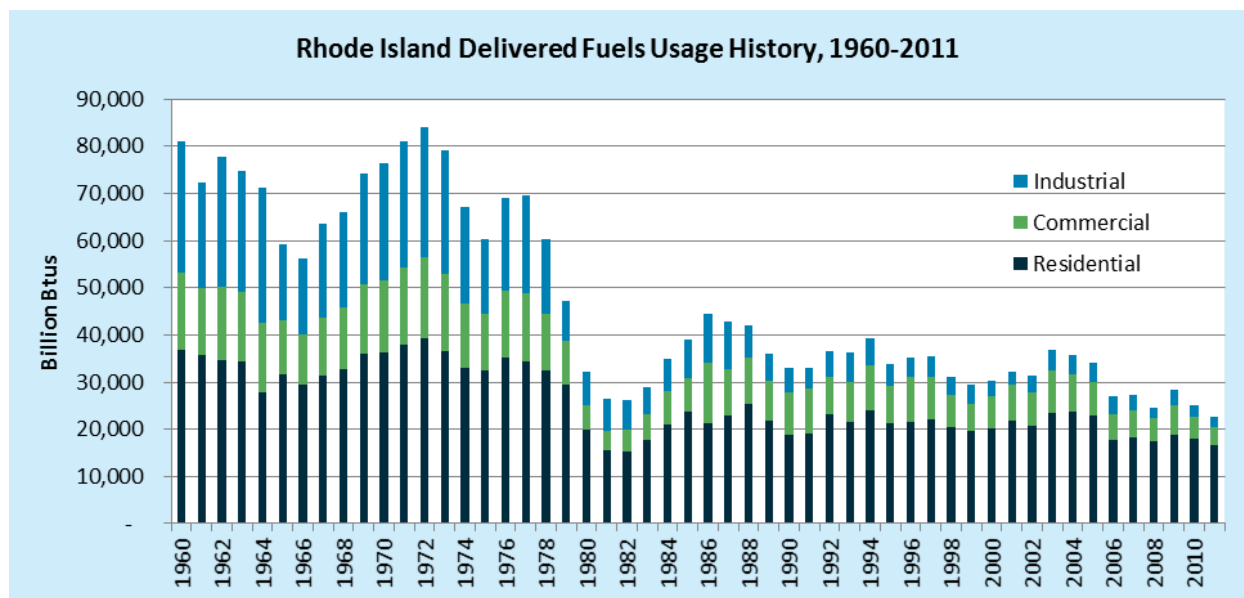
Figure 2. Rhode Island’s thermal sector fuel consumption profile is dominated by delivered fuels and natural gas.

⁶ Also commonly referred to as #2 fuel oil or home heating oil.

⁷ Non-transportation (i.e. thermal sector) consumption of motor gasoline in the commercial and industrial sectors covers a wide variety of applications including use in engines that power aerial lifts, fork lifts, mobile refrigeration units, generators, pumps, industrial sweepers/scrubbers, material handling equipment (such as conveyors), and portable well-drilling equipment.

Over the course of the past half century, however, consumption of delivered fuels in Rhode Island has declined steadily over time (Figure 3). Market economics, public initiatives, increases in heating equipment efficiencies, advancements in control technologies, building improvements, and alternative fuel options

(particularly, natural gas conversions) have all contributed to a trend in the reduced consumption of delivered fuels. New policies to support the growth of cleaner petroleum products—such as Rhode Island’s B5 bioblanding mandate by 2017—may further displace the sale of petroleum-based delivered fuels in Rhode Island.



Sources and Notes: see Appendix 1 - Delivered Fuels Market Assessment

Figure 3. Historical consumption of delivered fuels in Rhode Island homes and businesses has been declining steadily over time.

In total, approximately 186,400 Rhode Island homes and businesses heat with delivered fuels (Table 1). This represents about one-third of residential households. Single family homes—especially market rate households—appear to represent the most common delivered fuels

customer type. This finding aligns well with the general observation that delivered fuels energy providers tend to serve customers in rural locations away from gas lines, where housing tends to be predominantly single family and predominantly market rate.

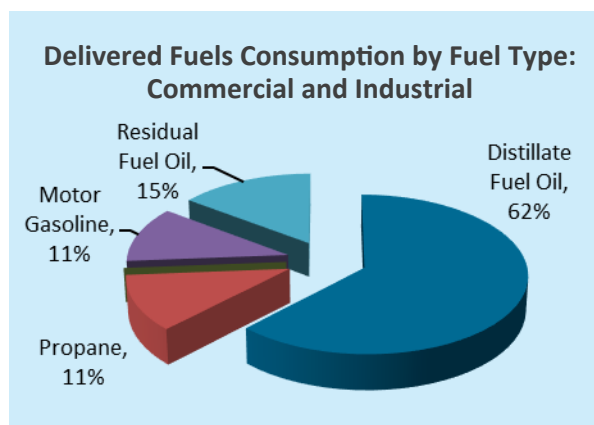
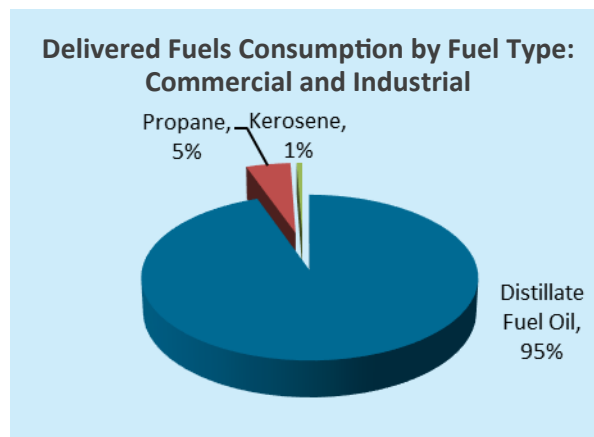
Table 1. Distribution of Delivered Fuels Customer Types and Consumption.

Customer Type	# of customers/accounts		Consumption (MMBtu)	
Single Family, Market Rate	93,700	50%	11,202,600	50%
Single Family, Income Eligible	48,600	26%	4,643,900	21%
Multifamily, Market Rate	3,600	2%	259,200	1%
Multifamily, Income Eligible	3,900	2%	224,700	1%
Commercial and Industrial	36,600	20%	5,902,500	27%
Total	186,400	100%	22,232,900	100%

Sources and Notes: see Appendix 1 - Delivered Fuels Market Assessment

Annual consumption of delivered fuels in Rhode Island totals 22.2 million MMBtu. Distillate fuel oil, or #2 home heating oil, represents the vast majority of this consumption. Other fuels used in the delivered fuels sector are propane, kerosene, motor gasoline, and residual fuel oil. In the residential sector, distillate fuel oil is by far the most widely used petroleum-based heating fuel, accounting for 95% of delivered fuels consumption (Figure 4). In the commercial and industrial sector, however, a more varied selection of fuels is used, with distillate fuel oil representing just under two-thirds of total consumption.

Despite the prominent role of delivered fuels in Rhode Island’s energy economy, energy efficiency investments have been historically lacking in the sector. Energy efficiency program services for delivered fuels customers have been available since 2010, but on a limited basis and funded through a patchwork of sources. These include, but are not limited to: American Recovery and Reinvestment Act (ARRA) funds, electric System Benefits Charge (SBC) funds, and Regional Greenhouse Gas Initiative (RGGI) funds. This report finds, however, that significant energy efficiency potential exists in Rhode Island’s delivered fuels sector—approximately 3.4 million MMBtus, or 15% of total consumption (Table 2).



Sources and Notes: see Appendix 1 - Delivered Fuels Market Assessment

Figure 4. Distillate fuel oil is the most widely used fuel type by residential delivered fuels heating customers in Rhode Island; commercial customers use a more varied assortment of delivered fuels for their thermal needs.

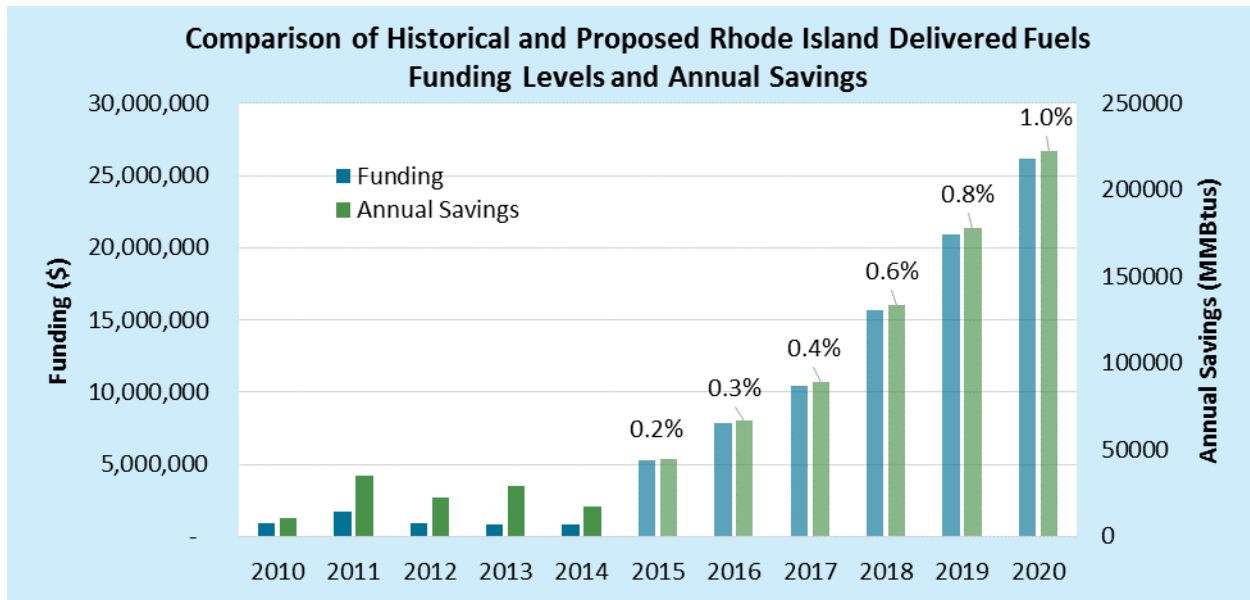
Table 2. Estimate of Cost-Effective Delivered Fuels Sector Energy Efficiency Potential in Rhode Island

		Residential Market Rate	Residential Income Eligible	Commercial and Industrial	Total
A	Total Consumption (MMBtu)	11,461,800	4,868,600	5,902,500	22,232,900
B	% savings potential	20%	20%	20%	
C	% applicable	80%	80%	80%	
D	Already Complete (MMBtu)	74,800	39,900		114,700
E	Total Potential (MMBtu)	1,759,100	739,100	944,400	3,442,600

Sources and Notes: see Appendix 1 - Delivered Fuels Market Assessment

Rhode Island’s current Least-Cost Procurement mandate requires investment in all cost-effective electric and natural gas energy

efficiency before the acquisition of additional supply. No comparable mandate exists for the delivered fuels sector.



Sources and Notes: see Appendix 1 - Delivered Fuels Market Assessment

Figure 5. Increasing investment in delivered fuels energy efficiency will require higher funding levels to achieve savings targets.

Figure 5 displays an illustrative schedule of hypothetical savings targets, expressed as a percent of 2014 sales, associated annual energy savings, and the corresponding program budgets required to support more aggressive investments in delivered fuels energy efficiency. The data helps contextualize current and past investments in delivered fuels efficiency. Past investments in delivered fuels energy efficiency represent annual savings on the order of 0.1% of total consumption, far below the levels of Rhode Island’s annual investment in electricity and natural gas energy efficiency (currently set at 2.5% and 1.0% of annual load, respectively).

Least-Cost Procurement of delivered fuels

energy efficiency resources would yield considerable economic benefits to Rhode Island, largely in the form of lower bills for households and businesses relying on delivered fuels for space and water heating. For instance, following the illustrative schedule of hypothetical savings targets in Table 3 is estimated to yield cumulative benefits of \$331.0 million and cost a total of \$86.3 million over the period of 2015 to 2020. Under this scenario, the benefit cost ratio (BCR) of the investments in delivered fuels energy efficiency is 3.84, indicating that capturing these savings would be very cost-effective, returning approximately \$3.84 to participants for every dollar invested.

Table 3. Savings, Costs, and Benefits from Least-Cost Procurement of Delivered Fuels in Rhode Island

Year	Annual Savings (MMBtu)	Lifetime Savings (MMBtu)	Benefits (Millions \$)	Costs (Millions \$)
2015	44,500	700,500	\$ 20.1	\$ 5.2
2016	66,700	1,049,900	\$ 30.1	\$ 7.8
2017	88,900	1,399,300	\$ 40.1	\$ 10.5
2018	133,400	2,099,800	\$ 60.2	\$ 15.7
2019	177,900	2,800,300	\$ 80.2	\$ 20.9
2020	222,300	3,499,100	\$ 100.3	\$ 26.1
Total	733,700	11,548,900	\$ 331.0	\$ 86.3

Sources and Notes: see Appendix 1 - Delivered Fuels Market Assessment

Jurisdictional Comparison

The purpose of the Jurisdictional Comparison was to evaluate delivery and funding mechanisms for delivered fuels energy efficiency services that are planned or active in other states. In order to better understand how other regional states handle efficiency initiatives for buildings that use delivered fuels, Rhode Island's thermal sector was compared to conditions in the other five New England states and New York for both the residential and commercial sectors. Detailed results and findings may be found in Appendix 2.

The program review revealed both common characteristics and significant discrepancies in the availability of delivered fuels services. For example, all of the states reviewed provide some form of home retrofit services to both low-income and non-low income residential customers who use fuel oil or propane for heating their homes. In most cases these programs are fuel neutral—in other words, they are available regardless of whether the primary heating fuel is oil, propane, natural gas, or electricity. However, the services available to commercial customers who use oil or propane are considerably more limited. Similarly, only some of the states have programs that specifically help either residential or commercial customers upgrade existing heating equipment to high efficiency equipment.

In Rhode Island, programs provide fuel neutral support for electric measures (e.g. lighting, appliances) regardless of the primary heating fuel. However, the weatherization incentives that are available for delivered fuels customers are lower than those available for electric- and gas-heated homes (25% incentive versus 50% incentive as of 2015). Furthermore, the funding to support those weatherization incentives has only been available on a limited basis and funded through a patchwork of sources, at levels significantly below the budgets available

for electric- and gas-heating customers. With the exception of a one-time program offering for agricultural customers, no specific programs for commercial delivered fuels customers have been offered to date. Finally, no direct incentive programs are available to help delivered fuels customers upgrade existing heating equipment to high efficiency equipment, however, the 0% HEAT Loan can finance efficient equipment and weatherization for all fuels.

The program funding approach taken by the various states considered also varies with the policy frameworks that direct the programs' planning and operations. In some cases there are discreetly managed funding streams tied to services for oil and propane customers, but in others, budgets are blended from a variety of sources and services and offered to all customers regardless of heating fuel used. In the latter case, there is not necessarily any attempt made to connect the specific funding source to specific projects. In yet other cases, electric System Benefits Charge (SBC) charges are used to directly fund services to oil and propane users. In Rhode Island, funding sources have included American Recovery and Reinvestment Act (ARRA) funds, electric SBC funds, and in recent years, Regional Greenhouse Gas Initiative (RGGI) funds.

The primary funding sources for energy efficiency programs for delivered fuels customers in New England and New York include:

- Electric SBC funds—used to a modest degree in Vermont for non-electric customers, and to a larger degree in New Hampshire, Massachusetts, Connecticut, and New York. Rhode Island has used these funds to support delivered fuels energy efficiency programs.
- RGGI and FCM revenues—used specifically

for delivered fuels customers in Vermont, and to increase the CORE efficiency program budgets in New Hampshire. Rhode Island has used RGGI funds to support delivered fuels energy efficiency programs. It is not clear how these revenues are used in the remaining states.

- Gross receipts tax on heating fuels—used for the Low Income Weatherization Trust Fund in Vermont.
- Federal WAP and LIHEAP funds for low income weatherization—used in all states, with supplements from state and utility funds that vary with each state.

While Rhode Island has taken some initial steps to support delivered fuels efficiency, funding has been inconsistent and policies have not fully addressed this sector. Rhode Island delivered fuels customers can benefit from the experience of other Northeast states and a renewed focus on policies, programs and committed funding that supports this sector.

Policy and Funding Options

The purpose of the Policy and Funding Options analysis was to explore potential opportunities for establishing a more stable, long-term funding stream for cost-effective investments in delivered fuels energy efficiency. Detailed results and findings may be found in Appendix 3.

The policy and funding options review considered some policy options for longer-term delivered fuels funding approaches for Rhode Island. Many of the policies and funding concepts suggested are not new. However, most have not been widely applied to delivered fuels efficiency initiatives. It will be necessary for Rhode Island policymakers to dive deeper to more fully understand the nuances and implications before proceeding with any one or a combination of options.

In considering policy and funding options, the Thermal Working Group developed a series of principles that should be considered as one weighs the merits and shortcomings of any approach:

1. Funding streams should be **sustainable and sufficient** to meet the state’s mandated goals.
2. Funding levels should be **dynamic** to ramp up and down over time as needed.
3. The level of funding should **balance short-term costs with the benefits of providing long-term affordability** to all Rhode Islanders; mechanisms should be put in place to minimize financial impacts on low-income Rhode Islanders.
4. Funding sources, like program delivery, should be **equitable across non-electric fuels and by customer class** (residential, commercial, etc.); cross-subsidization between fuels and customer classes should be minimized; equitable treatment for in-state and out-of-state fuel providers should also be addressed.
5. Mechanisms that are **administratively efficient** to create and implement, simple, and auditable are preferred.
6. The collection mechanism, sources, and uses of public funding must be **transparent**.
7. **Price signals** should support state energy policy goals.
8. Comprehensive delivered fuels energy efficiency programs should support the vibrancy of Rhode Island **communities and enhance competitiveness** of Rhode Island businesses.
9. Public funding should be used to **leverage private sources of capital**, where possible, to get the best return on each public dollar invested.

10. Public funding should be used **only to the extent that it is needed** to mobilize capital and meet private market shortcomings.

After settling on these principles for funding options, the Thermal Working Group developed an initial set of nine policy and funding options

to evaluate (Table 4). The different options were examined, described, and characterized according to their barriers, responses to barriers, pros, cons, and next steps. The nine policy and funding options are listed below, with all of the details presented in Appendix 3:

Table 4. Summary of Policy and Funding Options for Delivered Fuels Energy Efficiency Programs

Policy Option	Description
<i>Delivered Fuels System Benefits Charge</i>	Similar to the electric “system benefits charge” (SBC) raised from each kWh or therm to fund electric and natural gas efficiency programs, a “delivered fuels system benefits charge” (DFSBC) could raise funds for efficiency initiatives from fossil fuels.
<i>Expand Electric System Benefit Charge to Cover Delivered Fuels</i>	Rhode Island could increase the current system benefit charge (SBC) imposed on electricity to provide more funding for delivered fuels.
<i>RGGI Funds</i>	Rhode Island receives Regional Greenhouse Gas Initiative (RGGI) funds. A portion of RGGI funds could be directed to be spent supporting delivered fuels energy efficiency.
<i>FCM Funds</i>	The Forward Capacity Market (FCM) holds annual auctions looking ahead three years and pays states for efficiency obligations. A portion of FCM funds could be directed to be spent supporting delivered fuels energy efficiency.
<i>Gross Receipts Tax</i>	A tax to fund delivered fuels programs could be imposed at the energy distribution level based on their gross sales of energy.
<i>Energy Efficiency Obligation</i>	An Energy Efficiency Obligation (EEO) uses markets and rewards innovation to drive energy efficiency in the delivered fuels sector. With an EEO, the regulator would set a “savings requirement” target that the delivered fuels industry would have to meet.
<i>111(d) Off-Sets</i>	When 111(d) goes into effect, it could have the potential to raise the value of the carbon off-sets above current RGGI rates, providing greater revenues to states like Rhode Island.
<i>Carbon Tax</i>	A carbon tax could be placed on delivered fuels, based on the CO ₂ content of those fuels, to generate revenue that could be redirected to programs or ratepayers.
<i>Tax Incentives</i>	Rhode Island could amend the tax code to allow for certain tax credits as an incentive for homeowners and businesses investing in energy efficiency.

Sources and Notes: see Appendix 3 - Delivered Fuels Policy and Funding Options

While developing the list of policy and funding options, the Thermal Working Group also identified some key questions that need to be addressed as policies and funding options are considered:

- Who collects the funds and is responsible for managing and distributing them?
- Who administers the programs if the funding source is no longer from electric and gas ratepayers?
- How are these new programs coordinated with the existing National Grid programs? Or, do they become one-and-the-same program, with an expanded scope of services?
- What role does the EERMC have in this new scope of services? What about the delivered fuels industry?

With the list of policy and funding options finalized, the Thermal Working Group reviewed

the pros and cons of each option, with an eye to near-term and long-term solutions for funding. Using the principles above, policy options were sorted for priority consideration. The long-term approach that rose to the top of the list was a “delivered fuels system benefit charge” (Table 5). This solution would meet all of the principles identified including avoiding fuel cross-subsidization, would send the right price signals to reduce its use and could be scaled up and down to meet programmatic needs. However, as has been experienced in other states, the politics around raising fuel costs have been very challenging. Further discussions will be needed to explore such a long-term approach, while addressing concerns expressed by the industry. In the meantime, Rhode Island should continue to use short-term options for funding—at a minimum—the existing suite of energy efficiency programs available to delivered fuels customers in the state.

Table 5. Illustrative Rhode Island Delivered Fuels Systems Benefits Charge

\$/Gal. Charge	Yield	Annual Cost per Average Oil/Propane/Kerosene Customer	Monthly Heating Season Cost (Nov. - March)
\$ 0.01	\$ 1,795,500	\$ 7.58	\$1.52
\$ 0.02	\$ 3,591,000	\$ 15.17	\$3.03
\$ 0.03	\$ 5,386,500	\$ 22.75	\$4.55
\$ 0.04	\$ 7,182,000	\$ 30.33	\$6.07
\$ 0.05	\$ 8,977,500	\$ 37.91	\$7.58

Sources: see Appendix 3 - Delivered Fuels Policy and Funding Options

RECOMMENDATIONS

Based on the research, analysis, investigations and discussions, the Thermal Working Group recommends the following next steps in moving towards a “cleaner and more efficient energy system for homes and businesses using delivered fuels for heat”:

1. Continue dialogue between members of the Thermal Working Group

The Thermal Working Group meetings have helped bring together delivered fuels stakeholders who normally don't interact on a regular basis—including OER, EERMC, the Oil Heat Institute, and local fuel dealers. As the lead coordinating agency for the Thermal Working Group, OER should continue to work to foster a long-term partnership among these stakeholders, thereby establishing relationships and building trust.

2. Craft a collaborative vision and action plan for the Rhode Island fuel dealer industry of the future

Rhode Island's fuel dealer industry faces challenges including declining sales, consolidation, and competition from natural gas and cold climate heat pumps. However, from the State's perspective, fuel dealers can be valuable partners in driving Rhode Island to a secure, cost-effective and sustainable energy future. Fuel dealers' customer relationships, delivery infrastructure, and technical skills are assets in the new clean energy economy.

- Develop a mutually-beneficial vision and roadmap for fuel dealers to participate as active partners in the State's efforts to extend the benefits of energy efficiency, clean energy, cost-savings, and fuel options to all consumers.

- Build on the impressive progress made to date by the delivered fuels industry to reduce Rhode Island's carbon footprint.
- Research to better understand the technical, economic, availability and practical options of future renewable thermal technologies—including biofuels, heat pumps, and wood/wood pellets.
- Identify new business and job growth opportunities for fuel dealers that align with state energy, economic, and environmental policy goals—such as a transition to “energy service companies.”
- Based on the vision and opportunities, develop a one-year action plan with concrete outcomes.

3. Determine appropriate fuel dealer stakeholder engagement strategy

To date, OER has interacted with the Oil Heat Institute Executive Director and representatives from two fuel dealer companies in the Thermal Working Group. Consideration should be given to the value of a broader outreach effort to fuel dealers.

- Determine the extent to which direct outreach to fuel dealers through educational seminars, training resources, or other engagement efforts would support the goals outlined in the action plan.
- If outreach is determined to be valuable, discuss with the Oil Heat Institute the best way to engage members and gauge fuel dealer interest.

- One potential item would include inviting local fuel dealers that have successfully transitioned into more comprehensive energy services companies—with a focus on efficiency—to share their experience: successes, challenges, and on-going market/regulatory barriers.

4. Determine market development strategy for renewable thermal heating technologies

In many cases, low- and no-carbon heating technologies—such as highly efficient cold climate heat pumps (especially paired with photovoltaic solar systems), wood/wood pellets, solar thermal, and biofuels—offer lifecycle cost-savings compared to delivered fuels. These technologies also require a similar delivery infrastructure to delivered fuels; energy service companies are still needed to install, service and, in the case of pellets and biofuels, deliver fuel.

- Build up a strong training and technical infrastructure in support of the technology, with certification, such as NORA Gold⁸, supported by the Oil Heat Institute.
- Work with delivered fuels dealers to engage in these systems as they transition into new business opportunities.

5. Develop policies and a sustainable funding stream to match the potential for savings

The Thermal Working Group report indicates that significant potential exists in Rhode Island for delivered fuels energy

efficiency. Investing in this efficiency is projected to provide substantial consumer, economic, and environmental benefits that outweigh the costs. The next step to develop a long-term solution for funding delivered fuels energy efficiency is to work on a more detailed funding proposal for delivered fuels energy efficiency.

- Work with stakeholders to develop a more fully fleshed out proposal for a sustainable funding mechanism for delivered fuels energy efficiency, seeking areas of common ground by setting a framework of mutually-beneficial principles.
- Establish consensus by identifying areas where stakeholders disagree and determine what would be needed to overcome objections.
- Based on the foundational work above, work toward developing a comprehensive policy framework proposal that could be considered by stakeholders and leadership in the 2016 legislative session.
- Until there is a sustainable funding source established through legislation, continue to leverage RGGI and SBC funds, as appropriate, to support delivered fuels customers.

⁸ http://www.noraed.org/dcontent.cfm?keyword=Gold_More

Appendix 1: Rhode Island Delivered Fuels Market Assessment

Purpose

This report is the first of three information-gathering efforts conducted by the Rhode Island Thermal Working Group during 2014 in support of developing a plan to achieve a cleaner and more efficient delivered fuels sector. The Rhode Island Thermal Working Group was funded and directed by the Rhode Island Office of Energy Resources.

The purpose of the Delivered Fuels Market Assessment (“Market Assessment”) was to: (1) better characterize the current delivered fuels market in Rhode Island, and (2) to understand the costs, savings, and economic benefits of improving energy efficiency services for delivered fuels customers.

Introduction

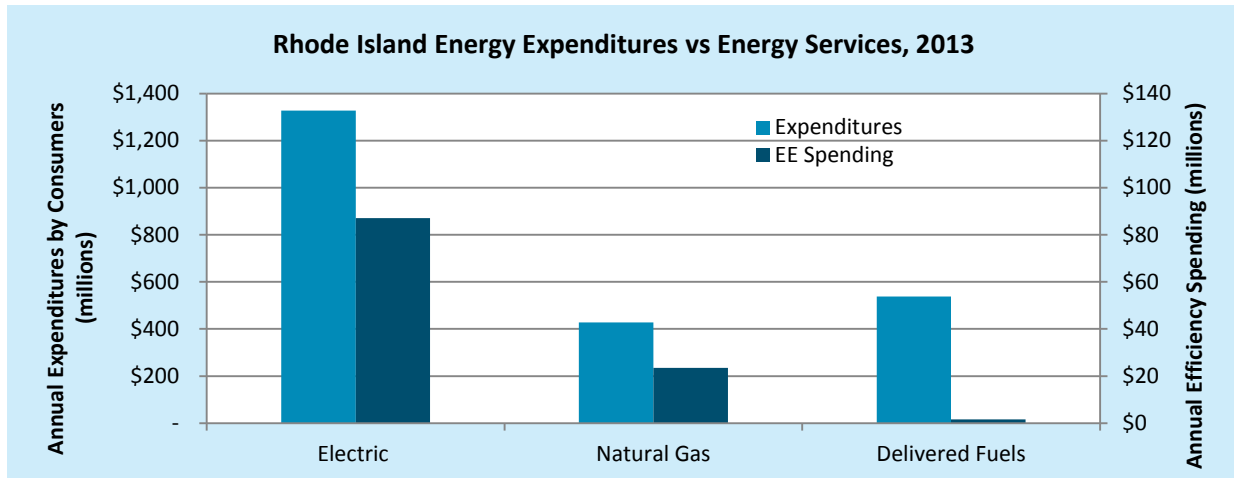
Delivered fuels¹ play a central role in the thermal sector of Rhode Island’s energy economy. Over one-third of Rhode Island homes use delivered fuels for heating. These fuels supply nearly 40% of Rhode Island’s overall heating needs. Despite the prevalence of delivered fuels, little dedicated energy efficiency program funding exists to serve delivered fuels customers²—even though the state currently ranks as a national leader in energy efficiency³.

This report presents analysis intended to achieve two purposes: (1) contextualize Rhode Island’s past investments in delivered fuels energy efficiency, and (2) explore an alternate vision for the future. Historically, Rhode Island energy efficiency programs for delivered fuels customers have relied on a patchwork of funding sources, faced recurring uncertainty in funding availability, and offered limited programs compared to “Least-Cost Procurement” investments in electricity and natural gas. Although the state has been able to secure limited funding for delivered fuels energy efficiency over the past several years, demand for efficiency services has outstripped supply, leaving a significant portion of Rhode Islanders with no access to efficiency services for their thermal needs. This disparity is clearly illustrated through a simple comparison of Rhode Island’s annual energy expenditures relative to efficiency spending across fuels, as in Figure 1.

¹ Delivered fuels refer to petroleum-based heating fuels, chiefly home heating oil, propane, and kerosene.

² Existing dedicated program funding includes federal DOE and LIHEAP low-income funds that support fuel assistance and energy efficiency program funding that supports fuel-neutral weatherization and direct install measures.

³ As of 2014, ACEEE ranked Rhode Island 3rd in the nation for energy efficiency: <http://aceee.org/files/pdf/state-sheet/rhode-island.pdf>



Source: EIA SEDS, National Grid 2013 Annual Report. Total delivered fuels EE funding in 2013 was estimated at \$1.6 million.

Figure 1. Energy efficiency for delivered fuels in Rhode Island is underfunded compared to electricity and natural gas, despite expenditures on delivered fuels accounting for nearly a quarter of all energy (electric and thermal) spending.

For electricity and natural gas, Rhode Island’s “Least-Cost Procurement” policy requires investment in all cost-effective energy efficiency before the acquisition of additional supply. No comparable mandate exists for the delivered fuels sector. Given the significant and proven consumer, economic, and environmental benefits of electric and natural gas Least-Cost Procurement, the Market Assessment attempts to better define what a potential “Least-Cost Procurement” approach to the delivered fuels sector could look like. The Market Assessment presents analysis and proposes feasible near- and medium-term targets, ramp-up rates, and associated budgets necessary to achieve Least-Cost Procurement levels of investment in the delivered fuels sector.

The following sources of information supplied data for the Market Assessment research:

- 2007 U.S. Department of Energy (DOE) Residential Energy Consumption Survey (RECS)
- Energy Information Administration (EIA) State Energy Data System (SEDS)
- National Grid billing and account data
- 2012 U.S. Census Bureau American Community Survey (ACS)
- U.S. Census American Housing Survey (AHS)
- Oil Heat Institute of Rhode Island
- National Oil Heat Research Alliance (NORA)
- 2009 Residential Appliance Saturation Survey (RASS) for the Commonwealth of Massachusetts

The data gathered from the above sources was supplemented with information from Rhode Island fuel dealers and other stakeholders knowledgeable about energy efficiency or delivered fuels.

The Market Assessment contains two main sections:

1. Market Profile: The Market Profile section presents summary information on the size of the existing delivered fuels market, consumption patterns, distribution of customer types, end-use equipment technologies and other key market characteristics.
2. Energy Efficiency Potential: The Energy Efficiency Potential section provides a high-level estimate of energy efficiency potential in Rhode Island's delivered fuels sector. The estimate is informed by the results of the Market Profile, delivered fuels energy efficiency activities to date in Rhode Island, and other market trends. The potential estimate is combined with assumptions about program costs, benefits, and scalability to estimate feasible near-term savings targets for the delivered fuels sector.

Market Profile

The Market Profile section presents summary information on the size of the existing delivered fuels market, consumption patterns, distribution of customer types, end-use equipment technologies and other key market characteristics.

The results of the Market Profile analysis demonstrate that:

- Delivered fuels play a significant role in Rhode Island’s thermal sector, supplying approximately 38% of Rhode Island’s heating needs.
- Approximately 34% of residential customers in Rhode Island heat with delivered fuels.
- Consumption of delivered fuels is declining over time.
- Usage is concentrated in market rate single family homes, with secondary use in income eligible single family as well as commercial and industrial buildings.
- Delivered fuels customers are mostly located in more rural areas off the gas mains, using mainly #2 distillate fuel oil-fired boilers and furnaces.

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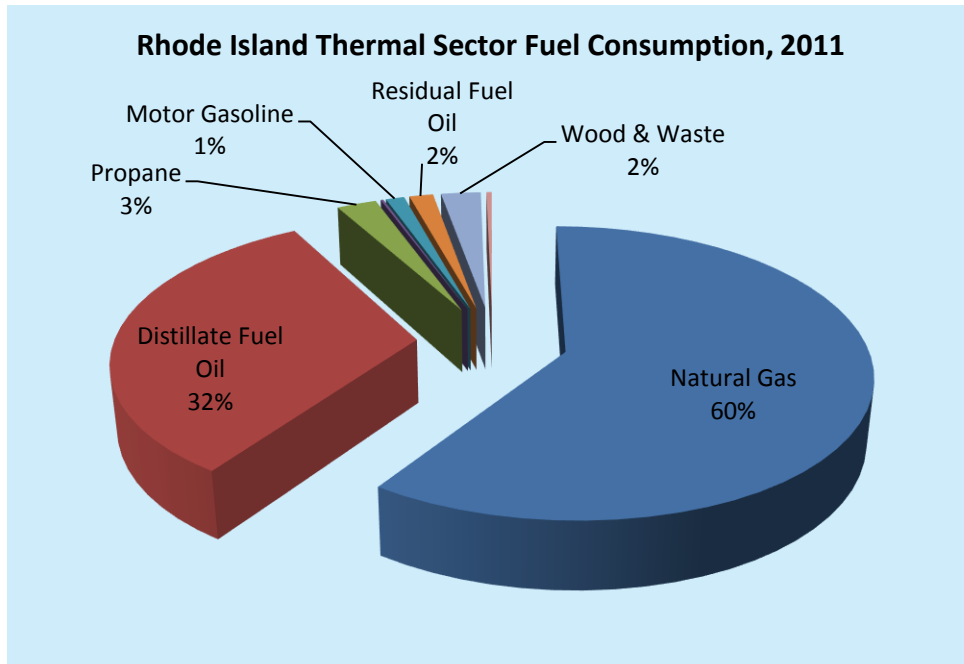
What role do delivered fuels play in Rhode Island’s overall thermal sector?

Rhode Island’s thermal sector includes energy consumed in residential and commercial buildings primarily for space and water heating, and industrial sector fuel consumption to generate process heat. Major fuels used in Rhode Island’s thermal sector include natural gas and a variety of petroleum-based delivered fuels—chiefly distillate fuel oil, propane, kerosene, motor gasoline, and residual fuel oil. The historical use of non-biomass renewable sources of thermal energy for heating purposes, including solar and geothermal, is negligible. As shown in Table 1 and Figure 2, delivered fuels supply a significant portion—approximately 38% in total—of Rhode Island’s heating needs.

Table 1. Rhode Island Thermal Sector Fuel Consumption, 2011 (Billion Btus)

Fuel Type	Residential	C&I	Total
Natural Gas			
	17,300	18,700	36,000
Delivered Fuels			
Distillate Fuel Oil	15,700	3,800	19,500
Propane	800	700	1,500
Kerosene	100	-	100
Motor Gasoline	-	700	700
Residual Fuel Oil	-	900	900
	16,600	6,100	22,700
Other (Renewables)			
Wood & Waste	1,200	300	1,500
Geothermal & Solar	200	-	200
	1,400	300	1,700
Grand Total	35,300	25,100	60,400

Source: EIA SEDS, 2011

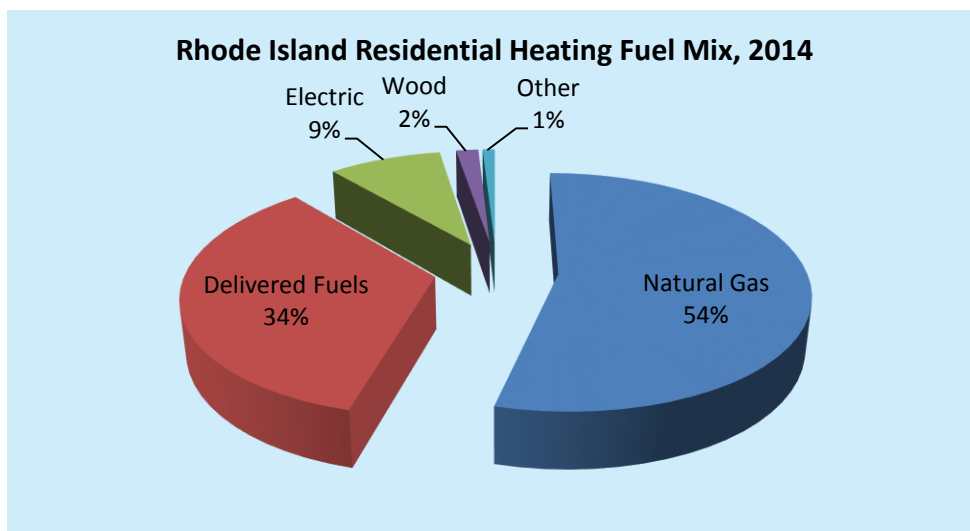


Source: EIA SEDS, 2011

Figure 2. Rhode Island’s thermal sector fuel consumption profile is dominated by delivered fuels and natural gas.

What percentage of Rhode Island customers heat with delivered fuels?

The primary fuels used by Rhode Island residential heating customers are natural gas, delivered fuels, electricity, and wood. Approximately 34% of Rhode Island residential customers heat with delivered fuels (Figure 3). No data was available on the breakout of commercial and industrial customers by heating fuel types.

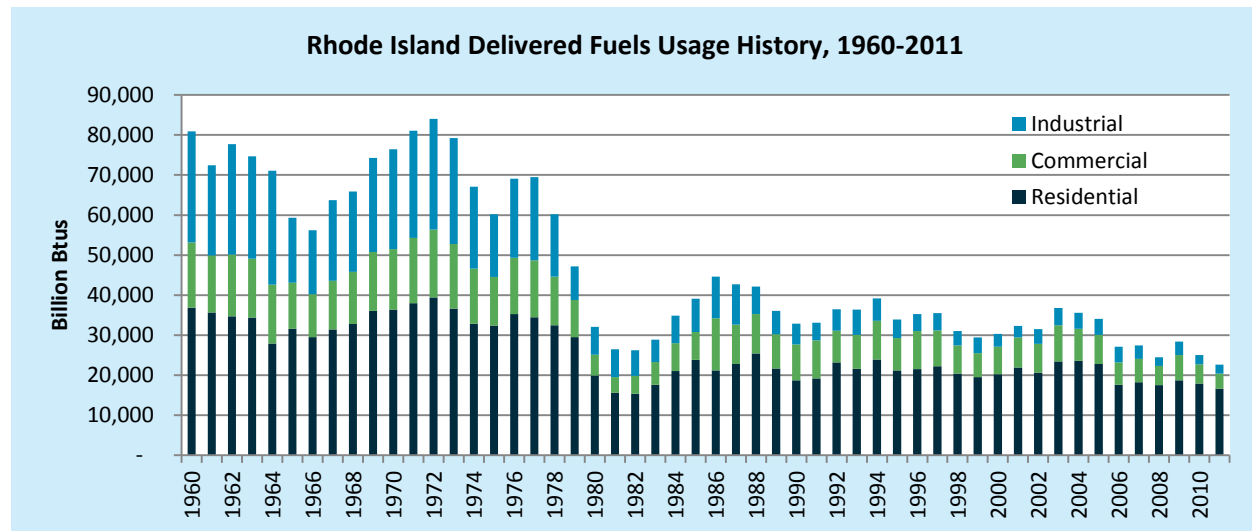


Source: National Grid, ACS. ACS data normalized to National Grid account data for gas and electric customers.

Figure 3. Approximately one-third of Rhode Island homes heat with delivered fuels.

How has delivered fuels usage in Rhode Island changed over time?

Historical consumption of delivered fuels in Rhode Island homes and businesses has been declining steadily over time, as seen in Figure 4. Market economics, public initiatives, increases in heating equipment efficiencies, advancements in control technologies, building improvements, and alternative fuel options (particularly, natural gas conversions) have all contributed to a trend in the reduced consumption of delivered fuels. New policies to support the growth of cleaner petroleum products—such as Rhode Island’s B5 bioblending mandate by 2017—may further displace the sale of petroleum-based delivered fuels in Rhode Island.



Source: EIA SEDS

Figure 4. Over the course of the past half century, consumption of delivered fuels in Rhode Island has declined steadily over time.

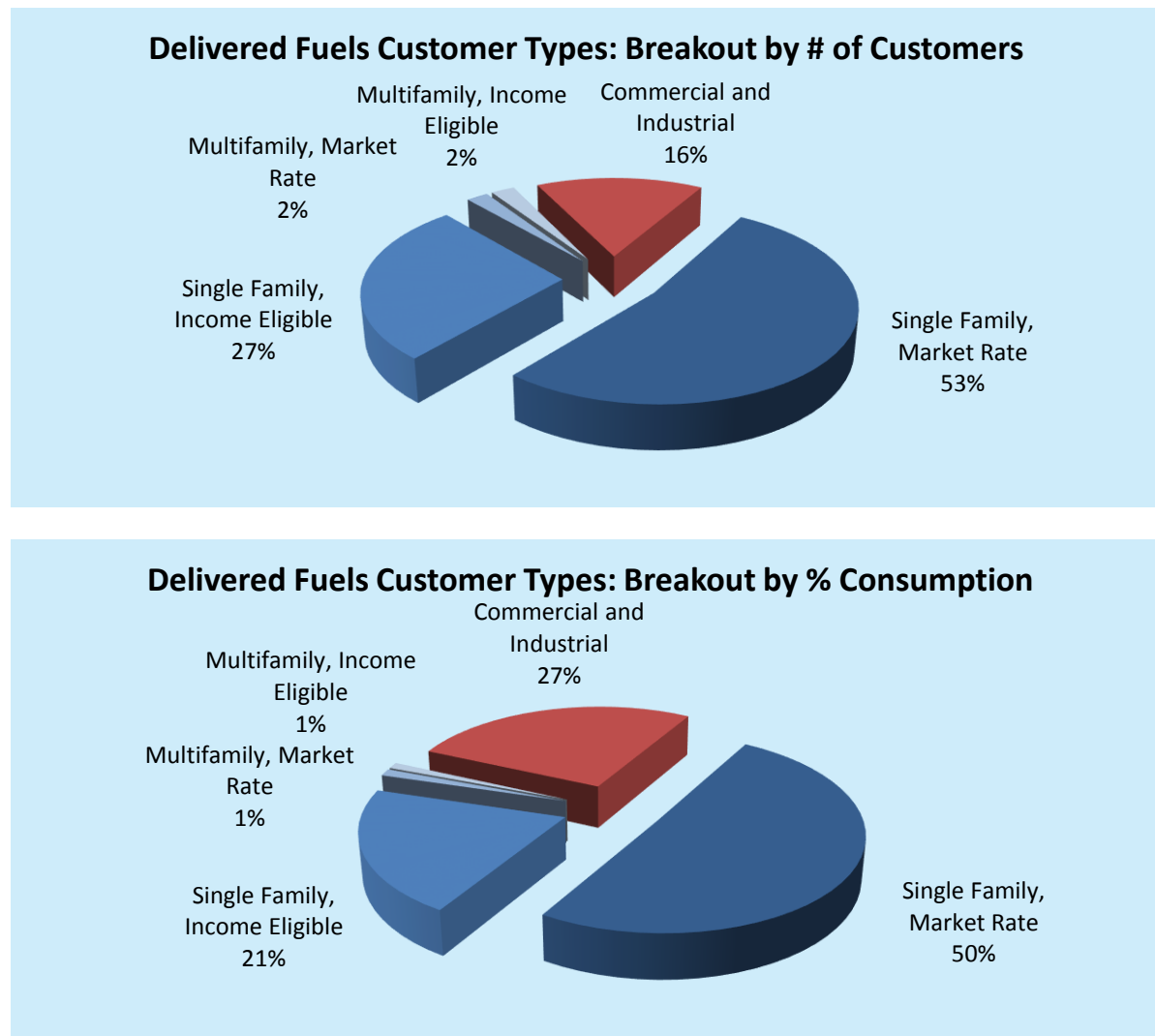
What types of Rhode Island customers heat with delivered fuels?

Approximately 186,400 Rhode Island homes and businesses heat with delivered fuels. Total annual consumption is 22.2 million MMBtu. As shown in Table 2 and Figure 5, single family homes—especially market rate households—are the largest delivered fuels customer type and account for the majority of consumption in Rhode Island. This finding aligns well with the general observation that delivered fuels energy providers tend to serve customers in rural locations away from gas lines, where housing tends to be predominantly single family and predominantly market rate.

Table 2. Distribution of Delivered Fuels Customer Types and Consumption

Customer Type	# of customers/accounts		Consumption (MMBtu)	
Single Family, Market Rate	93,700	50%	11,202,600	50%
Single Family, Income Eligible	48,600	26%	4,643,900	21%
Multifamily, Market Rate	3,600	2%	259,200	1%
Multifamily, Income Eligible	3,900	2%	224,700	1%
Commercial and Industrial	36,600	20%	5,902,500	27%
Total	186,400	100%	22,232,900	100%

Notes: Customer numbers estimated from National Grid account data for non-gas electric customers⁴, and adjusted for customers heating with wood/biomass and electricity. Total delivered fuels consumption and the split between the residential and commercial sectors were based on 2011 EIA SEDS data, adjusted to account for estimated gas conversions since 2011. The residential sector was further disaggregated based on data from RECS, AHS, and other minor sources.



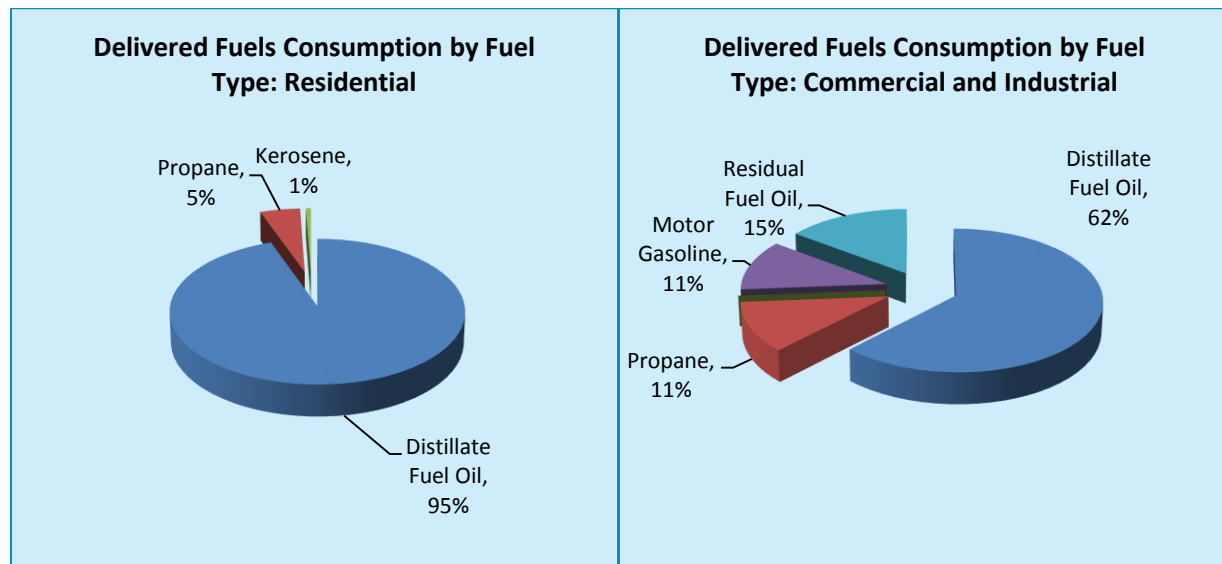
Source: see Table 2.

Figure 5. Breakout of number of customers and fuel usage among different delivered fuels customer types.

⁴ Accounts and customers are not necessarily equivalent. The 36,600 C&I figure was derived by subtracting the number of National Grid C&I natural gas accounts from the number of National Grid C&I electric accounts. This calculation represents an estimate of the number of National Grid C&I electric accounts associated with a heating fuel other than natural gas. No data was available on the distribution of heating fuel types used by non-gas C&I customers; however, it is inferred that almost all non-gas C&I customers heat with delivered fuels (not with other fuels such as electricity). Similarly, no data was available on the number of electric/gas accounts per typical C&I customer in order to estimate the number of Rhode Island C&I delivered fuels customers (not accounts). Anecdotal evidence suggests that typical C&I customers have multiple electric accounts more often than multiple gas accounts. Therefore, the number of C&I delivered fuels customers in the state is probably much lower than 36,600.

Which fuels do Rhode Island delivered fuels customers use?

Rhode Island delivered fuels customers use a variety of fuels for heating and thermal purposes. In the residential sector, distillate fuel oil (#2 home heating oil) is by far the most widely used petroleum-based heating fuel, accounting for 95% of delivered fuels consumption (Figure 6). Propane is the second most significant fuel type at 5% of residential usage, followed by kerosene. In the commercial and industrial sector, distillate fuel oil comprises 62% of delivered fuels consumption. The balance of market share is divided among other fuels, primarily propane, motor gasoline⁵, and residual fuel oil.



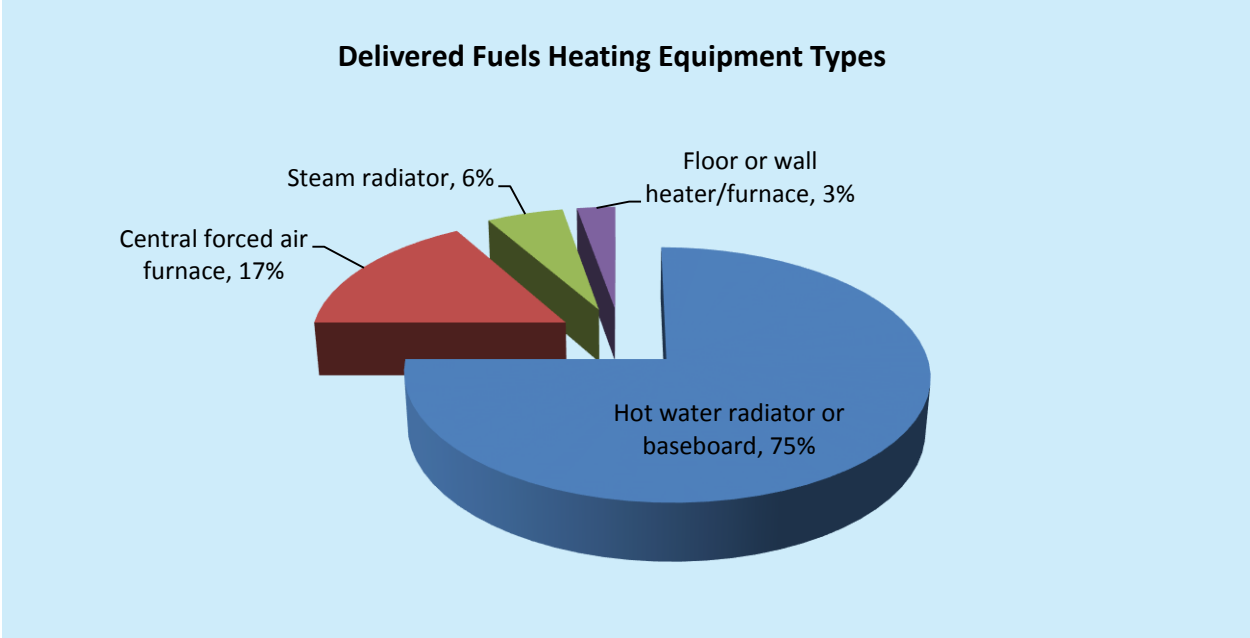
Source: EIA SEDS, 2011

Figure 6. Distillate fuel oil is the most widely used fuel type by residential delivered fuels heating customers in Rhode Island; commercial customers use a more varied assortment of delivered fuels for their thermal needs.

What heating equipment types do Rhode Island delivered fuels customers use?

The primary equipment types used by Rhode Island delivered fuels customers are furnaces and boilers. Figure 7 shows the distribution of different types of residential heating equipment for heating oil, based on studies conducted in Massachusetts. Data is not available on the type of equipment used for propane or kerosene heating in the residential sector. Similarly, information is lacking on the types of equipment used in the commercial and industrial sectors for delivered fuels. Data on the average age and efficiencies of heating equipment is not readily available at present.

⁵ Non-transportation (i.e. thermal sector) consumption of motor gasoline in the commercial and industrial sectors covers a wide variety of applications including use in engines that power aerial lifts, fork lifts, mobile refrigeration units, generators, pumps, industrial sweepers/scrubbers, material handling equipment (such as conveyors), and portable well-drilling equipment.



Source: MA RASS 2009

Figure 7. Most delivered fuels customers in Rhode Island use boilers and furnaces for heating.

Energy Efficiency Potential

The Energy Efficiency Potential section provides a high-level estimate of energy efficiency potential in Rhode Island's delivered fuels sector. The estimate is informed by the results of the Market Profile, delivered fuels energy efficiency activities to date in Rhode Island, and other market trends. The potential estimate is combined with assumptions about program costs, benefits, and scalability to estimate feasible near-term savings targets for the delivered fuels sector.

The results of the Energy Efficiency Potential analysis demonstrate that:

- Energy efficiency program services for delivered fuels customers have been available since 2010, but on a limited basis and funded through a patchwork of sources.
- Significant energy efficiency potential exists in Rhode Island's delivered fuels sector – approximately 3.4 million MMBtus, or 15% of total consumption.
- Investing in all cost-effective delivered fuels energy efficiency will likely require a ramp up schedule to achieve higher savings targets.
- Following an illustrative schedule of hypothetical savings targets is estimated to yield cumulative benefits of \$331.0 million and cost a total of \$86.3 million over the period of 2015 to 2020, for a benefit cost ratio of 3.84.

* * * * *

How much energy efficiency has been delivered to date for Rhode Island delivered fuels customers?

Energy efficiency programs for delivered fuels customers in Rhode Island first was offered in 2010. These services have been delivered by National Grid through the same programs that deliver electric and natural gas energy efficiency, namely EnergyWise (for market rate and income eligible) and ENERGY STAR HVAC (high efficiency heating equipment). During the past five years, a variety of different funding sources have supported these energy efficiency services for delivered fuels customers: initially American Recovery and Reinvestment Act (ARRA) funds, then electric System Benefits Charge (SBC) funds, and then Regional Greenhouse Gas Initiative (RGGI) funds. Table 3 summarizes recent energy efficiency activity for customers whose primary heating source is delivered fuels. Figure 8 charts the annual savings and number of home retrofits over the past five years, including both income eligible and EnergyWise.

Table 3. Summary of Historical Energy Efficiency Services in Rhode Island’s Delivered Fuels Sector

	Savings	High-Efficiency Heating Equipment	Home Weatherization			Funding Source	Funding Amount
	Annual MMBtus	# of Rebates	Income Eligible	Energy Wise	Total		
2010	10,926	505	188	82	270	ARRA	\$ 910,587
2011	34,885	1,061	377	858	1,235	ARRA	\$ 1,707,780
2012	22,131	208	596	592	1,188	ARRA	\$ 879,220
2013	29,445	1,146	552	635	1,187	SBC	\$ 795,463
2014	17,259	517	400	500	900	RGGI, SBC	\$ 1,600,000
Total	114,646	2,920	2,113	2,667	4,780		

Source: National Grid

As Table 3 and Figure 8 illustrate, energy efficiency services for delivered fuels have been relatively limited and the funding inconsistent. However, when delivered fuels efficiency has been funded, the programs have delivered inexpensive energy savings, estimated to cost between \$6 and \$8/MMBtu⁶ over the lifetime of the efficiency measures. The average retail price for delivered fuels depends on the fuel type, but is close to \$21/MMBtu for home heating oil as of February 2015⁷.

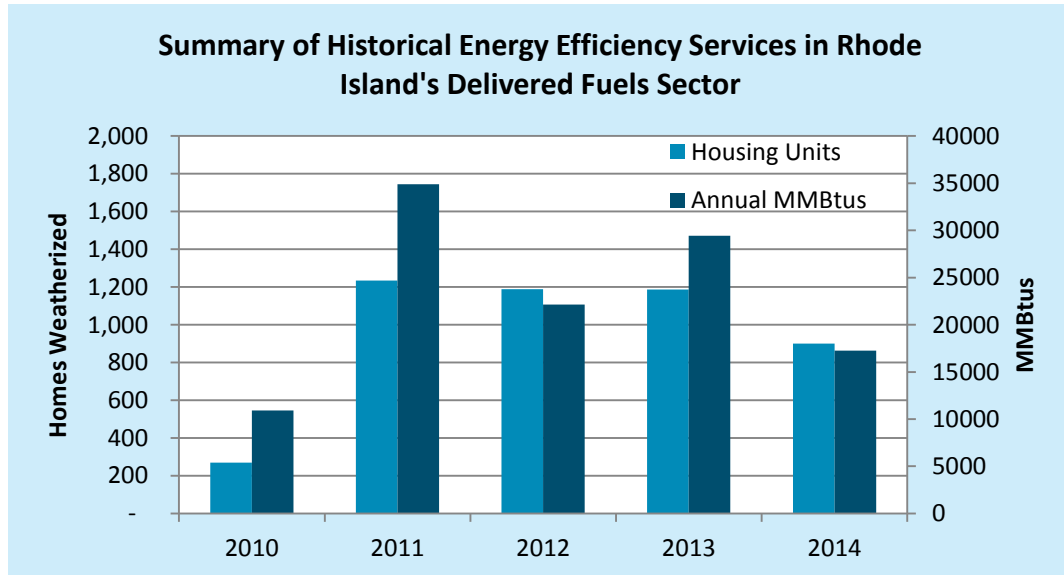


Figure 8. Rhode Island energy efficiency programs have provided limited offerings to delivered fuels customers since 2010.

⁶ Based on 2012 data from Vermont

(http://www.encyvermont.com/docs/about_efficiency_vermont/annual_plans/EVT_AnnualPlan2012_Addendum_HeatingAndProcessFuel.pdf) and Rhode Island’s 2014 natural gas program.

⁷ http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W_EPD2F_PRS_NUS_DPG&f=W

How much cost-effective energy efficiency potential exists in Rhode Island’s delivered fuels sector?

Quantifying the energy efficiency potential of Rhode Island’s delivered fuels sector helps contextualize current and past investments in delivered fuels efficiency. Table 4 displays an estimate of this potential. Total estimated cost-effective energy efficiency potential for delivered fuels is 3.4 million MMBtus, approximately 15% of total annual consumption. The potential estimate draws on findings from the Market Profile on delivered fuels consumption patterns, assumptions about typical project savings levels, information on applicable end use energy, and data from National Grid on historical efficiency savings.

Table 4. Estimate of Cost-Effective Delivered Fuels Sector Energy Efficiency Potential in Rhode Island

		Residential Market Rate	Residential Income Eligible	Commercial and Industrial	Total
A	Total Consumption (MMBtu)	11,461,800	4,868,600	5,902,500	22,232,900
B	% savings potential	20%	20%	20%	
C	% applicable	80%	80%	80%	
D	Already Complete (MMBtu)	74,800	39,900		114,700
E	Total Potential (MMBtu)	1,759,100	739,100	944,400	3,442,600

Notes:

- A) Based on Market Profile
- B) Case studies indicate that a typical weatherization job achieves 30% savings and a heating system replacement achieves 15% savings on average. Estimate based on a blend of weatherizations and heating system replacements.
- C) Corresponds to the portion of end use energy that efficiency programs actually apply to. Estimate based on data from National Grid suggesting 9% of delivered fuels households are on the main gas lines and likely to convert in coming years, with another 25% potential candidates.
- D) Corresponds to total delivered fuels savings from 2010-2013. Data provided by National Grid. See Table 3
- E) = [A x B x C] - D

What would Least-Cost Procurement of all cost-effective delivered fuels energy efficiency look like in Rhode Island?

Rhode Island’s current Least-Cost Procurement mandate requires investment in all cost-effective electric and natural gas energy efficiency before the acquisition of additional supply. No comparable mandate exists for the delivered fuels sector. The potential estimate provides a foundation for understanding what a “Least-Cost Procurement” strategy would look like for delivered fuels in Rhode Island.

The total potential estimate of 3.4 million MMBtus represents roughly 15% of the estimated annual consumption. To capture this efficiency resource Rhode Island would need to implement a delivered fuels efficiency program at levels similar to the current programs for natural gas. However, the unique consumption profile of delivered fuels (concentrated in single family homes and used almost exclusively for space heating) means the efficiency opportunities are more limited than natural gas. The primary measures would likely be home weatherization and high efficiency heating equipment, both of which

take considerable time and market infrastructure to deliver (some secondary usage may include water heating in homes with boilers). For this reason, it can be argued that a gradual escalation of efficiency savings targets for delivered fuels is reasonable to give the market time to adjust. Table 5 shows an illustrative schedule of hypothetical savings targets, expressed as a percent of 2014 sales, and the associated MMBtu savings and equivalent home retrofits.

Table 5. Illustrative Least-Cost Procurement Savings Targets for Delivered Fuels

Year	% of Sales Target	Annual Savings (MMBtu)	Home Weatherizations
2015	0.2%	44,500	2,400
2016	0.3%	66,700	3,600
2017	0.4%	88,900	4,800
2018	0.6%	133,400	7,200
2019	0.8%	177,900	9,600
2020	1.0%	222,300	11,900
Total	3.3%	733,700	39,500

These savings targets would set Rhode Island on a path toward Least-Cost Procurement of delivered fuels energy efficiency. The ramp-up in savings targets would help close the delivered fuels efficiency gap, while also giving the market time to develop the necessary delivery infrastructure and avoid damaging boom-bust cycles. To put these targets in context, Figure 9 shows the associated annual savings and equivalent home retrofits compared with recent history. The data shows that past investments in delivered fuels energy efficiency represent annual savings on the order of 0.1% of total consumption, far below the levels of Rhode Island’s annual investment in electricity and natural gas energy efficiency (currently set at 2.5% and 1.0% of annual load, respectively).

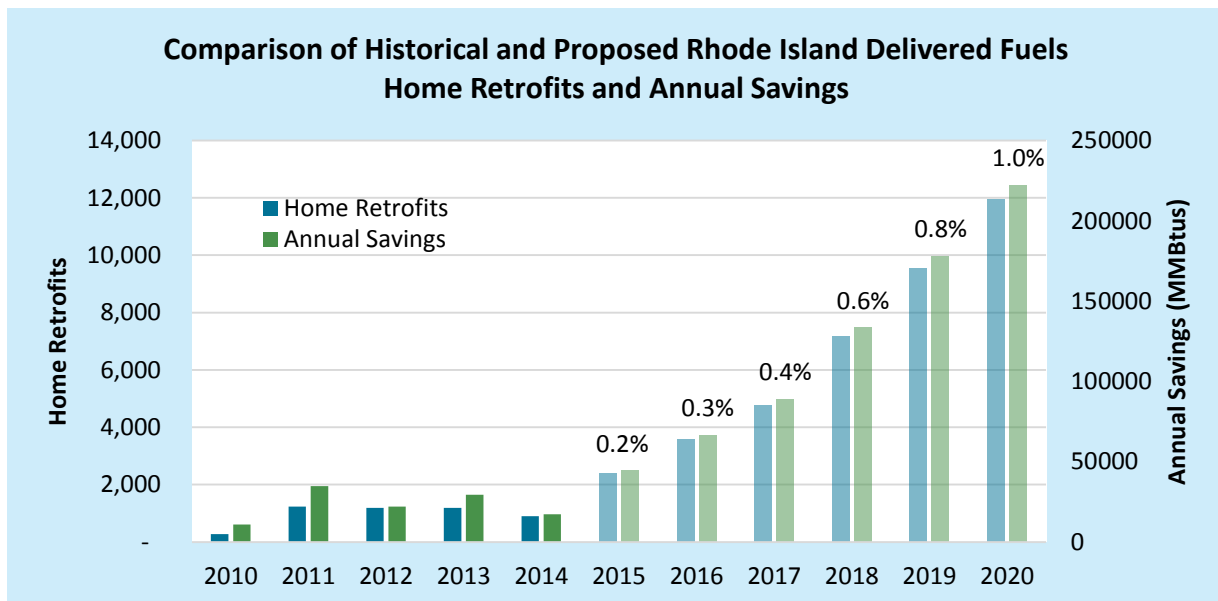


Figure 9. Least-Cost Procurement of delivered fuels energy efficiency in Rhode Island would increase savings compared to past investments in the sector.

What are the costs and benefits of investing in all cost-effective delivered fuels energy efficiency in Rhode Island?

Least-Cost Procurement of delivered fuels energy efficiency resources would yield considerable economic benefits to Rhode Island, largely in the form of lower bills for households and businesses relying on delivered fuels for space and water heating. Capturing all cost-effective energy efficiency for delivered fuels will also require considerably higher budgets to support program investments. Table 6 and Figure 10 detail the savings, costs, and benefits associated with achieving the illustrative savings targets shown in Table 5 above. Following the illustrative schedule of hypothetical savings targets is estimated to yield cumulative benefits of \$331.0 million and cost a total of \$86.3 million over the period of 2015 to 2020. Under this scenario, the benefit cost ratio (BCR) of the investments in delivered fuels energy efficiency is 3.84, indicating that capturing these savings would be very cost-effective, returning approximately \$3.84 to participants for every dollar invested.

Table 6. Savings, Costs, and Benefits from Least-Cost Procurement of Delivered Fuels in Rhode Island

Year	Annual Savings (MMBtu)	Lifetime Savings (MMBtu)	Benefits (Millions \$)	Costs (Millions \$)
2015	44,500	700,500	\$ 20.1	\$ 5.2
2016	66,700	1,049,900	\$ 30.1	\$ 7.8
2017	88,900	1,399,300	\$ 40.1	\$ 10.5
2018	133,400	2,099,800	\$ 60.2	\$ 15.7
2019	177,900	2,800,300	\$ 80.2	\$ 20.9
2020	222,300	3,499,100	\$ 100.3	\$ 26.1
Total	733,700	11,548,900	\$ 331.0	\$ 86.3

Notes: Measure life is estimated at 16 years based on a blended average of the actual measures installed for delivered fuels customers through National Grid programs between 2010 and 2013. Cost assumptions are \$8/lifetime MMBtu for residential and \$6/lifetime MMBtu for commercial. Costs were estimated based on the cost of the corresponding natural gas efficiency measures, including weatherization and high-efficiency heating equipment. Benefits assumptions are \$28.9/lifetime MMBtu for residential and \$27.9/lifetime MMBtu for commercial. Benefits were based on the 20 year levelized cost of home heating oil as calculated from distillate fuel oil avoided costs presented in the Synapse Energy Economics 2013 Avoided Energy Supply Cost Study.

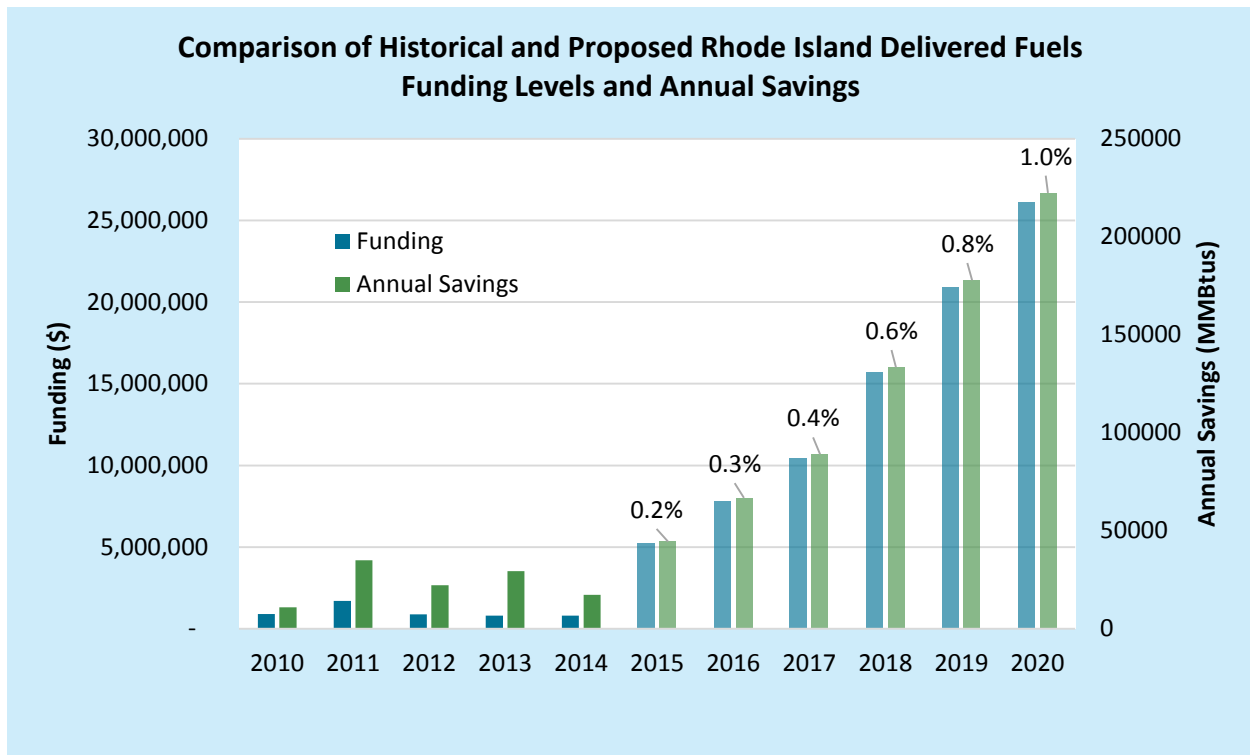


Figure 10. Increasing investment in delivered fuels energy efficiency will require higher funding levels to achieve savings targets.

Delivered fuels energy efficiency investments also provide significant environmental benefits. Combustion of delivered fuels is a significant source of greenhouse gases. Improving the efficiency of the combustion equipment or reducing the need for heat through weatherization helps reduce emissions of greenhouse gases, including carbon dioxide, nitric oxide, and sulfur dioxide. Table 7 illustrates the potential reductions in carbon dioxide and criteria pollutant emissions.

Table 7. Greenhouse Gas and Criteria Pollutant Emission Reductions from Delivered Fuels Energy Efficiency

	Annual Savings (MMBtu)	CO ₂ Avoided (Metric tons)	NO _x Avoided (Metric tons)	SO ₂ Avoided (Metric tons)
2015	44,500	3,584	4	5
2016	66,700	5,372	6	7
2017	88,900	7,160	8	10
2018	133,400	10,745	13	15
2019	177,900	14,329	17	20
2020	222,300	17,905	21	24
Total	733,700	59,095	70	81

Appendix 2: Delivered Fuels Jurisdictional Comparison for the Northeast

Purpose

This report is the second of three information-gathering efforts conducted by the Rhode Island Thermal Working Group during 2014 in support of developing a plan to achieve a cleaner and more efficient delivered fuels sector. The Rhode Island Thermal Working Group was funded and directed by the Rhode Island Office of Energy Resources.

The purpose of the Jurisdictional Comparison was to evaluate delivery and funding mechanisms for delivered fuels energy efficiency services that are planned or active in other states. The Jurisdictional Comparison provides context and comparisons to other Northeastern states as Rhode Island considers policy and funding options to support improving the energy efficiency of its existing residential and commercial buildings that use delivered fuels.

Introduction

As a region, the northeastern United States, with its unusually high reliance on delivered fuels— primarily oil and propane for heating and process uses— has long recognized the importance of implementing policies and practices that increase the efficiency of all types of energy use. For instance, through a combination of federal and state funding, the low income Weatherization Assistance Programs (WAP) have strived for decades to provide states’ most vulnerable populations with viable options for reducing their dependence on delivered fuels. In addition, electric utility energy efficiency and system benefits charges, RGGI and ISO New England Forward Capacity Market (FCM) revenues, ARRA grants, and other sources have been used to provide efficiency services to non-low income residential and commercial delivered fuels users in the Northeast. Despite long standing policy and funding support, the programs’ availability remains limited, and in many cases falls far short of meeting the need. Delivered fuels bills remain high for many customers.

This report catalogues the delivered fuels market in Rhode Island and compares it to conditions in the other five New England states and New York for both the residential and commercial sectors. A review was conducted of the types of programs and services available to oil and propane fuel users in the Northeast in order to provide valuable context for Rhode Island as it contemplates how to increase the availability of energy efficiency services for delivered fuels users. Information was gathered on programs in Vermont, New Hampshire, Maine, Massachusetts, Connecticut, and New York, as these states were believed to be most comparable to Rhode Island in terms of the preponderance of delivered fuels use, climate, and demographic characteristics. The relative levels of funding and funding sources for the programs were also examined where that information is readily available.

The information included in the Jurisdictional Comparison was derived from web research including review of customer facing materials on program websites, and in some cases publically available annual plans and reports. The information identified was then reviewed with individuals who are familiar with the programs in each state to fill in any gaps.

In addition to the state-by-state written summaries below, following is a detailed matrix that catalogs for each state the program activities, budgets, services offered, incentives, program integration, delivery entity and funding source for each of the following building areas:

- Home retrofit
- Home heating and domestic hot water equipment
- Multifamily
- Residential new construction
- Weatherization Assistance Program
- Commercial retrofit
- Commercial heating and hot water equipment
- Commercial new construction

Findings

The program review revealed both common characteristics and significant discrepancies in the availability of delivered fuels services. For example, all of the states reviewed provide some form of home retrofit services to both low-income and non-low income residential customers who use fuel oil or propane for heating their homes. In most cases these programs are fuel neutral— in other words, they are available regardless of whether the primary heating fuel is oil, propane, natural gas, or electricity. However the services available to commercial customers who use oil or propane are considerably more limited. Similarly, only some of the states have programs that specifically help either residential or commercial delivered fuels customers upgrade existing heating equipment to high efficiency equipment.

The approach to funding these programs also varies with the policy frameworks that direct the programs' planning and operations. In some cases there are discreetly managed funding streams tied to services for oil and propane customers, but in others, budgets are blended from a variety of sources and services and offered to all customers regardless of heating fuel used. In the latter case, there is not necessarily any attempt made to connect the specific funding source to specific projects. In yet other cases, electric SBC charges are used to directly fund services to oil and propane users.

Based on a review of the current Rhode Island current policy and conditions, and in comparison to other Northeast states, it is clear that significant improvement is possible to expand funding to increase the energy efficiency of delivered fuels customers in Rhode Island.

There are several primary funding sources for energy efficiency programs for delivered fuels customers in New England and New York, including:

- Electric SBC funds—used to a modest degree in Vermont for non-electric customers, and to a larger degree in New Hampshire, Massachusetts, Connecticut, and New York.
- RGGI and FCM revenues—used specifically for delivered fuels customers in Vermont, and to increase the CORE efficiency program budgets in New Hampshire. It is not clear how these revenues are used in the remaining states.

- Gross receipts tax on heating fuels— used for the Low Income Weatherization Trust Fund in Vermont
- Federal Weatherization Assistance Program (WAP) and Low Income Home Energy Assistance Program (LIHEAP) funds for low income weatherization— used in all states, with supplements from state and utility funds that vary with each state.

All of these funding sources provide direct benefits to delivered fuels customers, and there is not an apparent connection between the source of the funds and the effectiveness of the programs. However, the regulatory mandates that drive services to delivered fuels customers do make a significant difference. In Maine for example, in the absence of ARRA funding the incentives for delivered fuels customers in their HES program were expected to be significantly reduced, whereas in Massachusetts and Connecticut there is regulatory support for using electric SBC funds to provide services that save oil and propane. In Vermont, RGGI and FCM revenues are specifically tied to achieving savings for oil and propane customers—in other words, they can't be used for other purposes.

Rhode Island: Current Policy Framework Overview

The majority of energy efficiency funding stems from RI's progressive Least-Cost Procurement (LCP) law that was passed in 2006 and went into effect in 2008⁸. As a result of this law, significant investments have been made to procure all cost-effective least-cost gas and electric energy efficiency. LCP, however, does not require specific targets or funding obligations for delivered fuels energy efficiency. In addition to this funding created through LCP implementation, there are also limited funding sources from federal programs for income eligible customers (60% AMI and below) through the DOE WAP program and LIHEAP, which are fuel neutral. This funding is managed by the Rhode Island Department of Human Services (DHS), and implementation is via seven Community Action Program (CAP) agencies serving the state.

Since all businesses and residences are electric customers, programs have supported homes heated with delivered fuels for electric measures (e.g. lighting, appliances). However, it wasn't until 2010 that American Reinvestment and Recovery Act (ARRA) funding was channeled to the LCP-funded energy efficiency programs to fund program measures to reduce delivered fuels usage through weatherization and equipment upgrades. ARRA funding lasted only through 2012, and in 2013 LCP-funded program budgets were expanded to continue providing at least moderate support for weatherizing delivered fuels heated homes until other sources could be identified in order to continue the momentum. In 2014, OER-directed Regional Greenhouse Gas Initiative (RGGI) funds were allocated in another stop-gap mode to continue some baseline support. Those RGGI funds were depleted before the end of 2014, and LCP-funded program budgets were re-purposed to complete the year of weatherizing delivered fuels homes. For 2015, LCP-funding combined with RGGI allocations is planned to continue the baseline support. For the C&I sector, no dedicated funding was available until 2014, when a small allocation (\$200,000) was

⁸ <http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-1/39-1-27.7.HTM>

set aside for small C&I customers using delivered fuels, with a primary focus of the funds on the agriculture market.

Northeast States Comparison

What follows are brief state-by-state descriptions of the funding and program approaches for Vermont, New Hampshire, Maine, Massachusetts, Connecticut and New York. This information has been gathered from publicly available web sites and vetted with someone familiar with the local programs in each state.

Vermont

Vermont has long offered certain limited energy efficiency services to oil and propane customers through their “Energy Efficiency Utilities” or “EEUs” (that include Efficiency Vermont and the Burlington Electric Department) electric SBC-funded initiatives. These include residential and commercial new construction programs that address the efficiency of all end uses regardless of the energy source, which was justified based on long-standing policies of the Public Service Board that value Total Resource Benefits (TRB) rather than just MWh savings. Similar fuel-blind approaches have been used for multi-family programs and, to a degree in Vermont’s Home Performance with ENERGYSTAR program, their existing homes renovation program. Since 2010 revenues from RGGI and FCM have been specifically used for delivered fuels efficiency services and as a result these services increased in scope and depth. Other programs have been added to those previously mentioned, including rebates for oil and propane-fired commercial heating systems and comprehensive small commercial and multi-family building shell improvements for oil and propane customers. Though programs are offered that simultaneously address both electric and delivered fuels end uses, the EEUs track and report delivered fuels expenditures and savings separately from the electric SBC investments.

The Vermont Fuel Efficiency Partnership (for multifamily buildings), the Small Scale Renewable Energy Incentive Program (for solar hot water) and the Vermont Energy Education Program are all efforts that have used significant public dollars. In addition, policies that relate to thermal fuels include building codes, appliance and equipment standards, and Vermont’s environmental development review law, Act 250. Vermont has consistently encouraged and facilitated partnerships through a number of mechanisms and organizations that are directed at thermal fuel consumption reductions.

In addition to the programs, the state has supplemented Weatherization Assistance Program funding for low-income residents since the early 1990’s with a 0.5% gross receipts tax on heating fuels. The funds generated through this mechanism are placed into the Weatherization Trust Fund to support comprehensive efficiency services for Vermont’s low-income families. Generally the WAP budgets are devoted to non-electric savings and health and safety measures, and Efficiency Vermont provides electric SBC funds for electrical efficiency measures.

New Hampshire

Like Vermont, New Hampshire offers a number of programs that are available to increase the efficiency of delivered fuels customers. In contrast, these programs are offered directly through the utilities that collaborate in providing New Hampshire’s CORE energy efficiency programs, and though the RGGI and

FCM revenues do support the CORE programs they are not tracked and reported separately, nor are those expenditures directed to be specifically provided for delivered fuels efficiency measures. Like Vermont, the New Hampshire utilities offer Home Performance with ENERGYSTAR for residential buildings regardless of primary heating fuel. New Hampshire also periodically offers some rebates for both commercial and residential oil and propane heating system improvements, as well as for high efficiency heat pumps, even when they offset oil or propane heat. There is also an ENERGYSTAR Homes program for residential new construction that addresses all energy uses. Outside of the state-wide CORE programs, the New Hampshire Electric Co-op (NHEC) offers a program targeted towards reducing oil and propane use for its small commercial customers.

New Hampshire also offers a WAP program for its low income residents. In the absence of supplemental state funding such as Vermont's Weatherization Trust Fund, the total WAP budget in New Hampshire is less than half of Vermont's WAP budget, for a state with twice the population. However, New Hampshire does use RGGI dollars and the CORE SBC and other utility funding sources from otherwise sector-targeted program dollars to help supplement low income project funding.

Maine

Maine invested ARRA funds heavily in providing efficiency services to the residential markets regardless of fuel used, and as those funds have been drawn down over the past several years, Efficiency Maine Trust (EMT) has been able to pull from various sources to continue serving delivered fuels customers. Efficiency Maine continues to provide its Home Energy Savings Program (HESP) which provides efficiency services to electric, natural gas, and "all-fuels" customers. As currently described on its website, the HES program offers both a comprehensive approach and a prescriptive approach to home upgrades. Up to \$1500 in incentives is available for shell improvements (unless a pellet boiler or geothermal system is involved in which case the cap is \$5,000). The HES program also offers up to \$500 for qualifying central heating system replacement even for oil-fired systems. There is also a rebate available for residential customers to install a high efficiency ductless heat pump regardless of primary heating fuel.

Since mid-2013, EMT has provided over 1,000 \$500 rebates for ultra-high efficiency boilers and furnaces of any fuel type that meets their strict program criteria, and provided insulation and air sealing rebates to any eligible home regardless of primary or secondary fuel type. EMT has additionally supported the installation of 435 pellet boilers and more than 6,700 cold-climate heat pumps in delivered fuels heated homes. EMT's current fiscal year budget is \$10 million from a number of sources and is on track to be fully spent on rebates for projects in more than 10,000 homes in the fiscal year. EMT has also been ramping up their loan activity with \$3.0 million closed in the past six months bringing their total closed loans to \$12.7 million on 1,100 financed projects since 2011, with zero defaults. These products are fuel-neutral as well.

Efficiency Maine also offers a multi-family efficiency program that is available for multi-family buildings with five or more units, regardless of fuel type. There are both prescriptive and custom/modeled paths available to property owners, with incentives of up to \$1800 per unit for achieving overall savings of 30% or greater.

For commercial customers Efficiency Maine offers Maine Advanced Buildings, a new construction design assistance program that pays both the building owner and the lead design team for projects that use 30%-35% less energy than a baseline code compliant building would use.

Lastly, the Maine State Housing Authority offers Maine's WAP program to LIHEAP-eligible Maine residents. The \$2.7M federal funding for this program is supplemented with an additional \$1.1M from state funds, but is still far short of its New England neighbors other than Connecticut.

Massachusetts

Massachusetts makes significant investments in energy efficiency and offers several programs that are available to residential delivered fuels customers. Regardless of the fuel used by the customer, the Mass Save program⁹ provides residential energy assessments and air sealing at no cost to residents, as well as incentives for insulation upgrades. Mass Save also provides a number of heating and hot water rebates for installing high efficiency HVAC and hot water equipment, including gas, oil and propane-fired equipment. Periodically, Mass Save encourages the early retirement of functioning older, inefficient heating equipment by offering additional rebates for replacing such equipment with new high efficiency systems. Additionally, regardless of the customer's primary heating fuel, there are rebates for high efficiency ductless heat pumps and efficient biomass systems.¹⁰ These rebates allow oil and propane customers to replace much of their heating load with more efficient, lower operating cost systems, significantly reducing their heating costs. This oil and propane equipment can also be replaced with gas systems.

The Massachusetts Department of Energy Resources (DOER) is taking steps to ensure consistent and comprehensive delivery of energy efficiency programs and services to delivered fuels customers. Recently, DOER proposed updates to its Residential Conservation Services (RCS) program regulations¹¹ to clarify that oil and propane heated multi-family buildings are eligible for Mass Save insulation incentives and equipment rebates. The proposed updates also help ensure that delivered fuels customers are aware of the full range of options available to them when replacing or supplementing oil or propane-fired equipment.

Massachusetts also has a WAP program that is nearly 75% funded through utility efficiency funds. The program is available to Massachusetts households that are eligible for federal LIHEAP funds or that receive SSI/TAFDC payments. The WAP program pays 100% of the eligible measure costs and provides assessment at no charge. The average investment per household is \$5500.

⁹Energy efficiency programs, services, incentives and rebates through Mass Save are available to delivered fuels customers who receive electricity from an investor-owned electric utility or the Cape Light Compact.

¹⁰ The Massachusetts Clean Energy Center is providing these rebates, with funding from the Massachusetts Department of Energy Resources.

¹¹ The RCS program regulations govern how Massachusetts residential energy efficiency programs, including those provided through Mass Save, are designed and implemented.

Mass Save provides electric efficiency opportunities to commercial delivered fuels customers, e.g. incentives/rebates for efficient lighting, pumps, and air conditioning technologies.

Connecticut

Connecticut also provides energy efficiency services to delivered fuels customers through electric SBC charges in addition to other mechanisms. For commercial and industrial customers the State has adopted legislation that allows local jurisdictions to offer commercial Property Assessed Clean Energy (C-PACE) to local C&I customers regardless of fuel used. C-PACE is a non-traditional financing approach that, according to its website, is best-suited for projects over \$150,000 in scope. Projects are required to have a savings to investment ratio greater than 1.0, and can include boiler upgrades and shell improvements for oil-heated buildings.

For residential customers, Connecticut's Home Energy Solutions (HES) program and multiple financing products are provided by the utilities and the Connecticut Green Bank and funded through utility SBC charges. These include Smart-E Loans, loans through the Connecticut Housing Investment Fund (CHIF) and low interest (currently 0%) utility sponsored loans that can be used for delivered fuels buildings and heating equipment. HES offers reduced-cost energy assessments that include a diagnostic audit, targeted air sealing, and direct-install of efficient lighting for a low fixed price of \$75 for electric and gas heated homes and \$99 for oil or propane heated homes. Incentives may be available for additional improvements, and financing for the customer's share of the project cost can be obtained through these loans. Interestingly, as the State is actively promoting fuel-switching of oil and propane to natural gas, it has determined that if an oil or propane-heated home receives efficiency services that are funded through the electric SBC, and then subsequently converts to natural gas for its primary heating fuel, the electric SBC fund is reimbursed from the gas SBC fund for the project costs.

Connecticut does offer a WAP program, but it is dramatically under-funded relative to neighboring states. The total WAP budget for Connecticut is only just over \$1M for PY2013, and half of these funds come from utilities. Participants must have household incomes of 60% of state median income or less. However, the HES-Income Eligible (IE) program provides HES program services at no cost to income-eligible residents. For 2015, the HES-IE budget is \$20.4 million from the electric utilities and \$7.8 million for the gas utilities.

New York

New York has energy efficiency programs that are offered both by regulated utilities and by the New York State Research and Development Authority (NYSERDA) in a framework that is currently in the midst of a strategic re-design. NYSERDA is funded by utility SBC charges, RGGI and a Renewable Portfolio Standard (RPS) and offers a wide-variety of efficiency programs. Some of the residential programs are available to oil and propane customers utilizing RGGI funding, though there is not a standard program offering available to commercial oil and propane customers.

New York pioneered the Home Performance with ENERGYSTAR approach to home retrofits and continues to be a national leader in offering these comprehensive retrofit services to homeowners regardless of the primary heating fuel type. The program offers a 10% discount on the cost of eligible

measures and offers low interest rate loans to make it easier for homeowners to come up with their share of the project cost. In addition to the program that is available to all homeowners, NYSERDA also offers the Assisted Home Performance with ENERGYSTAR program which offers significantly greater incentives— up to 50% of the eligible measure cost with a \$5000 maximum incentive— to homeowners with household incomes at or below 80% of county median income. Further, for households at or below 60% of state median income NYSERDA offers EmPower New York, which pays 100% of approved measure costs.

New York also has a significant WAP program which has an eligibility criterion of 60% of state median income. Given that the WAP and EmPower programs are targeted to the same population, and that most WAP agencies are also EmPower service providers, there is coordination between the WAP agencies. As with the other WAP programs New York’s program pays 100% of the eligible measure cost, requiring no investment on the part of the low income households that it endeavors to serve.

State-by-State Initiatives by Building Type

A spreadsheet was developed providing additional detail for Vermont, New Hampshire, Maine, Massachusetts, Connecticut and New York, by building and program type. This spreadsheet is available on the OER website.

Appendix 3: Delivered Fuels Policy and Funding Options

Purpose

This report is the third of three information-gathering efforts conducted by the Rhode Island Thermal Working Group during 2014 in support of developing a plan to achieve a cleaner and more efficient delivered fuels sector. The Rhode Island Thermal Working Group was funded and directed by the Rhode Island Office of Energy Resources.

The purpose of the Policy and Funding Options analysis was to explore potential opportunities for establishing a more stable, long-term funding stream for cost-effective investments in delivered fuels energy efficiency.

Overview and Context

This section presents some policy options for longer-term delivered fuels funding approaches for Rhode Island. Many of the policies and funding concepts suggested here are not new. However, most have not been widely applied to delivered fuels efficiency initiatives. It is important to dive deeper to more fully understand the nuances and implications before proceeding with any one or a combination of options. This report does not do that. It provides a high-level overview of nine potential policy and funding options to enable some comparing and contrasting before sorting them out and prioritizing those initiatives worthy of more in-depth examination and analysis.

Principles for Public Funding

In considering the options for sustainable thermal efficiency funding sources, a Vermont task force developed the following principles which also seem applicable for Rhode Island's delivered fuels funding considerations. While not all of these principles will apply to each policy option addressed below, most of them do. Additionally, there are some administrative elements (e.g., #2 dynamic, #6 transparency) that can apply to any funding policy initiative selected and reminds the administrator to make sure to set up the implementation of the policy with all of these principles in mind.

1. Funding streams should be **sustainable and sufficient** to meet the state's mandated goals.
2. Funding levels should be **dynamic** to ramp up and down over time as needed.
3. The level of funding should **balance short-term costs with the benefits of providing long-term affordability** to all Rhode Islanders; mechanisms will be put in place to minimize financial impacts on low income Rhode Islanders.
4. Funding sources, like program delivery, should be **equitable across non-electric fuels and by customer class** (residential, commercial, etc.); cross-subsidization between fuels and customer classes should be minimized; equitable treatment for in-state and out-of-state fuel providers should also be addressed.
5. Mechanisms that are **administratively efficient** to create and implement, simple, and auditable are preferred.
6. The collection mechanism, sources, and uses of public funding must be **transparent**.

7. **Price signals** should support state energy policy goals.
8. Comprehensive delivered fuels energy efficiency programs should support the vibrancy of Rhode Island **communities and enhance competitiveness** of Rhode Island businesses.
9. Public funding should be used to **leverage private sources of capital**, where possible, to get the best return on each public dollar invested.
10. Public funding should be used **only to the extent that it is needed** to mobilize capital and meet private market shortcomings.

Policy and Funding Options

The following list of policy and funding options that could be utilized to provide long-term funding for delivered fuels efficiency initiatives provides a range of choices and approaches. While any one or combination of these options could work in theory, there will need to be some extensive contemplation, consultation, analysis and discussions before selecting an approach and moving forward.

In considering delivered fuels funding approaches in other states, a few issues continue to arise from the delivered fuels industry that are worth raising again in Rhode Island in order to increase the likelihood of success. These include the following:

1. Make sure to include the delivered fuels industry not only in any decision-making on funding policies and program design, but also ensure that they are in a position of oversight and control over any funds that are raised on an on-going basis (e.g., provide a seat on any oversight board); and
2. Establish programs that will directly benefit the delivered fuels industry and their customers. Direct funds raised from delivered fuels back to delivered fuels customers and avoid cross-subsidization between delivered fuels and electric and gas. Allow for efficient equipment incentives in addition to efficiency measures.

There are also some issues and questions that cut across all of these options, regardless of which one is pursued, that will need to be addressed. These include, but are not limited to the following:

- Who collects the funds and is responsible for managing and distributing them?
- Who administers the programs if the funding source is no longer from electric and gas ratepayers?
- How are these new programs coordinated with the existing National Grid programs? Or, do they become one-in-the-same program, with an expanded scope of services?
- What role does the EERMC have in this new scope of services? What about the delivered fuels industry?

As the policies and funding options are being considered, it is necessary to understand the delivered fuels program budget needs in order to calculate the tax rates or other needs from the funding source. Development of an annual delivered fuels program budget for the next ten years will help in taking the next steps towards determining the funding mechanism. Table 8 is an initial attempt at a budget from

2010 to 2020 based on the 2015-2017 Three Year Plan and the delivered fuels Market Assessment (Appendix 1). Delivered fuels program funding is predicated on growth from current rates up to 1% of delivered fuels sales in 2020. In order to achieve these levels, significant funding needs to be identified.

Table 8. Historical and Illustrative Delivered Fuels Energy Efficiency Program Budgets, 2010-2020

Year	% of Sales Target	Annual Savings	Funding	Funding Source	Reference
2010		16,047	910,587	ARRA	2015-2017 3-Yr Plan
2011		30,573	1,707,780	ARRA	2015-2017 3-Yr Plan
2012		14,483	879,220	ARRA & SBC	2015-2017 3-Yr Plan
2013		15,037	795,463	SBC	2015-2017 3-Yr Plan
2014		9,922 (YTD)	800,000	RGGI	2015-2017 3-Yr Plan
2015	0.2%	44,500	5,231,734		DF Market Assessment
2016	0.3%	66,700	7,841,722		DF Market Assessment
2017	0.4%	88,900	10,451,710		DF Market Assessment
2018	0.6%	133,400	15,683,444		DF Market Assessment
2019	0.8%	177,900	20,915,177		DF Market Assessment
2020	1.0%	222,300	26,135,154		DF Market Assessment

An initial set of nine policy and funding options are presented below. The different options were examined, described, and characterized according to their barriers, responses to barriers, pros, cons, and next steps.

1. Delivered Fuels System Benefits Charge

Explanation

Similar to the electric “system benefits charge” (SBC) raised from each kWh or therm to fund electric and natural gas efficiency programs, a “delivered fuels system benefits charge” (DFSBC) could raise funds for efficiency initiatives from fossil fuels. A DFSBC could be levied on fuel oil, kerosene, propane and coal and should use a common basis (either Btu energy content or CO₂ carbon content) for determining the fee and collected at the rack or distributor level. The further up the chain, the simpler it will be to collect and administer a DFSBC except for the fact that many fuel dealers work across state boundaries, which would need to be resolved. The difference is very small in terms of whether a charge is based on BTUs or CO₂ of any particular fuel. There will be some relatively minor differences that should be addressed as the details of administering the charge is worked out, but in the end there is very little impact on the cost per gallon. Basing the DFSBC on just delivered fuels would mean that biomass and biofuels would be exempt, which aligns with policies promoting these near-carbon neutral fuels.

Barriers to Implementation

- A. Concerns about raising the already high costs for oil and propane even more.
- B. Accounting for the DFSBC with dealers based in Connecticut and Massachusetts who deliver in Rhode Island and Rhode Island dealers who deliver fuel in surrounding states.

- C. Equity concerns across fuels with different bases for raising funds between electricity, natural gas and all other fuels (i.e., not using a consistent basis such as CO₂ or MMBtu, for all fuels, but instead \$/kWh and \$/Therm for electric and gas and now \$/CO₂ or MMBtu for delivered fuels).
- D. Possible opposition from national delivered fuels organizations.

Responses to Barriers

- A. Delivered fuels prices fluctuate significantly over time, so a small charge will not be readily noticed.
- B. Protocols for accounting need to be established for fuel delivered to Rhode Island customers to ensure that regardless of its origin, if it is delivered in state, it needs to contribute to the DFSBC.
- C. Examine the differences in charges and look for opportunities for alignment. However, this may be challenging given the long-standing precedents with electricity and gas. As long as all energy sources are contributing and providing opportunity to their customers, this may not be a significant issue.
- D. Engage the national delivered fuels trade associations early and work to see eye-to-eye on the benefits of being able to offer more services to their customers while attempting to head off natural gas conversions by providing good customer efficiency opportunities.

Pros

- A. The RI market and regulators are used to the concept of a charge to fund electric and gas efficiency, so a new fee to fund delivered fuels should be relatively easy to understand.
- B. Fuel dealers will appreciate the funding to help their customers.
- C. Could provide a competitive advantage for delivered fuels companies competing with gas conversions.

Cons

- A. Fuel dealers may be reticent about any new fees.

Steps Needed

- A. Collaborate with fuel dealers to ensure they understand the benefits of a pool of efficiency funds for their customers in order to enlist support.

Calculated Yields Sensitivity Based on \$/Gallon

Based on average Rhode Island delivered fuels consumption per household, a per-gallon charge on each gallon of petroleum used in homes and businesses would yield approximately \$1.8 million per penny charge. The annual impact for the average residential customer would be approximately \$7.58 per penny charged. This calculation is based on 179.5 million total oil gallons and 758 gallons/average household.

\$/Gal. Charge	Yield	Annual Cost per Average Oil/Propane/Kerosene Customer	Monthly Heating Season Cost (Nov. - March)
\$ 0.01	\$ 1,795,500	\$ 7.58	\$1.52
\$ 0.02	\$ 3,591,000	\$ 15.17	\$3.03
\$ 0.03	\$ 5,386,500	\$ 22.75	\$4.55
\$ 0.04	\$ 7,182,000	\$ 30.33	\$6.07
\$ 0.05	\$ 8,977,500	\$ 37.91	\$7.58

* * * * *

2. Expand Electric System Benefit Charge to Covered Delivered Fuels

Explanation

Increase the current system benefit charge (SBC) imposed on electricity to provide more funding for delivered fuels.

Barriers to Implementation

- A. Rhode Island’s electric SBC is approaching one cent/kWh and there has been resistance to increasing it significantly above the current level. Inclusion of delivered fuels efficiency at anything approaching the scale of investment for natural gas efficiency would create a significant uptick on either or both SBCs.
- B. The argument can be made that we are increasing costs on one fuel (electric or gas) that is potentially in competition with the fuel it is providing funds to make more efficient (cross-subsidizing).
- C. There are also system benefits to gas and electric investments that are difficult to demonstrate with delivered fuels (DRIPE, capacity value, line loss reduction, SRP benefits, etc.)

Responses to Barriers

- A. All delivered fuels customers are electric customers, so there is some component of electric benefit (and significant customer savings) from efficiency investments in buildings heating with delivered fuels. Electric savings do accrue to customers performing oil weatherization (i.e. A/C savings, fans and pumps etc.). There is an economy and consistency benefit to using the National Grid (gas and electric) Least-Cost Procurement (LCP) infrastructure to provide delivered fuels efficiency services to customers.
- B. Because of the benefits, and the claimable electric savings for delivered fuels homes with central air conditioning, adding delivered fuels homes into the EnergyWise program allows the full program to screen as cost-effective although individual homes may not. Therefore, based on the standards that programs must be cost-effective for PUC approval, including these homes in the program technically meets LCP standards.
- C. Delivered fuels LCP funded by electric (and potentially gas) might be justified in part by the argument that eventually many of the current delivered fuels may be served by either or both for their thermal needs.

Pros

- A. This approach would be relatively easy to implement, in theory, by simply working with Grid and the PUC to recommend an increased SBC earmarked for delivered fuels.
- B. Combining with strategic electrification of existing delivered fuels heated homes could be an approach that helps meet future climate goals.

Cons

- A. Exceeding \$.01/kWh is a threshold that will be politically challenging to cross, even if some portion of the fee would be used for delivered fuels and not electricity.

Steps Needed

- A. Explore the concept of raising additional delivered fuels funds through the electric charge with key constituents, the PUC and others who have been concerned about this issue in the past.

Calculated Yield from Increased SBC Charge

SBC Charge	Increase	Amount Raised	Difference/Yield)
\$0.00966	Current Charge	\$86,741,232	2015 Electric Budget
\$0.00986	\$0.00020	\$87,639,174	\$897,942
\$0.01006	\$0.00040	\$88,537,117	\$1,795,885
\$0.01026	\$0.00060	\$89,435,059	\$2,693,827
\$0.01046	\$0.00080	\$90,333,001	\$3,591,769
\$0.01066	\$0.00100	\$91,230,944	\$4,489,712
\$0.01086	\$0.00120	\$92,128,886	\$5,387,654
\$0.01106	\$0.00140	\$93,026,829	\$6,285,597
\$0.01126	\$0.00160	\$93,924,771	\$7,183,539
\$0.01146	\$0.00180	\$94,822,713	\$8,081,481
\$0.01166	\$0.00200	\$95,720,656	\$8,979,424

* * * * *

3. RGGI Funds

Explanation

Rhode Island has received about \$18 million in RGGI funds from September 2008 through 2012. Historically, this has been in the range of the high \$2 millions per year, but more recently jumped up substantially. Adjustments to the cap and pricing could potentially increase this amount in future years. As other states (e.g., Vermont) have done, all or a significant proportion of RGGI funds could be legislatively directed to be spent supporting delivered fuels. Through upcoming 111(d) regulations, there will be some regulatory changes, which might be a good opportunity to revisit spending priorities for RGGI funds by including delivered fuels funding as a recipient of these funds.

Barriers to Implementation

- A. RGGI funds in Rhode Island have been committed to energy efficiency, conservation, renewables and customer rate relief in the past. It may be challenging to wrestle these funds away and redirect them to a new use given the politics around keeping the SBC under \$.01.
- B. Since the RGGI funds are payments based on electricity savings, spending proceeds on delivered fuels contains some elements of cross-subsidization.

Responses to Barriers

- A. There are few other good options to fund delivered fuels. If this is a priority investment for Rhode Island, then it may be prudent to redirect a portion of funding to delivered fuels and let the existing SBC mechanisms continue to raise funds for electricity and natural gas.
- B. There is precedent in at least Vermont that has made a policy decision to fund thermal efficiency with RGGI funds. It can also be argued that funding weatherization for delivered fuels customers aligns with RGGI funding principles because electric savings do accrue to customers performing oil weatherization (i.e. A/C savings, fans and pumps etc.). Furthermore, according to Least-Cost Procurement (LCP) standards, full programs must screen as cost-effective, not necessarily individual measures or homes.

Pros

- A. This is an existing, reliable funding source into the future, especially as 111(d) comes into existence. Since the State has the option of using these funds as it wishes, redirecting some of them towards delivered fuels may be a good policy option.

Cons

- A. There is a good deal of competition for these funds, and adding delivered fuels to the mix may create some struggles.

Steps Needed

- A. Gauge the level of resistance to adding delivered fuels to the RGGI mix and determine whether there might be any political will to redirect some of this funding.
- B. Keep apprised of the 111(d) regulatory efforts and look for opportunities to include delivered fuels funding in the mix.

* * * * *

4. FCM Funds

Explanation

The Forward Capacity Market (FCM) holds annual auctions looking ahead three years and pays states for efficiency obligations. Over the previous six auctions, Rhode Island has received between \$2 million and \$5 million annually. In the latest auction 8, the clearing price jumped almost five times and so Rhode Island is expected to receive close to \$15 million starting in 2017. As other states (e.g., Vermont) have done, all or a portion of FCM funds could be legislatively directed to be spent supporting delivered fuels.

However, in Rhode Island, these funds have historically been used, and continue to be used to fund the electric and gas energy efficiency programs.

Barriers to Implementation

- A. As with RGGI funds, there will likely be challenges extracting new funding for delivered fuels programs from existing allocations of FCM funding, especially when National Grid is anticipating using future FCM funds for their existing electric and gas programs.
- B. Using FCM payments for delivered fuels savings could be considered cross-subsidization since these funds are generated based on payments for electric capacity savings from electric energy efficiency programs.

Responses to Barriers

- A. Given the future increases in FCM proceeds that are due to Rhode Island in the future, this may be an excellent opportunity to allocate some of that windfall to delivered fuels funding.
- B. There is precedent in at least Vermont that has made a policy decision to fund thermal efficiency with FCM funds. Rhode Island could acknowledge the cross-subsidization and choose to fund delivered fuels programs as a policy priority.

Pros

- A. New higher FCM funding could be allocated to delivered fuels programs and not be seen as being taken away from other commitments.

Cons

- A. There will need to be a negotiated or legislated re-allocation of FCM funds from their current allocations to delivered fuels, which will likely pose some challenges.
- B. These funds should not be considered a sustainable source, given their annual determination, which goes against one of the key principles above.

Steps Needed

- A. Gauge the level of resistance to adding delivered fuels to the FCM mix and determine whether there might be any political will to redirect some of this funding, especially in light of the anticipated windfall.
- B. Better understand the future likely clearing prices given possible plant closures under 111(d) in order to better anticipate future FCM allocations to Rhode Island.

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5. Gross Receipts Tax (GRT)

Explanation

A tax to fund delivered fuels programs could be imposed at the energy distribution level based on their gross sales of energy. Vermont currently imposes a 0.5% tax on the “gross receipts” dollar sales of fuel oil, kerosene, propane, natural gas, electricity, and coal. This tax raised \$7.9 million in 2011, which were

all directed at Vermont’s low-income weatherization program (“Weatherization Trust Fund”). However, Rhode Island could choose to levee such a tax and direct it to delivered fuels.

Barriers to Implementation

- A. This would be a new tax that would have to be imposed and could be subject to political barriers and opposition.
- B. If this were imposed on all fuels, not only would delivered fuels costs be impacted, but also those energy sources that already have an SBC (electricity and natural gas) charge, so ratepayers would pay twice.

Responses to Barriers

- A. Leveeing a tax on all energy sources at the same rate could be argued as treating all equitably. However, this approach would counter the principal #7, price signals.

Pros

- A. A GRT could be an effective mechanism to sustainably raise significant funds for delivered fuels once enacted.

Cons

- A. As a tax at the distribution level, a GRT lacks transparency and would go against principle #6 since it does not show up on the customer’s bill.
- B. There is also a lack of equity (a large portion of it comes from electricity sales), which goes against principle #4 and would appear to cross-subsidize.
- C. GRT revenues also have the potential to be vulnerable to legislative re-direction, at least in Vermont, so it cannot always be relied upon if the legislature has some control over the use of the funds a GRT generates.

Steps Needed

- A. Explore the legal tax issues of enacting a GRT.
- B. Analyze the size the GRT would need to be and its impact on the different energy rates in order to meet the needs of a delivered fuels program.
- C. Explore the political realities of imposing a new tax such as the GRT.

Calculated Yield Sensitivity Based on Gross Receipt Sales

% of Sales	Yield
\$ 0.001	\$ 520,695
\$ 0.002	\$ 1,041,390
\$ 0.003	\$ 1,562,085
\$ 0.004	\$ 2,082,780
\$ 0.005	\$ 2,603,475
\$ 0.006	\$ 3,124,170

6. Energy Efficiency Obligation

Explanation

As implemented in Europe and now being considered in Vermont, an Energy Efficiency Obligation (EEO) uses markets and rewards innovation to drive energy efficiency in the delivered fuels sector. With an EEO, the regulator would set a “savings requirement” target that the delivered fuels industry would have to meet. If the target was not met then penalties would be imposed. In this way, delivered fuels companies could individually raise funds from their customers and implement efficiency measures to achieve the savings goals. Or, they could pay into a fund that would hire third party efficiency implementers to recruit customers and install measures. This approach is similar to some of the industrial self-direct initiatives¹² in which some industrial and large commercial customers have encouraged states to allow them to “self-direct” their portion of SBC fees into internal energy efficiency investments instead of paying into the statewide efficiency fund. This option of administering the energy efficiency projects themselves can provide the industry with flexibility, but with State oversight and quality assurance. Vermont is considering obligating all electric utilities to increasingly reduce their total use of delivered fuels (for electrical generation, thermal use in buildings and for transportation) by their customers. While the utilities would have flexibility in determining how to meet their obligations, they would be fined if they do not succeed. Tracking, measurement, savings claims, customer service, marketing, eligible measures etc. would all need to be included in the arrangements with the delivered fuels industry and its members.

Barriers to Implementation

- A. This is a new concept that will take time to fully understand and set up.
- B. There is a good chance for inconsistency of program offerings between fuel dealers and any statewide delivery mechanism without coordination.

Responses to Barriers

- A. While this is a new approach in the U.S., it has a proven track record in the E.U., so there is opportunity to learn from their experiences.
- B. Consistent program offerings and coordination between fuel dealers could be built into the regulations.

Pros

- A. An EEO would provide flexibility to the market to innovate to meet the goals.
- B. This strategy would avoid the political battles around “imposing fuel taxes”.
- C. Vermont may provide some lessons learned for Rhode Island if a similar approach is adopted there.

¹² <http://www.aceee.org/blog/2011/10/industrial-and-commercial-self-direct>

Cons

- A. This is new and will take some time to set up and fully operationalize.

Steps Needed

- A. Research E.U. experience with this model.
- B. Keep track of Vermont's use and progress.

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7. 111(d) Off-Sets

Explanation

Section 111(d) of the Clean Air Act requires each state to develop “standards of performance” and an implementation plan to achieve those standards that addresses carbon pollution from new and existing power plants. The EPA has issued draft rules for all states that also encourage a multi-state approach to meeting these standards, similar to the RGGI approach. When 111(d) goes into effect in a few years (2018?), it could have the potential to raise the value of the carbon off-sets above current RGGI rates, providing greater revenues to states like Rhode Island.

Barriers to Implementation

- A. 111(d) is not yet finalized and is a few years off, so it would not provide any funding for a number of years.
- B. As with RGGI and FCM, reallocation of the current funds to include delivered fuels will need to be negotiated or legislated.
- C. EPA has not proposed including delivered fuels as part of the 111(d) mix, so there will need to be a better understanding of how delivered fuels could be supported after the final rule is passed. As with RGGI and FCM, using 111(d) funds for delivered fuels would be considered cross-subsidization since funds would be raised from the electricity sector.

Responses to Barriers

- A. 111(d) could be a longer-term delivered fuels funding solution, if allocations are negotiated now for the future.
- B. If funding delivered fuels is a policy priority, Rhode Island could choose to use its 111(d) funds for delivered fuels, while acknowledging cross-subsidization.

Pros

- A. 111(d) will be a longer-term reliable funding source that will provide increased funding to Rhode Island.

Cons

- A. Shorter-term stop-gap funding will need to be established to support delivered fuels until 111(d) is up and running.

- B. Allocations that include delivered fuels will need to be negotiated or legislated.

Steps Needed

- A. Follow the 111(d) rulemaking and understand whether there will be any restrictions to funding delivered fuels.
- B. Negotiate with others who also have an eye on increased 111(d) funding in the future to ensure an allocation for delivered fuels.

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8. Carbon Tax

Explanation

A carbon tax could be placed on delivered fuels, based on the CO₂ content of those fuels, to generate revenue that could be redirected to programs or ratepayers. There are a number of carbon tax proposals nationally that return the revenue from that tax to the public as a monthly or annual payment to protect households from rising costs associated with the carbon tax. There is a lot of discussion nationally and in other states about this approach and many questions that would need to be answered before pursuing, including how would it interact with the existing SBC funding of programs.

Barriers to Implementation

- A. This is a completely new policy approach with no track record in the U.S.
- B. There may be significant opposition to the idea of a new tax, regardless of how it is structured.
- C. Significant policy issues in terms of current SBC funding and allocations will need to be considered.

Responses to Barriers

- A. Massachusetts has been considering a carbon tax and has performed some economic modeling (<http://citizensclimatelobby.org/wp-content/uploads/2014/05/REMI-carbon-tax-MA.pdf>) that may provide some insights for Rhode Island.
- B. Any carbon tax should distribute benefits to all taxpayers as part of its design in order to minimize opposition.
- C. A carbon tax would be a longer-term solution preceded by extensive deliberations.

Pros

- A. A carbon tax has a significant opportunity to raise funds to reduce all carbon-emitting fuels, including delivered fuels.
- B. Taxing carbon-based fuels sends the right message to use less of that source.
- C. Providing proceeds from the tax to all taxpayers helps to negate opposition to the tax in the first place.

Cons

- A. A new broad-based tax is challenging to adopt in the first place and would then be complex to design, figure out the size of the tax and administer.
- B. Determining how a carbon tax would intersect with the SBC and other existing mechanisms that fund clean energy will also be challenging.

Steps Needed

- A. Research carbon tax approaches, successes and issues where there has been experience in other parts of the world.
- B. Explore the political issues and details of a revenue-neutral carbon-tax approach (see <http://citizensclimatelobby.org/carbon-tax/>).

Calculated Yield from a Carbon Tax

\$/Pound CO ₂	Additional Cost per Gallon of Oil	Yield
\$ 0.0001	\$ 0.002	\$ 401,833
\$ 0.0002	\$ 0.004	\$ 803,666
\$ 0.0003	\$ 0.007	\$ 1,205,499
\$ 0.0004	\$ 0.009	\$ 1,607,332
\$ 0.0005	\$ 0.011	\$ 2,009,165
\$ 0.0006	\$ 0.013	\$ 2,410,997
\$ 0.0007	\$ 0.016	\$ 2,812,830
\$ 0.0008	\$ 0.018	\$ 3,214,663
\$ 0.0009	\$ 0.020	\$ 3,616,496
\$ 0.0010	\$ 0.022	\$ 4,018,329

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9. Tax Incentives

Explanation

The State could amend the tax code to allow for certain tax credits as an incentive for homeowners and businesses investing in energy efficiency. A statewide Energy Efficiency Tax Credit would be approved by the Rhode Island legislature with a credit allocation amount for one or more years. The Energy Efficiency Tax Credit would allow capital investments to be made in energy efficiency improvements by individuals or investors and then have that tax credit approved portion of the investment credited to the individual or investor against their state tax liability for one or more years depending on how tax credit is structured. This mechanism could also allow personal tax credits when individuals donate funds to nonprofits to help with qualifying energy projects. Additionally, a mechanism could be set up for nonprofits to take the tax credits directly as a grant.

The State would administer the tax credit through an approved entity directed by the State. Applicants would apply for the tax credit and be awarded a tax credit certificate which would be utilized to claim the credit through the annual tax submittal process.

Barriers to Implementation

- A. The Legislature would need to figure out where to raise funds within the State's general budget in order to offer tax incentive.

Responses to Barriers

- A. This could reduce some of the public opposition about increasing energy costs which could be the case with some of the other proposed policies.

Pros

- A. This strategy may avoid concerns about any attempt to raise fuel prices.

Cons

- A. Tax incentives only benefit those with a tax liability, which excludes most lower-income people.

Steps Needed

- A. Look into Rhode Island tax regulations to determine applicability.
- B. Analyze quantitative impacts and value to taxpayers for different tax incentive levels.