RHODE ISLAND DIVISION OF PLANNING

State Guide Plan Element
Report # 120

ENERGY 2035

RHODE ISLAND STATE ENERGY PLAN

October 8, 2015

Rhode Island Department of Administration
Division of Planning
One Capitol Hill
Providence, Rhode Island 02908

www.planning.ri.gov

The Rhode Island Statewide Planning Program, Division of Planning, Department of Administration is established by § 42-11-10, Statewide Planning Program, of the Rhode Island General Laws as the central planning agency for Rhode Island. The State Planning Council, composed of federal, state, local, public representatives, and other advisors, guides the work of the Program. The objectives of the Program are to:

- prepare Guide Plan Elements for the State
- coordinate activities of the public and private sectors within the framework the State Guide Plan
- assist municipal governments with planning
- advise the Governor and others on physical, social, and economic planning-related topics.

Further, the Division of Planning is authorized by RI General Law 42-11-10, known as the *Statewide Planning Program,* to study and evaluate the needs of the State for current and future energy supply and has the following powers:

1. To adopt, amend, and maintain, as an Element of the State Guide Plan an element concerning the energy supply of the State (including the development of renewable energy resources), energy access, use, and conservation, human services, and other factors.

2. To adopt, amend, and maintain, as an amendment to an existing Element of the State Guide Plan, guidelines for the location of eligible renewable energy resources and renewable energy facilities in Rhode Island with due consideration for the location of such resources and facilities in commercial and industrial areas, agricultural areas, areas occupied by public and private institutions, and property of the State and its agencies and corporations, provided such areas are of sufficient size, and in other areas of the State as appropriate.

ABSTRACT

TITLE: *Energy 2035:* Rhode Island State Energy Plan

SUBJECT: Planning for the production, distribution, and use of energy in Rhode Island

DATE: Adopted by the State Planning Council on October 8, 2015

AGENCY: Division of Planning
Rhode Island Department of Administration
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PROJECT: Work Task #11.4, Fiscal Years 2012-2015

SERIES: State Guide Plan Element, Report Number 120

NUMBER OF PAGES: 169 pages including appendices

ABSTRACT: *Energy 2035* updates the State Guide Plan Element 781 adopted in 2002. It is intended to guide the activities of the Rhode Island Office of Energy Resources and the Division of Planning. The Plan describes the existing state of Rhode Island's energy system and sets goals and policies to improve energy security, cost-effectiveness, and sustainability in all sectors of energy production and consumption. It is intended to advance the effectiveness of public and private stewardship of the State's use of energy resources and identifies activities needed to keep the energy systems on which the state depends functioning optimally. As an element of the State Guide Plan, this Plan sets forth goals and policies that must, under state law, be reflected in future updates of comprehensive community plans.

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- **Ronald Wolanski,** Town of Middletown

ENERGY 2035 ADVISORY COUNCIL

The Energy 2035 Advisory Council played a central role in guiding the overall development of this Plan. The Advisory Council comprised 20 members with subject matter expertise in energy, including representatives from policy-making bodies, regulatory bodies, utility providers, energy users, municipalities, environmental advocacy groups, and industry. The Energy 2035 Project Team, composed of staff from the Rhode Island Office of Energy Resources (OER) and the Division of Planning (DOP), worked closely with the Advisory Council to undertake research and analysis for the Plan. The final Plan reflects the efforts of these hard-working and dedicated Advisory Council members who helped define the major issues, presented and debated positions, and eventually formed a consensus on a broad range of energy topics. It could not have been done without the following individuals who contributed numerous hours and provided technical and editorial review of the Plan as it developed through its various draft stages:

Advisory Council Member	Affiliation
1. Abigail Anthony	*Acadia Center*[1]
2. Anthony Paolantonio	*House Policy Office*
3. Bill Ferguson	*The Energy Council of Rhode Island (TEC-RI)*
4. Ben Swanson[2]	*RGS Energy*
5. Cynthia Wilson-Frias[3]	*RI Public Utilities Commission (RIPUC)*
6. Doug McVay	*RI Department of Environmental Management (RIDEM)*
7. Ian Springsteel	*National Grid*
8. Jack Leyden	*RI Building Code Commission (RIBCC)*
9. Jeff Broadhead	*Washington County Regional Planning Council (WCRPC)*
10. Jerry Elmer	*CLF (Conservation Law Foundation)*
11. John Gilbrook	*National Grid*
12. Jon Hagopian	*RI Division of Public Utilities and Carriers (RIDPUC)*
13. Julian Dash	*Clean Energy Development LLC*
14. Julie Gill	*Oil Heat Institute*
15. Kenneth Payne	*RI Agricultural Partnership*
16. Larry Chretien[4]	*People's Power & Light (PP&L)*
17. Linda George	*Senate Policy Office*
18. Melissa Long	*RI Department of Transportation (RIDOT)*
19. Robert Tormey	*NERC Solar*
20. Sheila Dormody	*City of Providence Office of Sustainability*

[1] Formerly Environment Northeast (ENE)
[2] Replaced Bob Chew (RCHEW Energy Consulting)
[3] Replaced Nicholas Ucci (formerly with the PUC, now with OER)
[4] Replaced Channing Jones (formerly with Environment Council of Rhode Island (ECRI))

ACKNOWLEDGMENTS

Energy 2035 is the product of a collaborative effort by numerous private and public stakeholders. In 2013 and 2014, the Project Team, composed of staff from the Rhode Island Office of Energy Resources (OER) and the Division of Planning (DOP), worked with a 20-member Advisory Council, stakeholder groups, and a consultant team to undertake research and analysis for the Plan. The final Plan incorporates the results of primary research, as well as feedback received at over a dozen meetings with stakeholders from state and local government, utilities and regulators, private sector and industry, and consumer and environmental advocates.

Energy 2035 was developed through a Memorandum of Understanding involving OER and DOP, both of the Department of Administration (DOA). Drafting of Energy 2035 was led by Danny Musher, Chief Program Development at OER, with support from a Project Team. The Project Team guided the development of the Plan and coordinated the review of the Plan by the Energy 2035 Advisory Council. The Division of Planning coordinated review of the Plan by the State Planning Council and its Technical Committee. The members of the Team were:

Office of Energy Resources

Marion S. Gold, Ph.D., Commissioner
Nicholas Ucci, Chief of Staff
Danny Musher, Chief Program Development
Christopher Kearns, Chief Program Development
Rachel Sholly, Chief Program Development

Division of Planning

Kevin Flynn, Associate Director Division of Planning
Jared Rhodes, Chief Statewide Planning Program
Land Use & Natural Resources Unit:
Nancy Hess, Supervising Planner
Paul Gonsalves, Senior Planner

Commerce RI

Hannah Morini, Renewable Energy Program Manager (Formerly)

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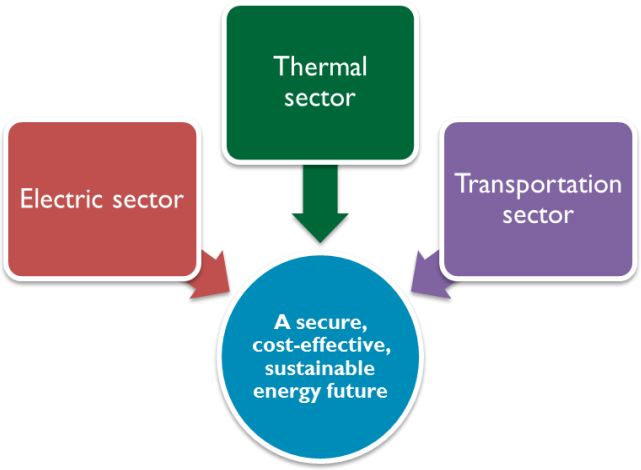
EXECUTIVE SUMMARY

Energy—its availability, reliability, affordability, and sustainability—underpins every inch of our state's economic and environmental fabric. Virtually all aspects of daily life and economic activity depend on reliable access to energy: energy supplies our electricity needs, our heating and cooling needs, and our transportation needs. The impacts of our energy use are far-reaching and consequential—Rhode Islanders currently spend approximately $3.6 billion on power and fuel each year, sourced mainly from out-of-region fossil fuels that annually emit over 11 million tons of greenhouse gases into the atmosphere.

Like many other jurisdictions across the nation, Rhode Island stands at a crossroads. Our existing energy system exposes the state to excessive risk, costs, and environmental damage. Yet, the resources we use to power our lights, heat our homes, and fuel our vehicles have scarcely changed for decades. To improve the quality of our energy system, we need a new approach. Fortunately, major changes in energy markets, increasingly cost-competitive technologies, and new models for energy management all bring within reach the promise of a brighter energy future.

Clearly, this is now the time to act. So how does Rhode Island move forward? The Rhode Island State Energy Plan (Energy 2035, or the Plan) the state's first data-driven energy planning and policy document, provides a long-term, comprehensive energy strategy for Rhode Island. The vision of the Plan is to provide energy services across all sectors—electricity, thermal, and transportation—using a secure, cost-effective, and sustainable energy system. The Plan takes an economy-wide view of Rhode Island's energy use, highlighting areas and sectors of greatest impact and opportunity. The Plan uses the best available data and analysis to develop ambitious but achievable goals and performance measure targets for transforming Rhode Island's energy system. Finally, the Plan proposes state-of-the-art policies and strategies to achieve those goals and identifies activities needed to keep the energy systems on which the state depends functioning optimally.



*In **2035**, Rhode Island provides energy services across all sectors—**electricity, thermal, and transportation**—using a **secure, cost-effective, and sustainable** energy system.*

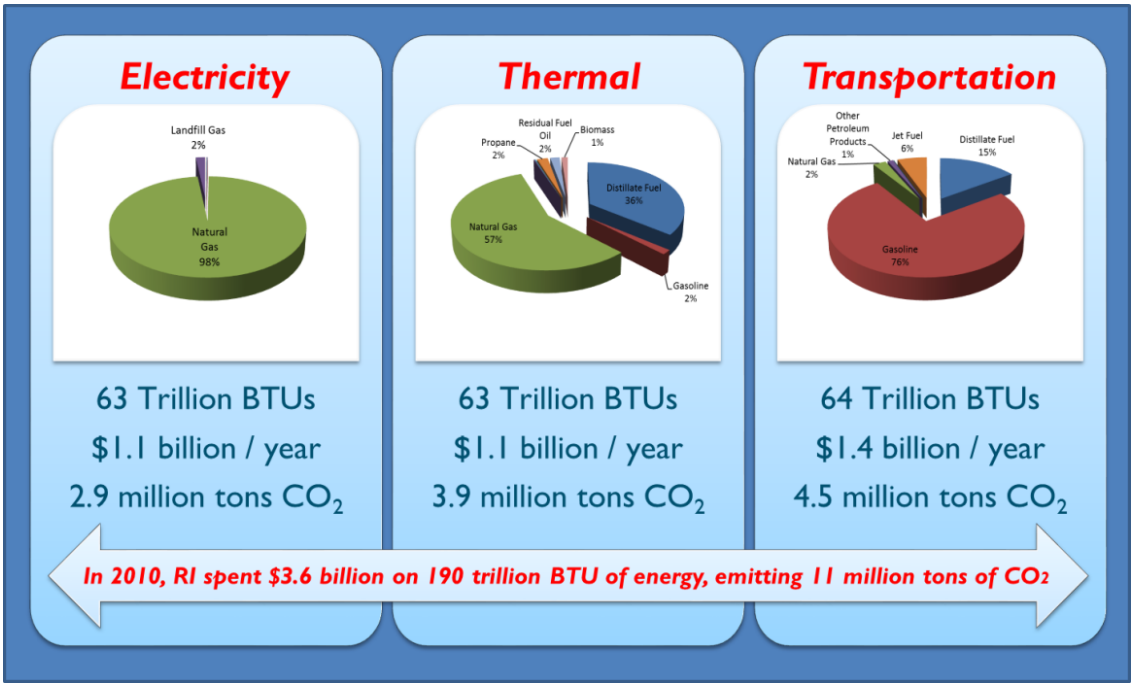
Energy 2035 contains three main sections, with supporting appendices and technical reports. Each section addresses a key question central to energy planning in Rhode Island:

- **Part 1: Overview of Energy in Rhode Island:** What does Rhode Island's energy system look like today?
- **Part 2: Goals and Performance Measure Targets:** What do we want our energy system to look like in 2035?
- **Part 3: Policies and Strategies:** How can Rhode Island achieve its vision of a secure, cost-effective, and sustainable energy future?

In **Part 1: Overview of Energy in Rhode Island**, Energy 2035 examines where Rhode Island is now. What does Rhode Island's energy system look like today? The section presents information on energy use in Rhode Island—the types, amount, cost, and environmental effects of major fuels and energy resources used in all sectors of Rhode Island's economy.

Rhode Island's economy has experienced significant transformations over the past 20 years. Yet during this time, the applications and sources of energy in the state have remained remarkably similar. The state continues to rely on energy for three main purposes—electricity, thermal energy, and transportation. Fossil fuels such as natural gas and petroleum still supply virtually all of the energy needs in each sector. In contrast, patterns of energy consumption, expenditure, and emissions have changed markedly over time. During the past decade, energy costs have risen sharply in real terms, carbon dioxide emissions have fallen, and demand has grown in some sectors while decreasing in others.

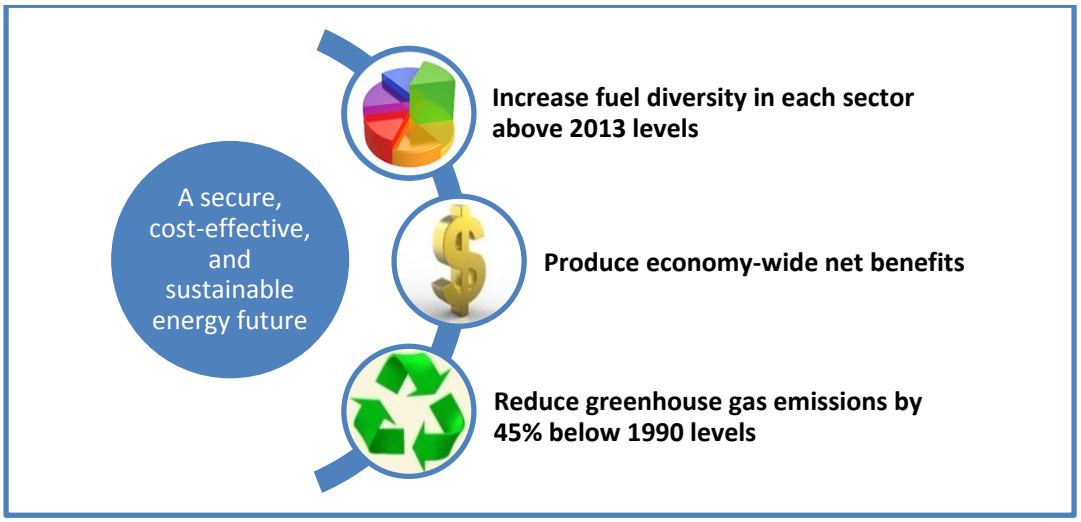
Part 1: Overview of Energy in Rhode Island shows that today, Rhode Island's economy-wide energy consumption totals nearly 190,000 trillion BTU. Rhode Islanders spend approximately $3.6 billion on electricity and fuels to meet thermal and transportation energy needs. Total carbon dioxide emissions top 11 million metric tons.



In **Part 2: Goals and Performance Measure Targets**, Energy 2035 examines where Rhode Island wants to go. What do we want our energy system to look like in 2035? This section sets goals and performance measure targets for Rhode Island's energy future. They are quantifiable, yet inspiring; visionary, yet realistic; bold, yet built on consensus. The Plan goals sketch a vision for an energy system that advances the human, economic, and environmental well-being of the people, communities, and natural resources of Rhode Island.

Through the goal- and performance measure target-setting process, the Project Team conducted detailed research and data-driven analysis to examine tradeoffs associated with alternative energy futures. The results are striking: Not only can Rhode Island achieve dramatic transformations of existing energy systems, but there are feasible ways that the State can concurrently address the three primary themes of the Energy 2035 Vision—energy security, cost-effectiveness, and sustainability.

Part 2: Goals and Performance Measure Targets sets the Plan's three performance measure targets for a secure, cost-effective, and sustainable energy future: Rhode Island can increase sector fuel diversity, produce net economic benefits, and reduce greenhouse gas emissions by 45 percent by the year 2035.

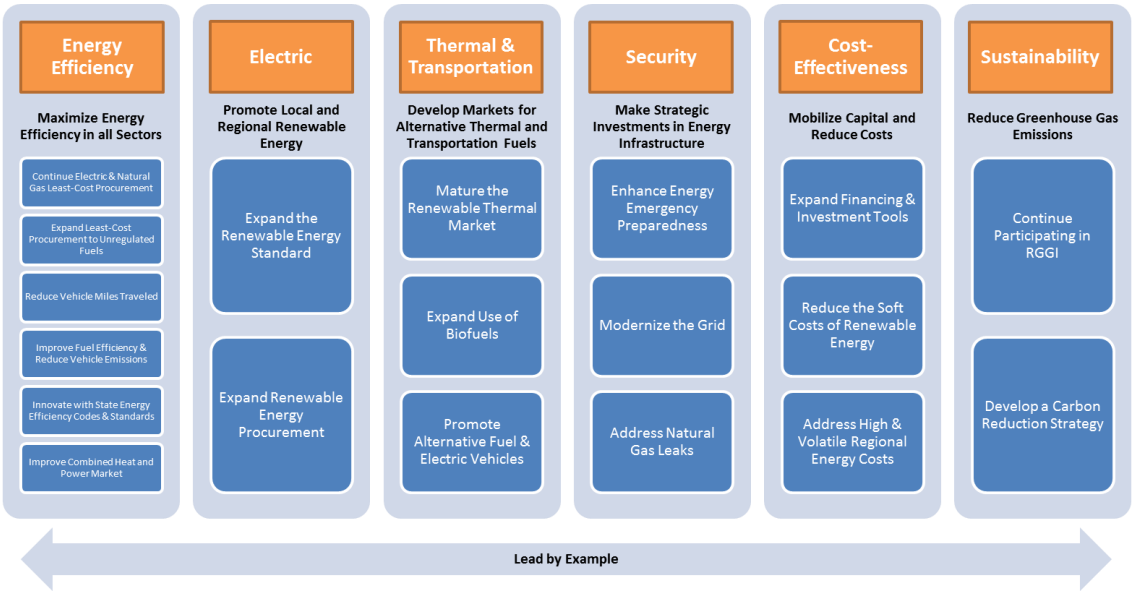


In **Part 3: Policies and Strategies**, Energy 2035 examines how Rhode Island can achieve its energy vision of a secure, cost-effective, and sustainable energy future. This section presents a comprehensive suite of policies and strategies that can assist the State with meeting the energy security, cost-effectiveness, and sustainability goals and performance measure targets established in **Part 2: Goals and Performance Measure Targets**. The policies and strategies that follow are meant to provide decision makers with a complete picture of the near- and long-term actions Rhode Island should consider in each sector of the economy—electric, thermal, and transportation.

A dramatic transformation of Rhode Island's existing energy systems requires commensurately ambitious action at the state and local levels. To achieve the goals and performance measure targets laid out in the Plan, Energy 2035 recommends an "all-of-the-above" clean energy framework. This framework centers on strategic investments that provide long-term energy, economic, and environmental benefits, setting Rhode Island firmly on a path to a lower-risk, lower-cost, and lower-impact energy future.

Part 3: Policies and Strategies presents Rhode Island's all-of-the-above clean energy framework to maximize energy efficiency in all sectors; promote local and regional renewable energy; develop markets

for alternative thermal and transportation fuels; make strategic investments in energy infrastructure; mobilize capital and reduce costs; reduce greenhouse gas emissions; and lead by example.



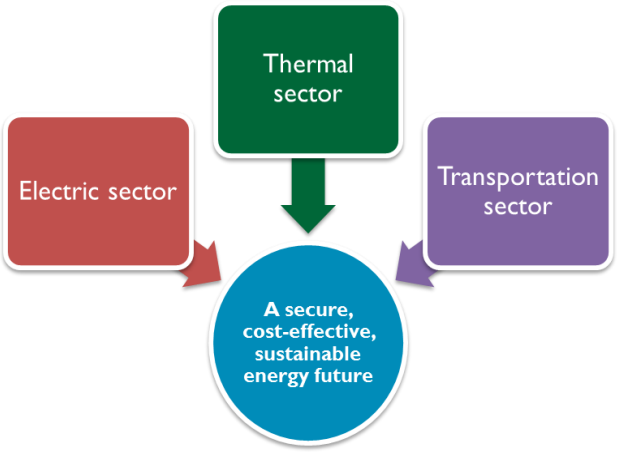
The Plan's findings send a clear message: Rhode Island cannot afford a business-as-usual course of action that increases energy security risks to the state, costs more than viable alternative paths, and fails to meet our obligation to mitigate the worst consequences of global climate change. Because the impact of long-term planning and investment choices will reverberate for decades to come, we must be especially prudent and strategic as we address the weighty energy policy decisions that face us today.

INTRODUCTION AND VISION

Energy—its availability, reliability, affordability, and sustainability—underpins every inch of our state's economic and environmental fabric. Virtually all aspects of daily life and economic activity depend on reliable access to energy: energy supplies our electricity needs, our heating and cooling needs, and our transportation needs. The impacts of our energy use are far-reaching and consequential—Rhode Islanders currently spend approximately $3.6 billion on power and fuel each year, sourced mainly from out-of-region fossil fuels that annually emit over 11 million tons of greenhouse gases into the atmosphere.

Like many other jurisdictions across the nation, Rhode Island stands at a crossroads. Our existing energy system exposes the state to excessive risk, costs, and environmental damage. Yet, the resources we use to power our lights, heat our homes, and fuel our vehicles have scarcely changed for decades. To improve the quality of our energy system, we need a new approach. Fortunately, major changes in energy markets, increasingly cost-competitive technologies, and new models for energy management all bring within reach the promise of a brighter energy future.

Clearly, this is now the time to act. So how does Rhode Island move forward? The Rhode Island State Energy Plan (Energy 2035, or the Plan) the state's first data-driven energy planning and policy document, provides a long-term, comprehensive energy strategy for Rhode Island. The vision of the Plan is to provide energy services across all sectors—electricity, thermal, and transportation—using a secure, cost-effective, and sustainable energy system (Figure 1). The Plan takes an economy-wide view of Rhode Island's energy use, highlighting areas and sectors of greatest impact and opportunity. The Plan uses the best available data and analysis to develop ambitious but achievable goals and performance measure targets for transforming Rhode Island's energy system. Finally, the Plan proposes state-of-the-art policies and strategies to achieve those goals and identifies activities needed to keep the energy systems on which the state depends functioning optimally.



*In **2035**, Rhode Island provides energy services across all sectors—**electricity, thermal, and transportation**—using a **secure, cost-effective, and sustainable** energy system.*

Figure 1. The Energy 2035 Vision Statement: In 2035, Rhode Island will provide energy services across all sectors—electricity, thermal, and transportation—using a secure, cost-effective, and sustainable energy system.

The Plan contains an introduction, three primary sections, two appendices, and two technical reports:

1. **Introduction and Vision:** This section introduces the Energy 2035 Vision Statement and describes the structure, approach, and major findings of the Plan.
2. **Part 1: Overview of Energy in Rhode Island:** This section presents information on energy use in Rhode Island—the types, amount, cost, and environmental effects of major fuels and energy resources used in all sectors of Rhode Island's economy. The section also summarizes the major components of Rhode Island's existing policy framework for addressing energy issues.
3. **Part 2: Goals and Performance Measure Targets:** This section sets measurable goals and performance measure targets for achieving an energy system that advances the human, economic, and environmental well-being of the people, communities, and natural resources of Rhode Island.
4. **Part 3: Policies and Strategies:** This section lays out a comprehensive implementation plan for meeting the Plan's goals and performance measure targets.
5. **Appendix A: Rhode Island Energy Laws:** This appendix provides detailed summaries of Rhode Island's major energy laws.
6. **Appendix B: A Portfolio of Strategies:** This appendix presents a more detailed overview of each strategy in the format of a concise "policy brief."
7. **Technical Report #1: Business-as-Usual Forecast (ENE):** This forecast projects energy demand, prices, expenditures, and carbon dioxide emissions in Rhode Island through 2035, assuming no changes in existing or planned federal, regional and state energy policies and estimated resource availability.
8. **Technical Report #2: Scenario Modeling (Navigant Consulting):** This analysis offers three alternative energy futures for Rhode Island, with changes to resources spanning the electric, thermal, and transportation sectors, relative to the Business-as-Usual (BAU) forecast.

In 2013 and 2014, the Project Team, composed of staff from the Rhode Island Office of Energy Resources (OER) and the Division of Planning (DOP), worked with a 20-member Advisory Council, stakeholder groups, and a consultant team to undertake research and analysis for the Plan. The final Plan incorporates the results of primary research, as well as feedback received at over a dozen meetings with stakeholders from state and local government, utilities and regulators, private sector and industry, and consumer and environmental advocates, as shown in Table 1.

Table 1. Energy 2035 stakeholders

Project Team
• **Office of Energy Resources (OER)** - Project Management & Report Authorship • **Division of Planning (DOP)** - Guidance on State Guide Plan Integration
Consultant Team
• **ENE (Environment Northeast)** - Business-as-Usual Forecast • **Navigant Consulting** - Scenario Modeling
Advisory Council
• Twenty members with subject matter expertise in energy • Representatives from policy-making bodies, regulatory bodies, utility providers, energy users, municipalities, environmental advocacy groups, and industry
Implementation Group
• Stakeholders with subject matter expertise in each energy sector: electricity, thermal, and transportation

In developing the Plan, the Project Team and Advisory Council acknowledged that no crystal ball can predict the future. Major changes in energy markets have occurred in the decade since the adoption of Rhode Island's last energy plan in 2002: the domestic natural gas revolution; precipitous drops in the cost of renewable technologies; and widespread economic retirements of regional coal, oil, and nuclear generating units. Just as no one could have anticipated these developments ten years ago, so too can no one know what new market drivers will emerge to re-shape our energy system in the coming years and beyond.

To reflect the uncertainties associated with forecasting for a dynamic energy system, the Project Team and Advisory Council deliberately chose a directional approach, rather than a specific approach, in establishing the Plan's vision, goals, and strategies. With the understanding that "all models are wrong, but some are useful,"[5] the Team structured a data-driven scenario modeling analysis that would help policy makers understand order-of-magnitude impacts and sensitivities—that is, the range of credible outcomes Rhode Island might expect from strategic investments in alternative demand and supply of energy resources. The team developed goals and performance measure targets that were quantitative enough for meaningful measurement, but not specific enough to risk immediate irrelevance. The team proposed a comprehensive set of policies and strategies to improve Rhode Island's energy system and achieve performance measure targets set in the Plan, but shied away from prescriptive actions and discrete tactics, which will be addressed in the implementation of the plan, including development of policy and program design.

> Whenever I run into a problem I can't solve, I always make it bigger.
> I can never solve it by trying to make it smaller, but if I make it big enough, I can begin to see the outlines of a solution.
> *--Dwight D. Eisenhower*

A directional approach, however, does not mean the approach was cautious. The Plan sets bold and ambitious performance measure targets for transforming Rhode Island's energy system and offers commensurately aggressive strategies. The Plan shows that Rhode Island can **increase sector fuel diversity, produce net economic benefits, and reduce greenhouse gas emissions by 45 percent (below 1990 levels) by 2035 with an "all-of-the-above" clean energy framework to:**

- **Maximize energy efficiency in all sectors**
- **Promote local and regional renewable energy**
- **Develop markets for alternative thermal and transportation fuels**
- **Make strategic investments in energy infrastructure**
- **Mobilize capital and reduce costs**
- **Reduce greenhouse gas emissions**
- **Lead by example**

The Plan's findings send a clear message: Rhode Island cannot afford a business-as-usual course of action that increases energy security risks to the state, costs more than viable alternative paths, and fails to meet our obligation to mitigate the worst consequences of global climate change. Because the impact of long-term planning and investment choices will reverberate for decades to come, we must be especially prudent and strategic as we address the weighty energy policy decisions that face us today. At the same time, the Plan's long-range orientation is not meant to preclude near- and intermediate-term steps that can be taken to ensure the optimal maintenance of Rhode Island and New England's energy system.

[5] George E.P. Box, British mathematician well known for his work in quality control studies and time series analysis. See Box, George. E. P., and Draper, Norman R., (1987), *Empirical Model Building and Response Surfaces*, John Wiley & Sons, New York, NY: p. 424.

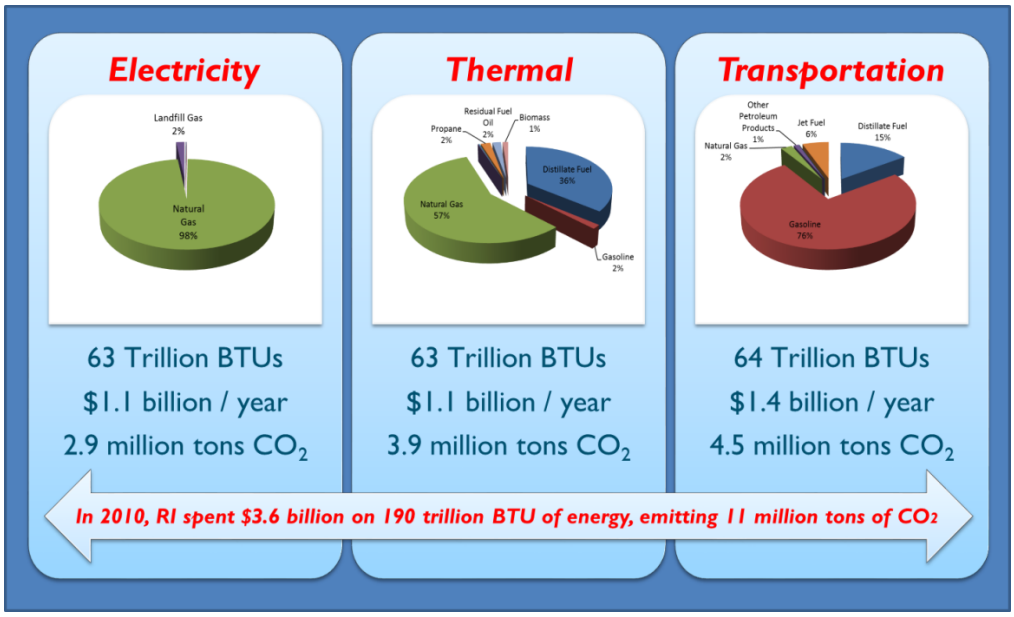
With the completion of the Plan, Rhode Island is now armed with the data and information it needs to direct energy policy efforts to improve the energy security, cost-effectiveness, and sustainability of the state's energy system. Although the Plan is finished, the work has just begun.

PART 1: OVERVIEW OF ENERGY IN RHODE ISLAND

What does Rhode Island's energy system look like today? This section presents information on energy use in Rhode Island—the types, amount, cost, and environmental effects of major fuels and energy resources used in all sectors of Rhode Island's economy. The section also summarizes the major components of Rhode Island's existing policy framework for addressing energy issues.

Rhode Island's economy has experienced significant transformations over the past 20 years. Yet during this time, the applications and sources of energy in the state have remained remarkably similar. The state continues to rely on energy for three main purposes—electricity, thermal energy, and transportation. Fossil fuels such as natural gas and petroleum still supply virtually all of the energy needs in each sector. In contrast, patterns of energy consumption, expenditure, and emissions have changed markedly over time. During the past decade, energy costs have risen sharply in real terms, carbon dioxide emissions have fallen, and demand has grown in some sectors while decreasing in others.

Today, Rhode Island's economy-wide energy consumption totals nearly 190,000 trillion BTU. Rhode Islanders spend approximately $3.6 billion on electricity and fuels to meet thermal and transportation energy needs. Total carbon dioxide emissions top 11 million metric tons.



Growing concerns about the security, cost, and sustainability impacts of energy use have placed energy issues at the forefront of Rhode Island's public policy agenda over the past two decades. In recognition of the central role that energy plays in shaping the state's communities, economy, and environment, policy makers have enacted ambitious energy policies and programs, primarily in the areas of energy efficiency and renewable energy. Due to the multidimensional nature of energy planning, management, and oversight, the implementation of these programs involves a wide range of state agencies and boards.

Part 1: Overview of Energy in Rhode Island details the different components and characteristics of Rhode Island's whole energy system, individual end use sectors, and current policy framework.

METHODS AND PROCESS

To characterize Rhode Island's energy profile, the Plan's Project Team and Advisory Council identified three broad sectors of energy use in Rhode Island: electricity, thermal, and transportation[6] (**Figure 2**). Each sector represents a category of "end use" energy consumption in the state. A variety of energy sources and fuels—primarily fossil fuels such as natural gas and petroleum—supply most energy needs in each sector.

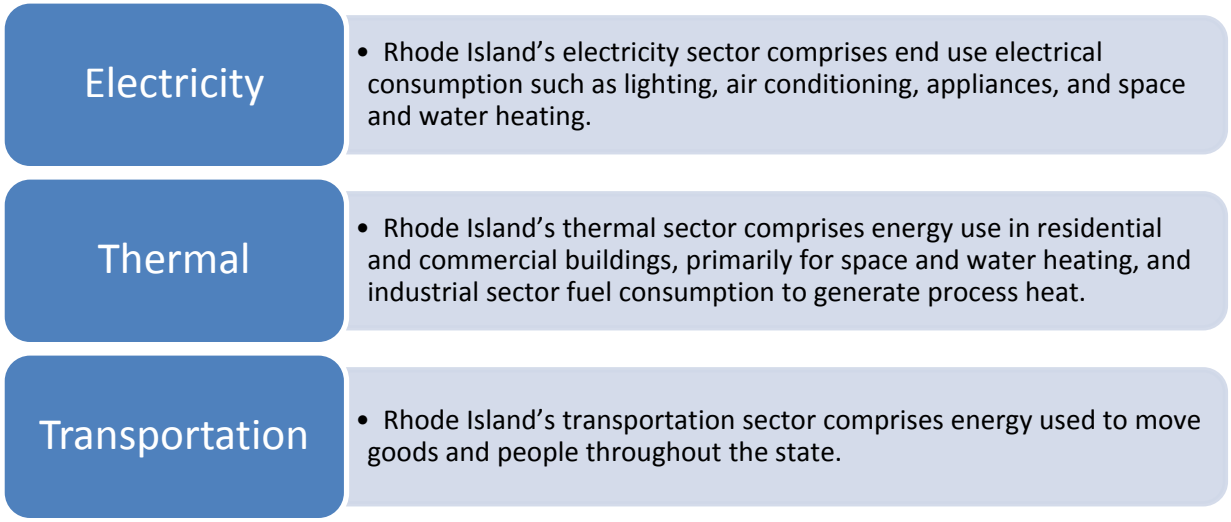


Figure 2. Rhode Island's energy use sectors.

The Project Team and Advisory Council then selected metrics to characterize how energy use has changed in the state over time. The Project Team examined the composition of energy supply by source, expenditures on energy, energy prices, and carbon dioxide emissions. These metrics provide information about energy system impacts on energy security, cost-effectiveness, and sustainability. These three areas of interest for energy planning are the three primary themes of the Energy 2035 Vision Statement.

The main sources of information used to gather data on Rhode Island's energy system were the U.S. Energy Information Administration (EIA), the Independent System Operator of New England (ISO-NE), National Grid, and the Rhode Island Energy Assurance Plan (EAP).

[6] Electricity can also be used in thermal and transportation end use applications, such as electric heating or electric vehicles. In Rhode Island, however, such applications account for only a minor portion of overall historical thermal or transportation energy consumption. For the purposes of this section, these applications are counted as end use consumption in the electricity sector.

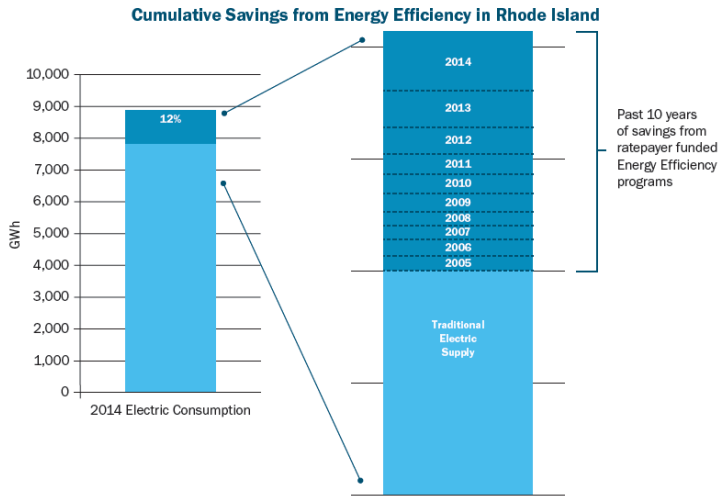
Energy Supply and Infrastructure Assets

Few indigenous energy resources exist in Rhode Island. In fact, the state's most significant "supply" resource is actually on the demand side—energy savings achieved through investments in energy efficiency. After energy efficiency, Rhode Island is virtually entirely dependent on imported fossil fuels (natural gas and petroleum products) for supplying in-state electric generation, thermal energy, and transportation fuels. Renewable energy resources such as wind and solar comprise a very small, but growing, portion of the state's energy portfolio. The state relies on complex regional and international supply chains and infrastructure for reliable access to energy, including a regional electric grid managed by ISO New England, an extensive interstate natural gas pipeline delivery system, and shipments of petroleum products into the state. The following section provides an overview of the major sources of energy supply and associated infrastructure assets in Rhode Island.

Energy Efficiency

Rhode Island's "first fuel" is energy efficiency. In general, two options exist to meet the energy needs of consumers, businesses, and institutions: using sources of energy supply ("megawatt-hours" produced from natural gas, petroleum, renewable energy, etc.) or reducing energy demand ("negawatt-hours" produced from energy conservation or investments in energy efficiency). As a matter of public policy, Rhode Island prioritizes the latter—energy efficiency—by requiring electric and gas distribution companies to invest in all cost-effective demand reduction measures (for example, higher efficiency lighting, HVAC systems, and appliances; insulation; air-sealing) before acquiring more expensive, conventional supply resources for end uses. The result of this "Least-Cost Procurement" resource acquisition strategy is an energy supply portfolio that maximizes the use of the lowest-risk, lowest-cost, and arguably most sustainable energy resource available: energy efficiency. For more information on Rhode Island's Least-Cost Procurement policies, see the section **Current Policy Framework**.

Energy efficiency's contribution to Rhode Island's overall energy supply portfolio is significant. For example, as of 2013, a decade's-worth of demand reduction investments made through the ratepayer-funded electric energy efficiency program supply approximately 12 percent of Rhode Island's electric energy needs (Figure 3).



Source: EERMC 2014 Annual Report

Figure 3. The role of energy efficiency since 2000, and its cumulative effects on energy use in Rhode Island.

ELECTRICITY

The electricity consumed in Rhode Island homes, businesses, and institutions is generated at power plants, transported through a network of high-voltage transmission lines, and distributed via local poles and wires to end users. Rhode Island's electrical grid is connected to a larger regional power grid composed of more than 350 generating resources (natural gas, coal, and oil-fired power plants; hydroelectric dams; nuclear stations; biomass plants; and renewable energy units like wind and solar), 8,000 miles of transmission lines, and 6.5 million households and businesses that create electric demand throughout New England.[7]

Half a century ago, individual "vertically integrated" electric utilities operated throughout New England as regulated monopolies, handling every aspect of providing electricity: generation, transmission, and distribution.[8] The fully integrated regional electric grid we know today is the result of decades of infrastructure investment and regulatory reform, culminating in electricity deregulation during the 1990s. Today, New England's power grid is centrally managed by ISO-NE, the regional independent system operator. Created by the Federal Energy Regulatory Commission (FERC) in 1997, ISO-NE oversees minute-to-minute dispatch of electricity on the bulk power system, administers the regional wholesale electric and capacity markets, and manages system planning.

Although ISO-NE is responsible for coordinating the interstate flow of power, retail delivery of electricity to consumers within individual states falls to electric distribution companies. Today, three such companies operate in Rhode Island. National Grid, the largest of the three, manages the distribution system for 99 percent of the state, serving 486,000 electricity customers with a network of more than 6,000 miles of distribution lines.[9] Block Island Power Company and the Pascoag Utility District serve the remaining areas on Block Island and in western Burrillville, respectively. All electric distribution companies in the state are regulated by the Rhode Island Public Utilities Commission (RIPUC).

Rhode Island's restructured retail electric market allows consumers and businesses to choose a competitive power provider for their electricity service, while still relying on the local electric utility for distribution service. Electric distribution companies are required by state law to provide "standard offer" and "last resort" electric service for customers who do not elect to purchase power from an alternate electricity retailer. As of 2012, competitive suppliers served approximately 35 percent of Rhode Island's electric load.[10]

Rhode Island is home to approximately 2 gigawatts (GW) of electric generating capacity (Figure 4). Most of these power plants are owned and managed by merchant (non-utility) generation companies. Virtually all major generating facilities in the state use natural gas as the primary fuel. In 2011, natural gas-fired generation accounted for approximately 98 percent of in-state generation capacity.[11] Many small, distributed renewable energy systems also exist in Rhode Island. These systems harness the power of indigenous, renewable sources of energy such as the sun, wind, and water. See Figure 7 for a list of existing distributed renewable energy facilities in Rhode Island.

[7] http://www.iso-ne.com/nwsiss/grid_mkts/elec_works/index.html
[8] http://www.iso-ne.com/aboutiso/co_profile/history/index.html
[9] http://www.ripuc.org/eventsactions/docket/4473-NGrid-Electric-ISR-2015(12-19-13).pdf
[10] http://www.ripuc.org/utilityinfo/PUC-RES-AnnualReport2012-Rev(3-25-14).pdf
[11] Form EIA-860.

Power Plant	Nameplate Capacity (MW)	Primary Fuel	Dual Fuel Capability
Entergy Rhode Island State Energy LP	596	Natural Gas	
Manchester Street	515	Natural Gas	Distillate Fuel Oil
Tiverton Power Plant	272.5	Natural Gas	
Ocean State Power	254.2	Natural Gas	Distillate Fuel Oil
Ocean State Power II	254.2	Natural Gas	Distillate Fuel Oil
Pawtucket Power Associates	68.8	Natural Gas	Distillate Fuel Oil
Rhode Island LFG Genco	33.4	Landfill Gas	
Toray Plastics	12.5	Natural Gas	
Central Power Plant	10.7	Distillate Fuel Oil, Natural Gas	
Rhode Island Hospital	10.4	Natural Gas	Residual Fuel Oil
Block Island	9.6	Distillate Fuel Oil	
Brown University Central Heating	3.2	Natural Gas	Residual Fuel Oil
Total	**2,041**		

Source: EIA-860 Annual Electric Generator Report

Figure 4. Major power plants in Rhode Island, their fuel mix, and the capacity they deliver.

Natural Gas

Natural gas plays a crucial role in Rhode Island's energy economy. Nearly all in-state electric generation relies on natural gas as a fuel source. Gas also supplies the majority of in-state thermal energy needs.

Natural gas is not a fuel indigenous to New England. Gas brought into the region originates primarily from production in the Appalachian region, the Gulf Coast, and to a lesser extent, Canada.[12] The vast majority of natural gas consumed in Rhode Island arrives via pipelines developed and operated by the Algonquin Gas Transmission Company and the Tennessee Gas Pipeline (TGP) Company (Figure 5). The remainder is transported as liquefied natural gas (LNG) to the state via tanker trucks. The Algonquin Gas Transmission is an interstate pipeline that transports natural gas from New Jersey throughout New England. The TGP is a major interstate pipeline that extends from the Texas / Mexico border to eastern Massachusetts.

National Grid, Rhode Island's only natural gas distribution company, manages the retail delivery of gas to end users in the state. The local gas distribution system operated by National Grid serves approximately 257,000 residential, commercial, and industrial customers using a network of over 3,200 miles of mains.[13] National Grid also owns and operates three LNG storage facilities in the state.[14]

[12] Rhode Island Office of Energy Resources *Energy Assurance Plan*, June 29, 2012, Section 7.
[13] Rhode Island Public Utilities Commission data, http://www.ripuc.org/eventsactions/docket/4474-NGrid-Gas-ISR-2015(12-20-13).pdf.
[14] *Energy Assurance Plan,* Section 7.

Source: Rhode Island Energy Assurance Plan

Figure 5. Natural gas pipelines in Rhode Island.

Petroleum Products

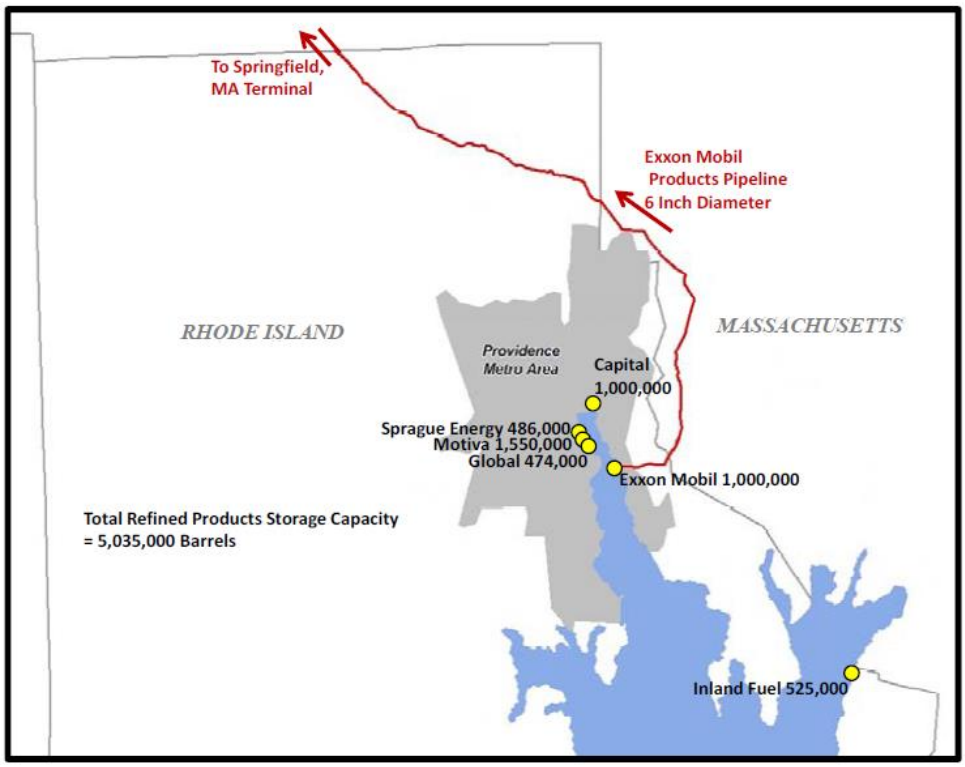
Petroleum-based fuels used in Rhode Island include gasoline, distillate fuel, propane, kerosene, residual fuel oil, and jet fuel. Petroleum products supply fuel needs mainly in the thermal and transportation sectors, and to a lesser extent, in the electric sector (for natural gas plants in the state with dual fuel capability, see Figure 4).

Petroleum-based fuels are not locally produced in Rhode Island. The state receives shipments of refined petroleum product via six marine import terminals in East Providence, Providence, and Tiverton (Figure 6). Most of the product arriving at the terminals is subsequently trucked to end users in Rhode Island, eastern Connecticut, and parts of Massachusetts.[15] The East Providence Exxon Mobil terminal owns and operates the sole refined products pipeline in the state, a small-diameter pipeline that transports product up to the Springfield, Massachusetts, terminal.

Rhode Island does not regulate retail sales of petroleum products. Gasoline operations—production, refining, and retail sales—can be vertically integrated, with large companies such as Exxon and Sunoco transporting, refining, and selling the fuel through their filling stations. Over time, major oil companies have increasingly moved out of the retail business, with franchised dealers and other independent retailers assuming responsibility for retail operations. Distillate fuel, kerosene, and propane sales are managed

[15] *Energy Assurance Plan,* Section 8.

primarily by local fuel dealers who sell product to residential and commercial customers. Some large commercial and industrial customers who have on-site reserves purchase fuel directly from wholesale distributors.



Source: Rhode Island Energy Assurance Plan

Figure 6. Rhode Island's marine import terminals, and the route to the Springfield, Massachusetts, refining terminal.

Renewable Energy

Renewable energy resources—wind, solar, hydropower, biomass, and others—can be used to generate electricity with minimal environmental impact, compared to fossil fuel-fired power plants. Some renewable energy resources such as solar, geothermal, and biofuels have applications in the thermal and / or transportation sectors as well. Until recent years, the use of renewable energy in Rhode Island was negligible. During the past decade, the enactment of state laws and programs have stimulated a nascent market for renewable energy in Rhode Island. The most significant of these changes include the Renewable Energy Standard (RES), the Long-Term Contracting Standard for Renewable Energy (LTC), the Distributed Generation Standard Contracts Program (DG), Net Metering, the Renewable Energy Growth Program (REG), and the Renewable Energy Fund (REF). For more information on Rhode Island's renewable energy policies, see the section **Current Policy Framework**.

Renewable energy resource potential is modest in Rhode Island compared to other regions of the country. Nevertheless, important in-state opportunities exist for developing renewable forms of energy. The State's most significant renewable energy resource from a power production standpoint is offshore wind. The 2007 RIWINDS study, commissioned by the Rhode Island Economic Development Corporation (now the Rhode Island Commerce Corporation, or Commerce RI), concluded that over 95 percent of the wind energy

resources available to Rhode Island are located offshore.[16] Subsequent renewable energy resource assessments conducted in 2012 through the Renewable Energy Siting Partnership (RESP) helped quantify the resource opportunities for land-based wind, small hydropower on existing dams, and solar photovoltaic projects located on landfills throughout the state.[17] Further references and information on the resource potential of different forms of renewable energy resources can also be found in Technical Report #2: *Rhode Island State Energy Plan Scenario Modeling Executive Summary & Results* and in **Part 2: Goals and Performance Measure Targets**.[18] Currently commercially-available renewable energy technologies in Rhode Island include wind, solar, hydropower, and biomass. In the future, markets may develop for emerging technologies such as wave and tidal power, however, at present, no such installations exist in the state.

As of December 2013, more than 340 distributed renewable energy systems representing approximately 29 MW of hydropower, solar, and wind capacity were installed in the state (Figure 7).

Technology	Capacity (kW)	# of Systems
Small Hydro		
All sizes	**6,656**	**7**
Solar Photovoltaic		
50 kW & under	1,866	296
>50 kW	11,147	15
	13,013	**311**
Wind		
50 kW & under	94	11
>50 kW	9,060	12
	9,154	**23**
Grand Total	**29,005**	**341**

Source: National Grid, FERC

Figure 7. Renewable energy systems in Rhode Island.

Wind

Wind turbines use the energy of moving air to generate electricity. Turbines produce more power at higher wind speeds, which are typically found in areas with high elevations and low surface roughness. In Rhode Island, the most significant wind energy resources are concentrated in areas along the coast and offshore in ocean waters.

The use of wind to generate electricity is a relatively new undertaking in Rhode Island. The first commercial-scale wind turbine was installed in 2006 at the Portsmouth Abbey. As a small and densely populated state, Rhode Island does not lend itself to large onshore wind farms of the type seen in the Midwest and western states. Instead, Rhode Island's wind power potential lies in municipal or small-scale commercial projects consisting of one or a few wind turbines, and in offshore wind farms. As of December 2013, the Ocean

[16] http://sbe.umaine.edu/avian/Assets/Monitoring%20Network%20PDFs/ReportsPDFs/RIWINDSReport_2007.pdf
[17] http://seagrant.gso.uri.edu/coast/resp.html
[18] See pages 62-87 in Technical Report #2: *Rhode Island State Energy Plan Scenario Modeling Executive Summary & Results*, and Figure 25 in **Part 2: Goals and Performance Measure Targets**.

State had an estimated installed wind capacity of approximately 9 MW, with 12 systems larger than 50 kW (see Figure 7). Although no offshore wind installations currently exist in Rhode Island, Deepwater Wind LLC began construction on their proposed five-turbine, 30 MW wind farm in state waters off the coast of Block Island in 2015[19]. A much larger offshore wind project—up to 1,000 MW—is planned for development in federal waters off of Rhode Island and Massachusetts[20].

Siting wind energy projects involves a careful consideration of both the available wind resource and the potential impacts a project may pose to the surrounding area. A number of public-private partnerships and state initiatives have evaluated siting considerations associated with offshore and onshore wind in Rhode Island. These efforts include the Ocean Special Area Management Plan (SAMP), the Division of Planning (DOP) Wind Siting Guidelines, and the Renewable Energy Siting Partnership (RESP).

The Ocean Special Area Management Plan (SAMP)[21] is a planning and regulatory development process conducted by the Coastal Resources Management Council (CRMC) to promote, protect, enhance, and honor existing human uses and natural resources in the coastal waters of Rhode Island, while encouraging economic development, creating renewable energy siting zones, and facilitating the coordination of state and federal decision making bodies. Adopted October 19, 2010, the Ocean SAMP informed the siting of Rhode Island's first offshore wind farm in state waters off Block Island and will direct the future siting of utility-scale wind farms in Rhode Island Sound.

In 2012, the Division of Planning (DOP) released a technical report, "Interim Siting Factors for Terrestrial Wind Energy Systems,"[22] which put forth guidelines for siting wind turbines in municipalities. DOP produced this report as part of an overarching statutory charge to develop siting guidance for the location of renewable energy facilities in the state. The law directed the DOP to consider standards and guidelines for the location of eligible renewable energy resources and facilities with consideration for the location of such resources and facilities in commercial, industrial, and agricultural areas, areas occupied by public and private institutions, and property of the State, and in other areas of the state as appropriate. OER will coordinate with DOP on these guidelines and issue updated wind siting guidance for municipalities in the future as new data and information on siting impacts emerge.

In response to questions about the effects that the increased development of renewable energy may have on the people and communities of Rhode Island, the State initiated the Renewable Energy Siting Partnership (RESP)[23] in 2011. The RESP spearheaded a statewide conversation among residents, municipalities, and other stakeholders about the benefits and impacts of renewable energy development in the state. The RESP evaluated impacts of land-based wind turbines on bird and bats, scenery, cultural value, property values, and public safety, as well as acoustic, shadow flicker, and electromagnetic interference impacts. The RESP also performed an analysis of modeled wind speed values and confirmed modeled estimates with data collected at specific sites. Drawing on analysis of impacts and wind resource data, the RESP performed a siting analysis to visualize the distribution of wind energy opportunities and constraints around the state. Finally, a "Wind Energy Siting Tool" was developed as an online decision-support tool that stakeholders can use to assess the estimated power production and siting impacts of proposed wind projects.

[19] http://dwwind.com/block-island/
[20] http://dwwind.com/dww-deepwater-one/
[21] http://seagrant.gso.uri.edu/oceansamp/
[22] http://www.planning.ri.gov/documents/LU/Wind%20Energy%20FacilityGuidelines_June-2012_.pdf
[23] http://www.crc.uri.edu/projects_page/rhode-island-renewable-energy-siting-partnership-resp/

Solar

Many technologies can harness the energy produced by the sun. The simplest application of solar power, called *passive solar*, uses building design principles to collect, store, and distribute solar energy as heat. More complex, *active solar* systems can generate heat for water or space heating (solar thermal), or produce electricity directly from sunlight using receptor panels (photovoltaics, or PV).

Solar PV systems produce the most energy in locations with superior access to the radiant light or heat energy of the sun. The quality of the solar resource in a given area depends on topography, weather, time of day, season, latitude, and the changing distance and orientation between the Earth and sun. The average annual photovoltaic solar radiation in New England ranges between 3 and 4 kWh per square meter per day.

In Rhode Island, solar PV systems are in place throughout the state on residences, public and municipal buildings, businesses, non-profits, and commercial properties. At various times during the past decade, state tax credits and/or rebates supported the development of limited numbers of solar systems in the state. In recent years, the prospects for Rhode Island's solar market improved with the creation of the Distributed Generation (DG) Standard Contracts Program and the Renewable Energy Growth (REG) Program. These programs are leading to a dramatic increase in the number of solar systems constructed in the state. As of December 2013, the Ocean State had an estimated installed solar PV capacity of 13 MW, with more than 300 known installations (see Figure 7).

Hydropower

Hydropower systems convert the energy of water flowing downstream into electricity to generate power. In Rhode Island, limited hydropower resources exist due to the state's flat, coastal terrain and small number of large rivers. Because of this, the principal opportunity to develop hydropower generation in Rhode Island lies in co-locating new projects on existing dams. Rhode Island waterways contain significant numbers of dams (more than 742 are known to exist); however, only a handful are likely suitable for development. Most studies estimate total state hydropower potential at approximately 10 to 20 MW. As of December 2013, seven permitted hydroelectric facilities exist in Rhode Island, with a combined authorized capacity of 6.7 MW (see Figure 7).

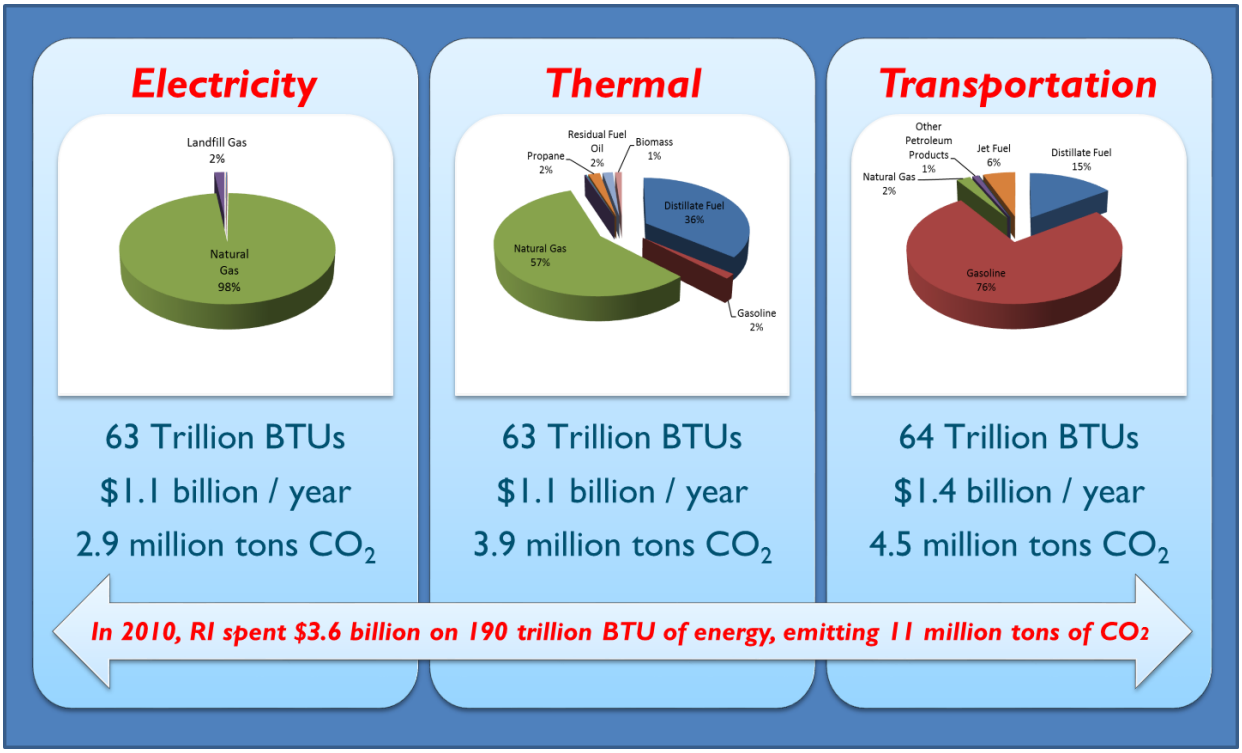
Biomass

Biomass—organic matter such as plants, residue from agriculture and forestry, and the organic component of municipal and industrial wastes—can be used to generate electrical power. Rhode Island's largest renewable energy facility, located at the Central Landfill in Johnston, is a 33.4 MW combined cycle unit fueled by landfill gas—a biomass energy source[24]. In recent years, this facility produced between 1 and 2 percent of the electricity generated in Rhode Island.

[24] http://energy.gov/sites/prod/files/2013/11/f5/chp_landfillgas_casestudy.pdf

Energy Use and Historical Trends

Rhode Island relies on energy for three major purposes: end use electric consumption, thermal energy demand, and transportation applications (Figure 8). The state's energy consumption is split fairly evenly among the three main areas of energy use; however, different sources supply demand in each sector. The electric sector is highly dependent on natural gas, whereas the transportation sector is virtually entirely dependent on petroleum fuels such as gasoline and distillate fuel (diesel). Both natural gas and petroleum fuels (for example, No. 2 home heating oil) supply thermal energy needs. Because petroleum fuels are higher cost and more carbon intense relative to natural gas, energy expenditures and emissions are higher in Rhode Island's thermal and transportation sectors compared to the electric sector. The following subsection provides an overview of energy use and historical trends in each end use sector of Rhode Island's economy—electric, thermal, and transportation.



Source: EIA SEDS, EIA-923

Figure 8. Rhode Island's total energy profile.

Whole Energy System

Rhode Island is a small state, with the second-to-lowest total energy consumption in the nation.[25] The state ranks lowest in the country for per-capita energy use, in part because it lacks heavy industry, relative to other states.[26]

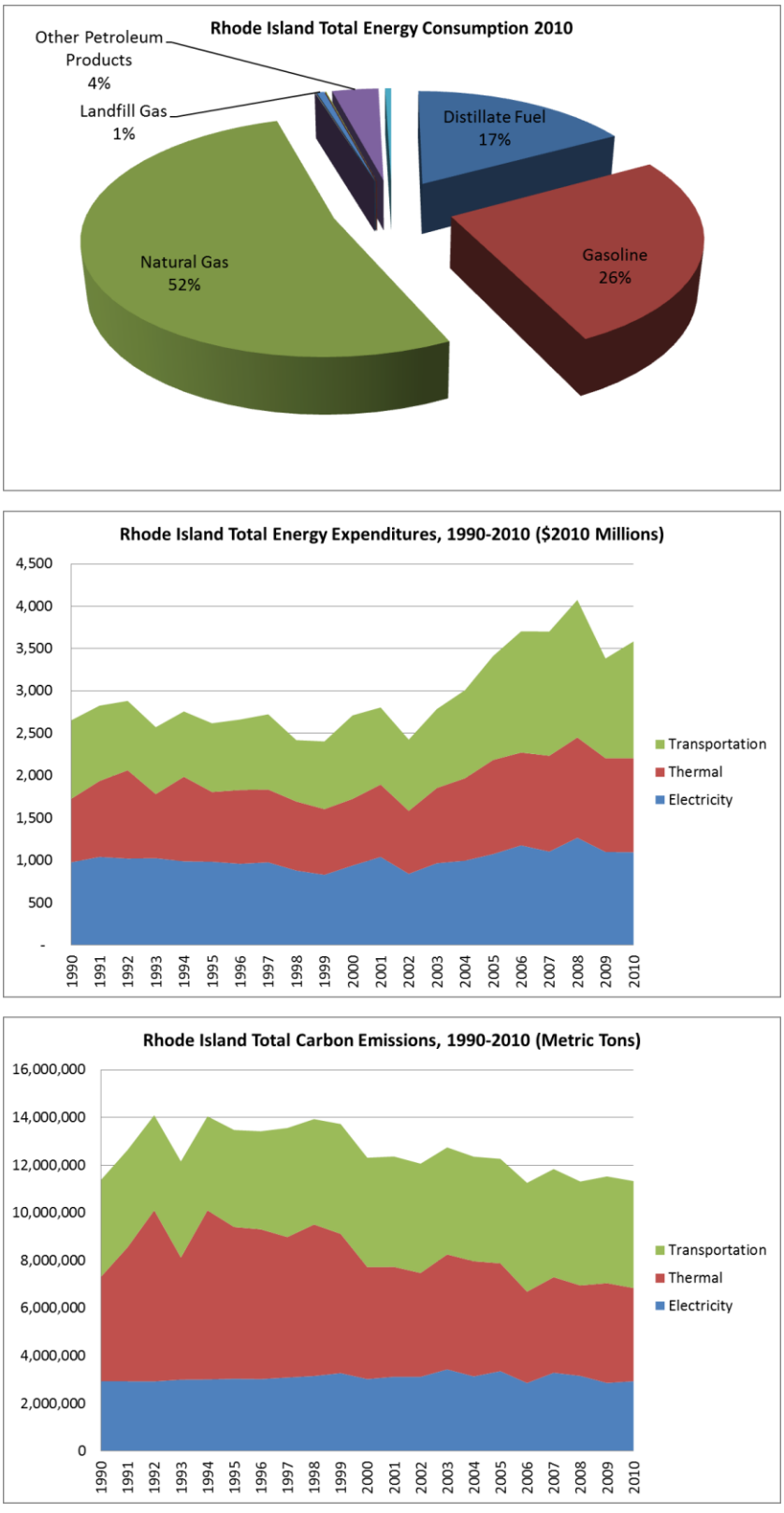
Rhode Island's cross-sector consumption of fuels reflects the central role of two major fuels: natural gas in the electric and thermal sectors and gasoline in the transportation sector (Figure 9). The remaining

[25] http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_te.html&sid=US&sid=RI.
[26] http://www.eia.gov/state/?sid=RI.

consumption consists largely of petroleum products, including distillate fuel, which play an important role in the thermal and transportation sectors.

Expenditures on energy in Rhode Island have risen significantly in real terms over the past decade. As of 2010, annual expenditures in Rhode Island on electricity, thermal, and transportation fuels total approximately $3.6 billion, up nearly $1 billion from 10 years ago. Much of this increase is due to growing costs in the thermal and transportation sectors, which depend more heavily on high-cost petroleum-based fuels.

Economy-wide carbon dioxide emissions rose during the 1990s, primarily driven by thermal-sector energy consumption. Today, however, emissions have returned to approximately 1990 levels, after a steady decline in the past decade. The most significant contributor to carbon dioxide emissions in Rhode Island is the transportation sector, followed by the thermal sector. This is due to greater reliance on petroleum fuels, which are more carbon intense, relative to natural gas, the dominant fuel in the electric and thermal sectors.



Source: EIA SEDS, EIA-923

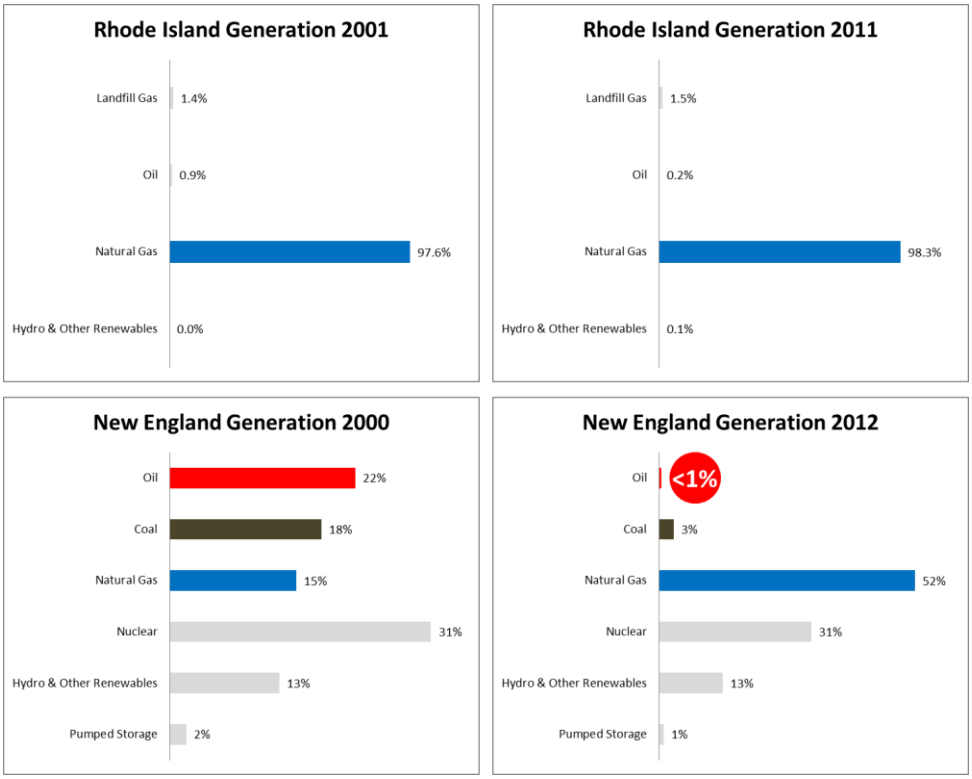
Figure 9. Rhode Island whole energy system consumption, expenditure, and carbon dioxide emissions profile.

ELECTRICITY

Rhode Island's electric sector comprises all end use electrical consumption in the state—primarily lighting, air conditioning, appliances, and space and water heating. Electric demand is served by power plants located in-state, as well as generating resources in other neighboring states, due to the regional nature of New England's electric grid.

Rhode Island's in-state electric generation portfolio has scarcely changed over the past decade (Figure 10). Natural gas accounts for nearly all power generated; the remainder comes mainly from landfill gas. Generation from renewable energy resources other than landfill gas contributes negligibly to the total in-state electric supply. In 2010, Rhode Island power plants generated approximately 7,739 gigawatt-hours (GWh) of electricity.[27]

Unlike Rhode Island's electricity generation portfolio, New England's overall generating mix has undergone fundamental changes in the last decade (Figure 10). In recent years, surging production of domestic natural gas, falling gas prices, and increasingly stringent regional environmental regulations have shifted the economics of natural gas in New England, particularly relative to coal and oil use. The result has been a dramatic increase in natural gas' share of the regional electric supply. In 2000, natural gas accounted for just 15 percent of New England's power generation; today, gas supplies approximately 50 percent. During this same period, energy generated from oil plummeted from 22 percent to less than 1 percent of regional supply; coal generation fell from 18 percent to 3 percent.

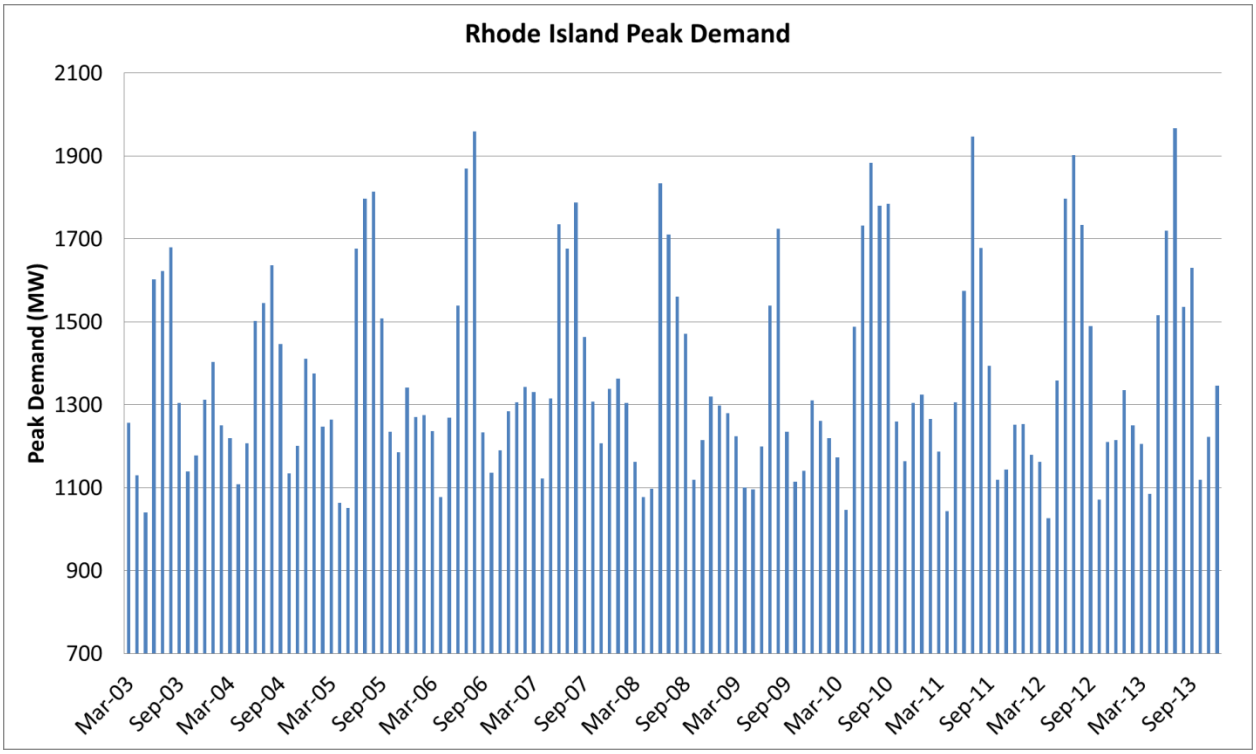


Source: Form EIA-923, ISO New England (http://www.iso-ne.com/support/training/courses/isone_101/04_overview_system_planning.pdf)

Figure 10. Historical patterns of electricity generation in Rhode Island and New England as a whole.

[27] Form EIA-923

During the past 20 years, overall electricity demand in Rhode Island has increased (Figure 12). Consumption has grown approximately 20 percent over the past two decades, with increases in residential and commercial demand outpacing a decrease in industrial electric use. In 2010, Rhode Island homes, businesses, and institutions together used 7,799 GWh of electricity. As of December 2013, Rhode Island's statewide historical peak demand was 1,967 MW (Figure 11).

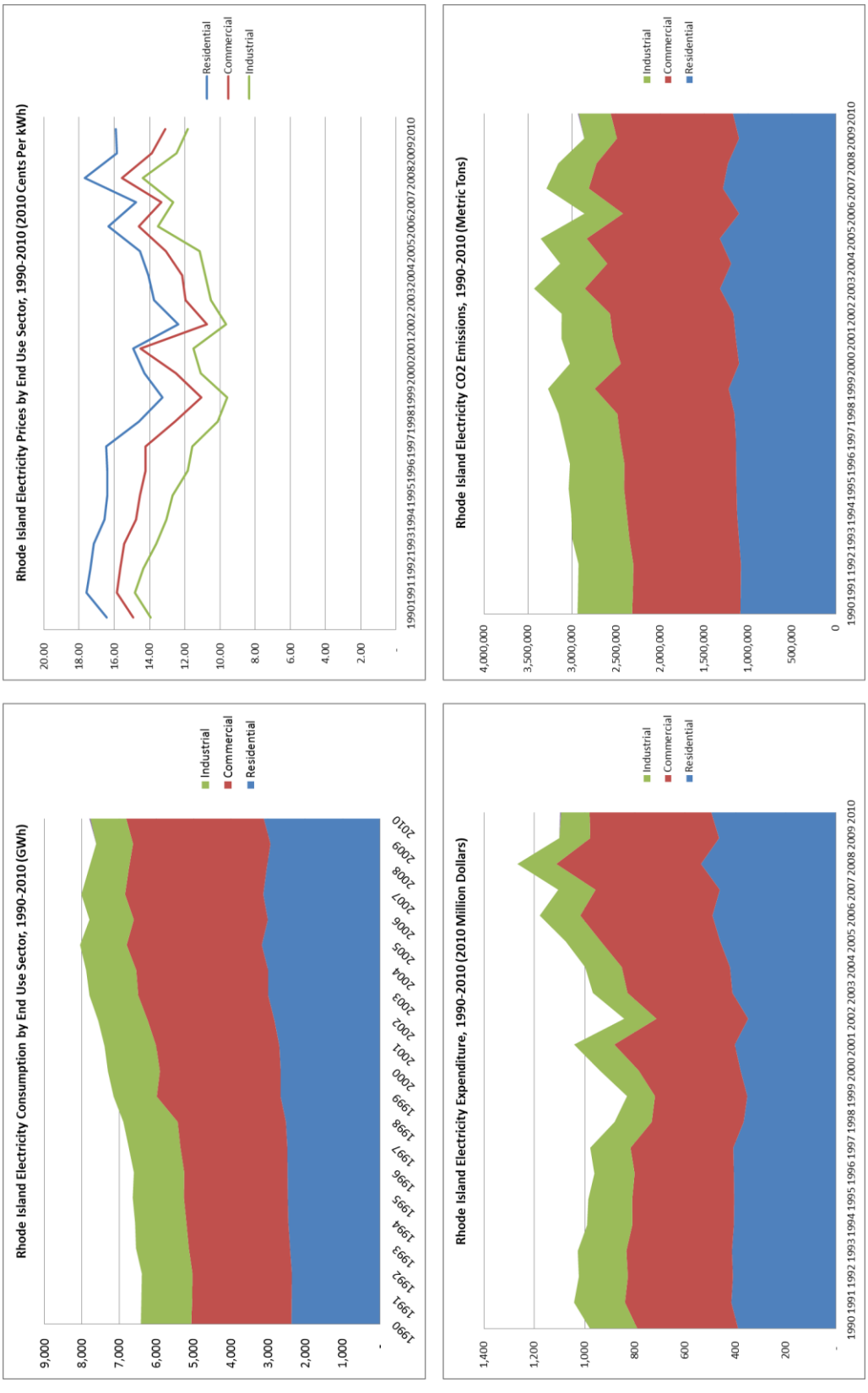


Source: ISO New England (http://www.iso-ne.com/markets/hstdata/znl_info/monthly/)

Figure 11. Patterns of peak demand in Rhode Island, 2003-2013.

Growth in electricity expenditures has generally tracked increases in electricity consumption over the past 20 years. In recent years, total expenditures on electricity have reached $1.1 billion, compared to an average of $970 million during the 1990s. Electricity expenditures have increased by about 25 percent in real terms in the residential and commercial sectors in the past decade.

Carbon dioxide emissions from Rhode Island electric consumption can be measured as a reflection of the contributions from in-state generation plus electricity imports, or simply by pro-rating the state's electric consumption by the New England system mix. Carbon dioxide emissions measured using the latter method show that emissions grew slightly during the 1990s, but currently are similar to levels seen 20 years ago.



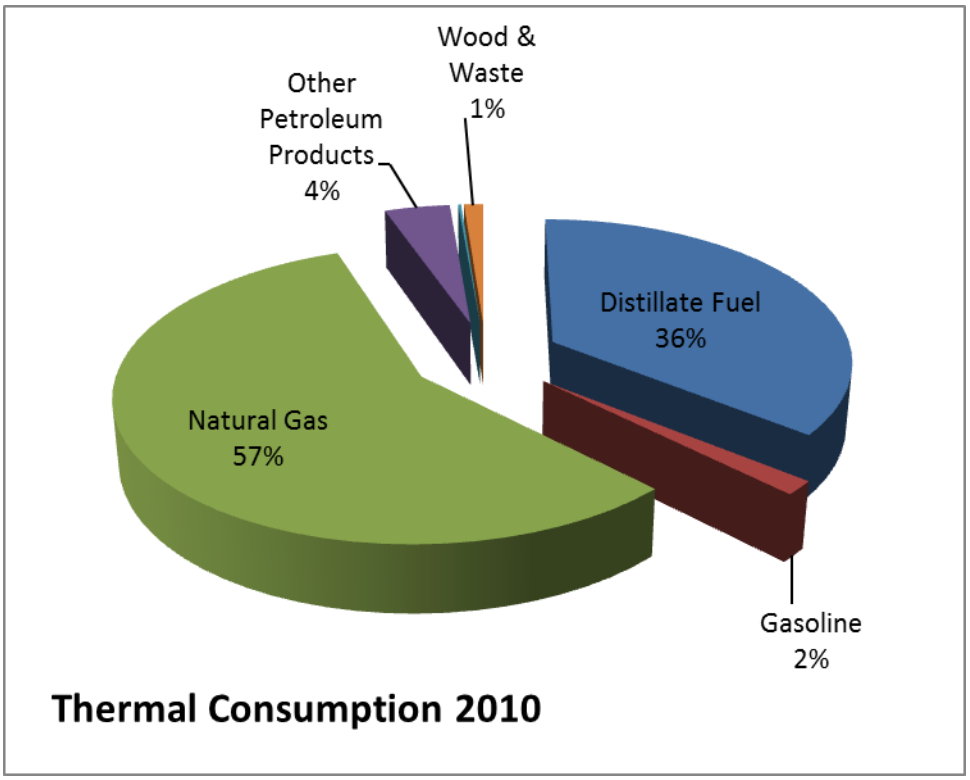
Source: EIA

Figure 12. Trends in electricity use in Rhode Island, 1990-2010.

THERMAL

Rhode 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. The thermal sector essentially represents non-electric energy use in buildings. Natural gas and petroleum-based fuels account for nearly 100 percent of historical thermal energy consumption in the state.

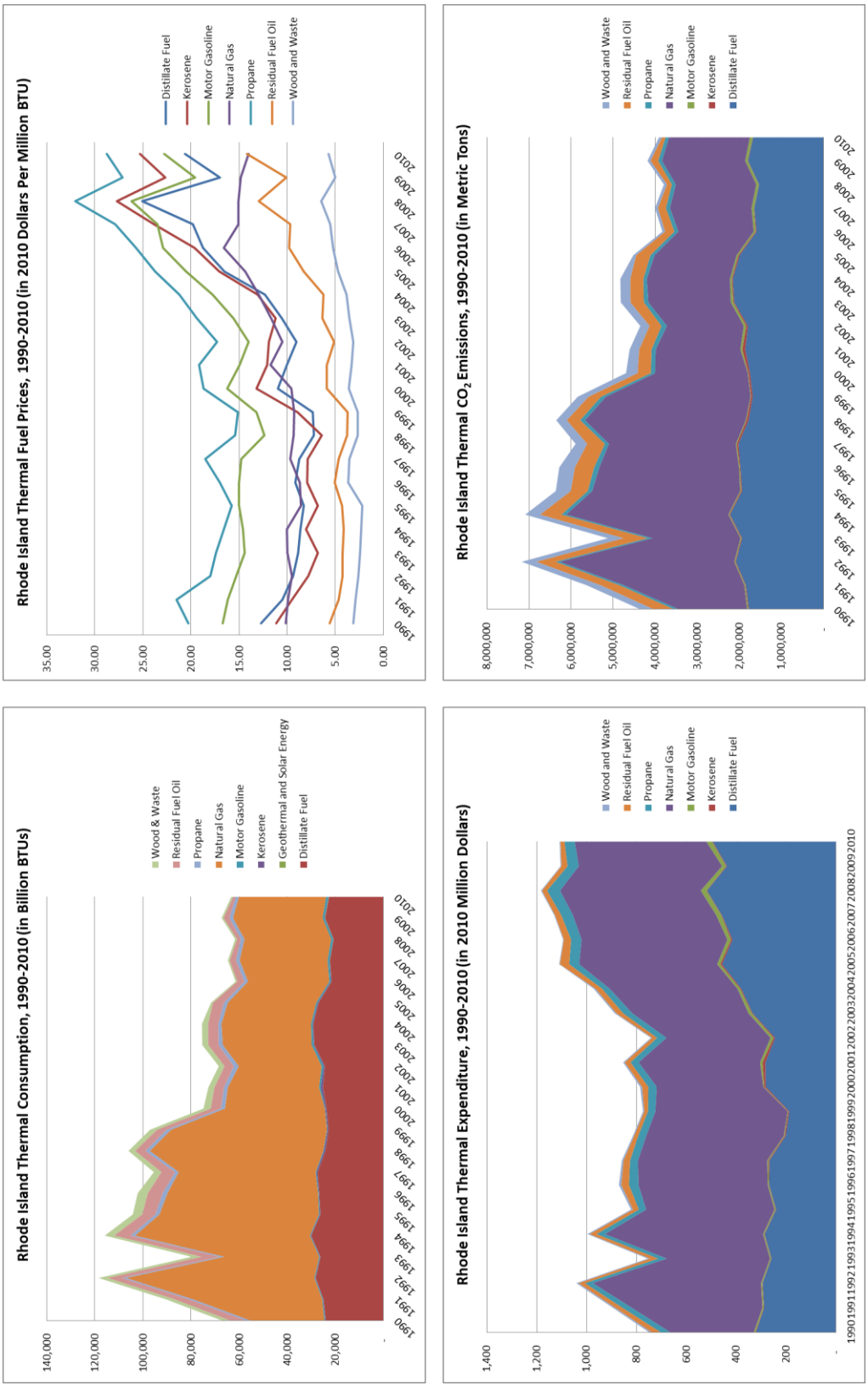
Major fuels used in Rhode Island's thermal sector include natural gas and a variety of petroleum-based deliverable fuels—distillate fuel, propane, kerosene, gasoline, and residual fuel oil. The use of non-biomass renewable sources of thermal energy for heating purposes, including solar and geothermal, is negligible. In 2010, natural gas supplied 57 percent of thermal energy demand; distillate fuel supplied 36 percent; and other fuels such as gasoline, propane, residual fuel oil, and wood / waste supplied the remaining 7 percent (Figure 13). In total, Rhode Island's thermal sector consumed 63,269 billion BTUs of energy in 2010.



Source: EIA

Figure 13. Thermal energy use in Rhode Island, 2010.

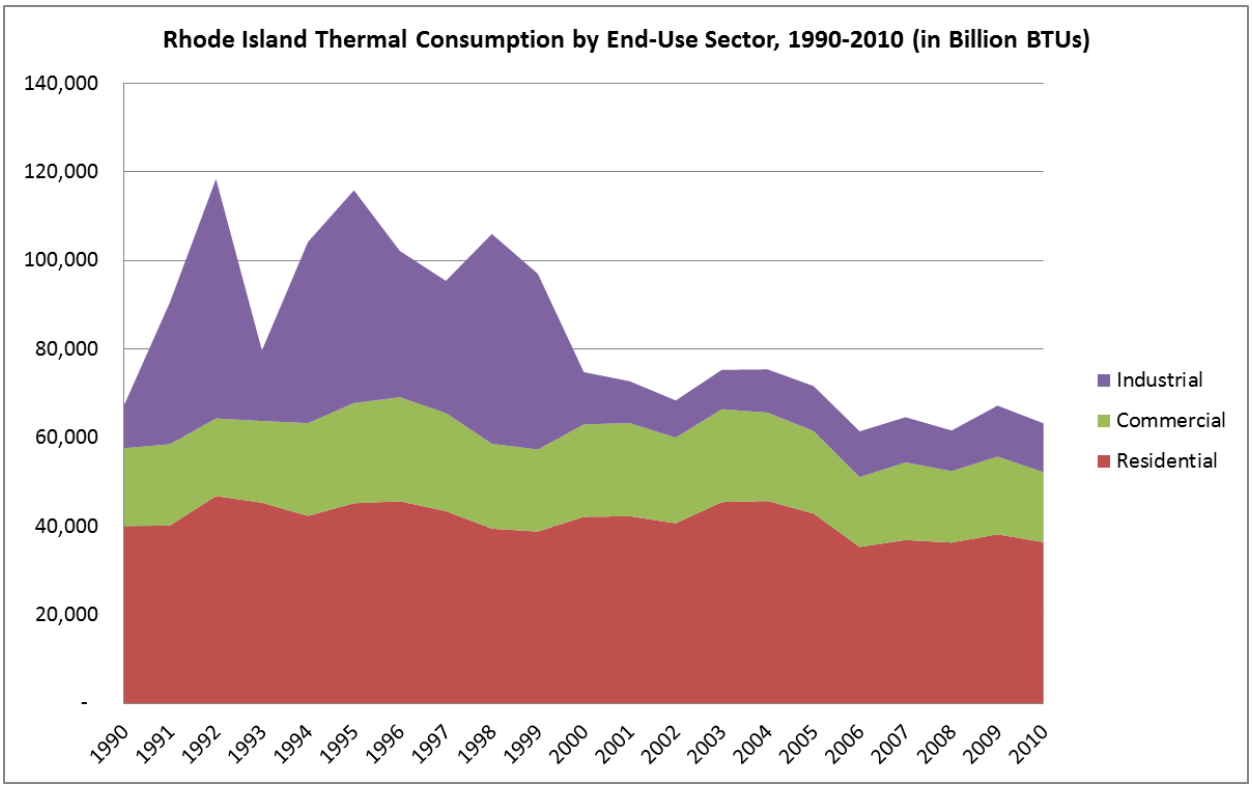
Rhode Island has witnessed a modest but gradual decline in thermal energy consumption in recent decades (Figure 14). Higher overall consumption levels in the 1990s reflect more natural gas use in the industrial sector. In the following decade, between 2000 and 2010, thermal fuel consumption dropped approximately 15 percent, primarily because of decreasing use in the residential and commercial sectors (Figure 15).



Source: EIA

Figure 14. Trends in thermal energy use in Rhode Island, 1990-2010.

Although overall thermal consumption has dropped, the composition of Rhode Island's thermal energy fuel supply has changed little during the past decade. Natural gas and distillate fuels continue to be the dominant fuels for heating and other thermal uses. Natural gas is the most significant thermal fuel source in Rhode Island, accounting for just shy of 60 percent of total thermal consumption in recent years. Petroleum-based heating products— distillate fuel, propane, kerosene, gasoline, and residual fuel oil— supply just over 40 percent of Rhode Island's thermal energy needs.



Source: EIA

Figure 15. Thermal consumption in Rhode Island, by end use, 1990-2010.

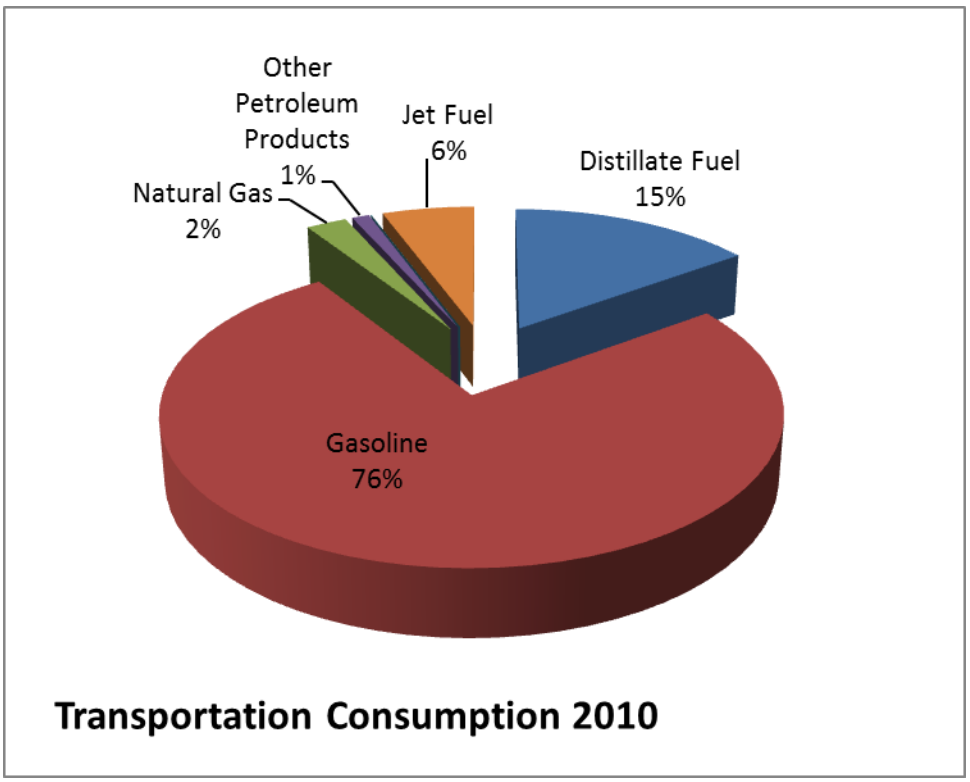
Even as thermal fuel consumption decreased over the last decade, expenditures on Rhode Island thermal energy needs have grown dramatically. Total thermal sector expenditures now exceed $1 billion, compared to only $780 million ten years ago—a 40 percent increase in real terms. This increase in expenditure, despite lower consumption, can be attributed primarily to rising prices of petroleum fuels, which began increasing steadily in the 2000s.

Carbon dioxide emissions associated with the combustion of thermal fuels closely track the changes in consumption of those fuels. Over the last 20 years, thermal sector carbon dioxide emissions have decreased by approximately 17 percent. Emissions have fallen because of lower overall consumption; further, natural gas use has increased at the expense of petroleum-based fuels, which emit more carbon per BTU.

TRANSPORTATION

Rhode Island's transportation sector includes energy used to move goods and people throughout the state. Petroleum-based fuels account for essentially 100 percent of historical transportation energy consumption in the state.

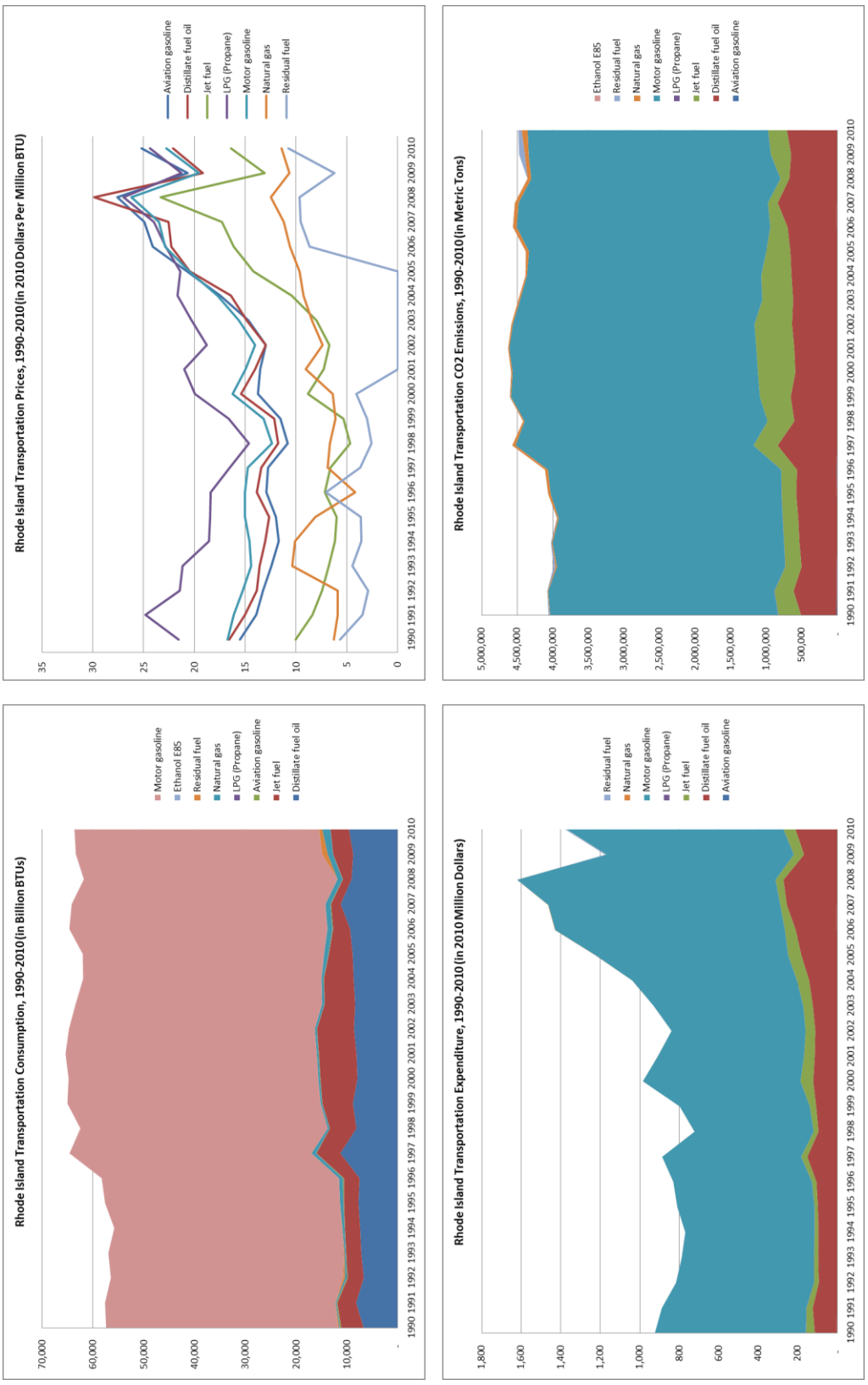
The primary fuels used in Rhode Island's transportation sector are gasoline and distillate fuel (diesel). In 2010, these fuels accounted for 91 percent of transportation fuel consumption. Jet fuel, natural gas, and residual fuel supplied the remaining 9 percent of energy needs in the sector (Figure 16). The use of renewable and alternative transportation fuels is negligible. In 2010, Rhode Island's transportation sector consumed a total of 63,627 billion BTUs of energy.



Source: EIA

Figure 16. Transportation energy use in Rhode Island, 2010.

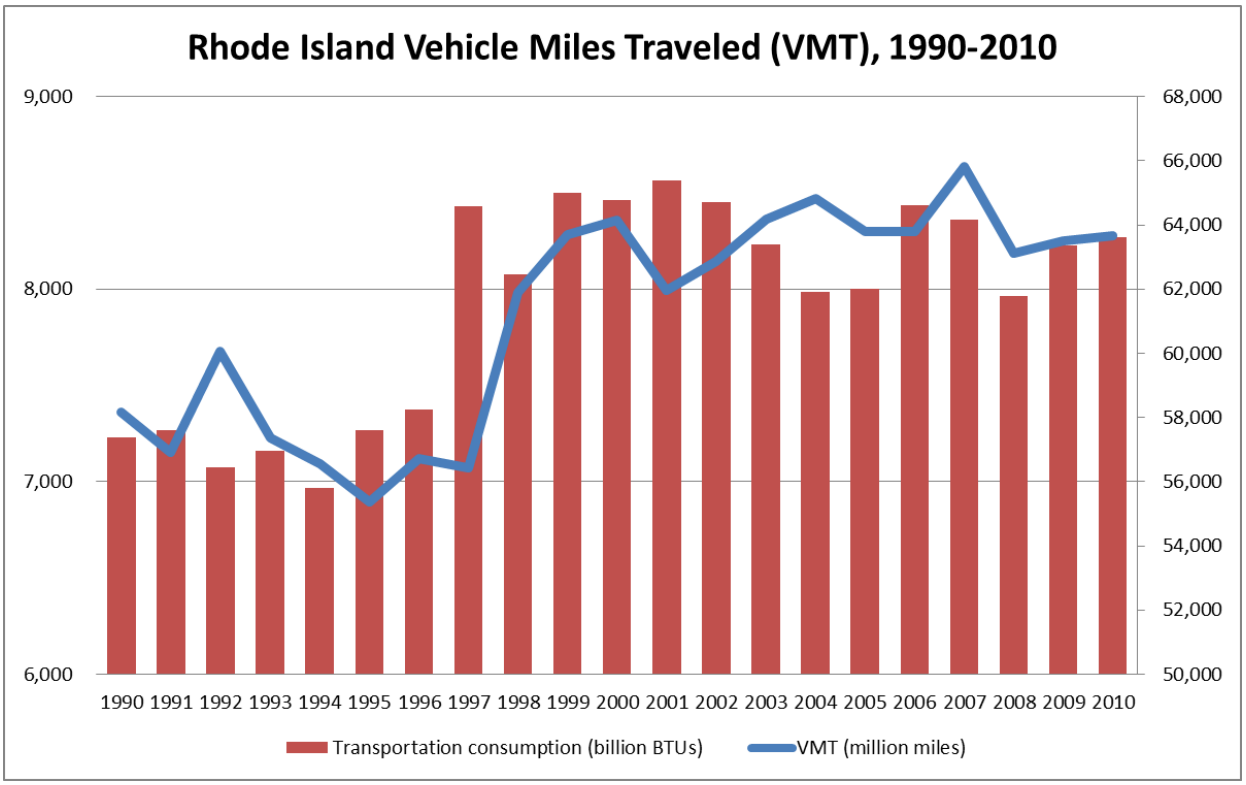
Transportation fuel consumption in Rhode Island has remained relatively stable over the last decade, but consumption is approximately 10 percent higher overall today than it was 20 years ago (Figure 17). The composition of the state's transportation fuel supply has also changed little in recent years. Gasoline is by far the most important transportation fuel, consistently accounting for more than 75 percent of annual fuel consumption in the sector. Distillate fuel and jet fuel constitute the majority of remaining fuel use.



Source: EIA

Figure 17. Trends in transportation energy use in Rhode Island, 1990-2010.

Demand for transportation is often measured in vehicle miles traveled, or VMT. VMT represents the distance traveled on roadways by motor vehicles. Rhode Island VMT has gradually increased during the past 20 years, roughly tracking total transportation sector fuel consumption. In 2010, Rhode Islanders drove 8.28 billion miles (Figure 18).



Source: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics

Figure 18. Vehicle miles traveled in Rhode Island, 1990-2010.

Transportation expenditures in Rhode Island have soared over the past two decades. During the 1990s, transportation fuel expenditures averaged just over $820 million; in 2010, expenditures totaled nearly $1.4 billion—an increase of almost 50 percent in real terms. Virtually all of this expenditure leaves Rhode Island because petroleum-based transportation fuels are imported into the state for sale. The primary driver of ballooning transportation expenditures during the past decade are persistent increases in transportation fuel prices.

Changes in Rhode Island's transportation sector carbon dioxide emissions profile mirror consumption trends. Carbon dioxide emissions in the sector have grown approximately 10 percent in the past two decades. The primary source of emissions is gasoline, followed by distillate and jet fuel.

CURRENT POLICY FRAMEWORK

Rhode Island public policy plays a direct role in shaping the markets, institutions, and regulatory regimes that affect energy use in the state. In recent years, state policy makers have pursued an increasingly proactive agenda on energy public policy. This evolving response has largely been prompted by changes in energy markets, as well as a growing recognition of the need for state and regional responses to energy security, cost, and environmental concerns. A wide variety of state actors share responsibility for the oversight, administration, and implementation of Rhode Island's major energy programs and policies, reflecting the complex and cross-cutting nature of many energy issues. The following subsections provide an overview of Rhode Island's major energy laws and the state government bodies, offices, and boards that assist in the implementation of these energy policies.

MAJOR ENERGY LAWS

Perhaps the single most defining change in state energy policy in recent history occurred during the 1990s, when Rhode Island joined four other New England states in restructuring the electric distribution companies operating in their respective jurisdictions.[28, 29] The "Rhode Island Utility Restructuring Act of 1996" required utilities to sell off their generating assets, opening up the wholesale electric market to non-regulated power producers. Restructuring also introduced retail choice, effectively unbundling the energy supply and electric distribution functions of utilities like Narragansett Electric (National Grid's predecessor company). Under the restructured system, customers can remain under a default "standard offer" or "last resort" electric service provided by the electric distribution company or select a competitive supplier for electric service. In both instances, customers continue to receive distribution service from the electric distribution company.

During the two decades following restructuring, Rhode Island enacted subsequent major energy legislation addressing key areas of energy policy, primarily energy efficiency and renewable energy. Policy making has dominantly addressed the electric sector, with only secondary consideration to date on the thermal and transportation sectors.

Table 2 summarizes a selection of policies representing the most significant energy legislation passed in Rhode Island since restructuring. Policies are ordered according to the year of enactment. For more detailed information on each energy law, see Appendix A: Rhode Island Energy Laws.

[28] http://www.ripuc.org/utilityinfo/electric/96H8124b.html
[29] http://www.ripuc.ri.gov/utilityinfo/electric/ura1996summ.html

Table 2. Major energy laws in Rhode Island

Statute Name	RI General Law	Year Established	Purpose
Renewable Energy Standard	39-26	2004	Requires state retail electricity providers to supply 16 percent of retail electricity sales from eligible renewable energy resources by 2019
Least-Cost Procurement	39-1-27.7	2006	Requires state utility providers to invest in all cost-effective energy efficiency before the acquisition of additional supply
Implementation of the Regional Greenhouse Gas Initiative Act	23-82	2007	Authorizes Rhode Island's participation in RGGI, the regional electric power sector carbon dioxide emissions cap-and-trade program
Long-Term Contracting Standard for Renewable Energy	39-26.1	2009	Requires electric distribution utilities to enter into long-term contracts for a minimum of 90 MW of newly developed renewable energy resources by December 31, 2014
Revenue Decoupling	39-1-27.1	2010	Established a new cost recovery mechanism for utility distribution system investments
Distributed Generation Standard Contracts Program	39-26.2	2011	Requires electric distribution utilities to enter into long-term contracts for 40 MW of newly developed renewable energy resources located in the electric distribution utility's load zone by December 30, 2014
Net Metering	39-26.4	2011	Establishes net metering for self-generator-sited renewable energy
LIHEAP Enhancement Plan	39-1-27.12	2011	Authorizes supplemental funding assistance for low-income energy customers in Rhode Island
Petroleum Savings and Independence Advisory Commission	42-140.4	2012	Created the Commission to make recommendations on how to reduce petroleum-based fuel consumption in Rhode Island
Biodiesel Heating Oil Act of 2013	23-23.7	2013	Requires all No. 2 distillate heating oil sold in the state to contain 5 percent of a bio-based product by 2017
Renewable Energy Growth Program	39-26.6	2014	Expands the Distributed Generation Standard Contracts Program by establishing a new tariff-based system designed to finance an additional 160 MW of renewable energy resources located in the electric distribution utility's load zone between 2014 and 2019
Affordable Clean Energy Security Act	39-31	2014	Establishes a coordinated process for Rhode Island to work with other New England states to make potential investments in large-scale hydropower, regional renewable energy resources, natural gas and infrastructure upgrades

GOVERNANCE STRUCTURE

Public responsibilities for energy planning, management, and oversight in Rhode Island are distributed among an array of agencies, each with distinct powers, duties, and functions. **Table 3** summarizes the major state government bodies, offices, and boards that assist in the implementation of Rhode Island energy public policy. More detailed information can be found on the website maintained by each agency.

Table 3. State government agencies, boards, and councils with responsibilities related to energy

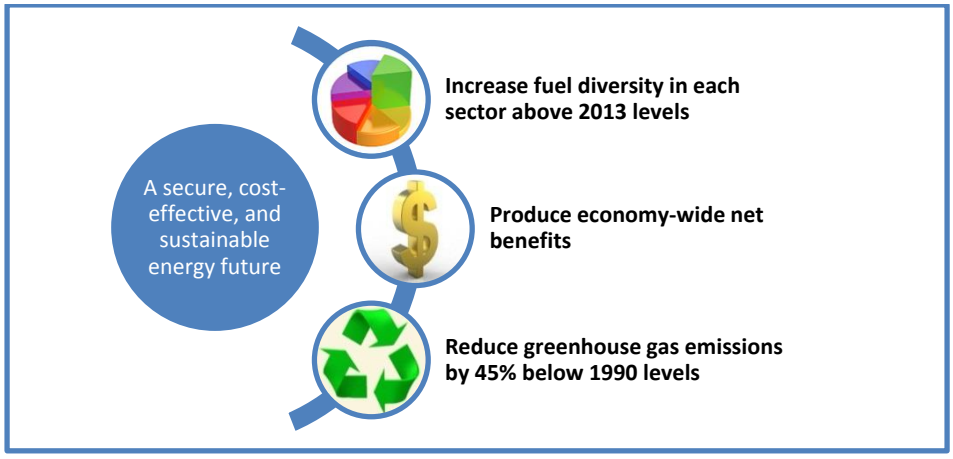
Agency	Website	Responsibilities
Building Code Commission	www.ribcc.ri.gov	Establishes minimum requirements for protecting public health, safety, and welfare in the built environment, and administers implementation of the Rhode Island Green Building Act
Coastal Resources Management Council	www.crmc.ri.gov	Oversees marine spatial planning through the implementation of the Ocean Special Area Management Plan (SAMP) and permits offshore wind energy systems
Commerce RI	www.commerceri.com	Administers the State's Renewable Energy Fund, which provides grants and loans for renewable energy projects with the potential to make electricity in a cleaner, more sustainable manner, while stimulating job growth in the green technology and energy sectors of Rhode Island's economy
Department of Environmental Management	www.dem.ri.gov	Preserves the quality of Rhode Island's environment by implementing laws related to clean air, clean water, and other areas of environmental protection
Department of Human Services	www.dhs.ri.gov	Oversees low-income heating assistance and energy efficiency programs, including the Weatherization Assistance Program and LIHEAP, which are available through local Community Action Programs
Department of Transportation	www.dot.ri.gov	Designs, constructs, and maintains the state's surface transportation system, including roadways, bridges, rail stations, and bike and pedestrian paths
Division of Planning	www.planning.ri.gov	Creates long-range policy plans for land use, energy, transportation, and natural resources in Rhode Island
Division of Public Utilities and Carriers	www.ripuc.org	Operates in concert with the PUC and supervises all laws relating to providers electric and natural gas service
Office of Energy Resources	www.energy.ri.gov	Develops and administers energy policy and programs designed to promote energy efficiency, renewable energy, alternative fuels, and energy assurance in Rhode Island
Public Utilities Commission	www.ripuc.org	Regulates electric and gas distribution companies in Rhode Island and reviews and approves implementation of major energy efficiency and renewable energy policies
RIPTA	www.ripta.com	Operates public transit services throughout Rhode Island
Boards & Councils	**Website**	**Responsibilities**
Energy Facility Siting Board	www.ripuc.org/efsb/index.html	Licenses and permits the siting, construction, or alteration of major energy facilities in Rhode Island
Energy Efficiency and Resource Management Council	www.rieermc.ri.gov	Oversees the development and implementation of Rhode Island's system reliability and energy efficiency investments according to Least-Cost Procurement
Distributed Generation Standard Contracts Board	sos.ri.gov/openmeetings/	Oversees the development and implementation of Rhode Island's Distributed Generation Standard Contracts Program
Renewable Energy Coordinating Board	sos.ri.gov/openmeetings/	Coordinates the short and long-term implementation of renewable energy policies by state agencies
Executive Climate Change Coordinating Council	www.planning.ri.gov/statewideplanning/climate/	Develop and tracks the implementation of a plan to achieve greenhouse gas emissions reductions below 1990 levels of: 10 percent by 2020; 45 percent by 2035; and 80 percent by 2050

PART 2: GOALS AND PERFORMANCE MEASURE TARGETS

What do we want our energy system to look like in 2035? This section sets goals and performance measure targets for Rhode Island's energy future. They are quantifiable, yet inspiring; visionary, yet realistic; bold, yet built on consensus. The Plan goals sketch a vision for an energy system that advances the human, economic, and environmental well-being of the people, communities, and natural resources of Rhode Island.

Through the goal- and performance measure target-setting process, the Project Team conducted detailed research and data-driven analysis to examine tradeoffs associated with alternative energy futures. The results are striking: Not only can Rhode Island achieve dramatic transformations of existing energy systems, but there are feasible ways that the State can concurrently address the three primary themes of the Energy 2035 Vision—energy security, cost-effectiveness, and sustainability.

The Plan sets three performance measure targets for a secure, cost-effective, and sustainable energy future: **Rhode Island can increase sector fuel diversity, produce net economic benefits, and reduce greenhouse gas emissions by 45 percent by the year 2035.**



Part 2: Goals and Performance Measure Targets describes in detail the analytical justification for setting these performance measure targets for each theme and within each of the three energy sectors: electricity, thermal, and transportation.

METHODS AND PROCESS

The goal- and performance measure target-setting process involved assembling the best available information to develop goals and performance measure targets to achieve the Energy 2035 Vision for a secure, cost-effective, and sustainable energy future. The information used to develop the goals and performance measure targets included a scenario modeling analysis, a review of best practices, and stakeholder feedback (Figure 20).

To create goals and performance measure targets, the Project Team and Advisory Council began with the themes identified in the Energy 2035 Vision Statement: Security, Cost-Effectiveness, and Sustainability. The Plan themes represent fundamental, broadly accepted values. Although opinions differed on the relative prioritization of the themes, all agreed—at least in theory—to the set of values.

The Project Team and Advisory Council used these three themes to develop goals, nesting each goal under the corresponding theme, as shown in Figure 19. Four goals were created for each theme, for a total of twelve goals.

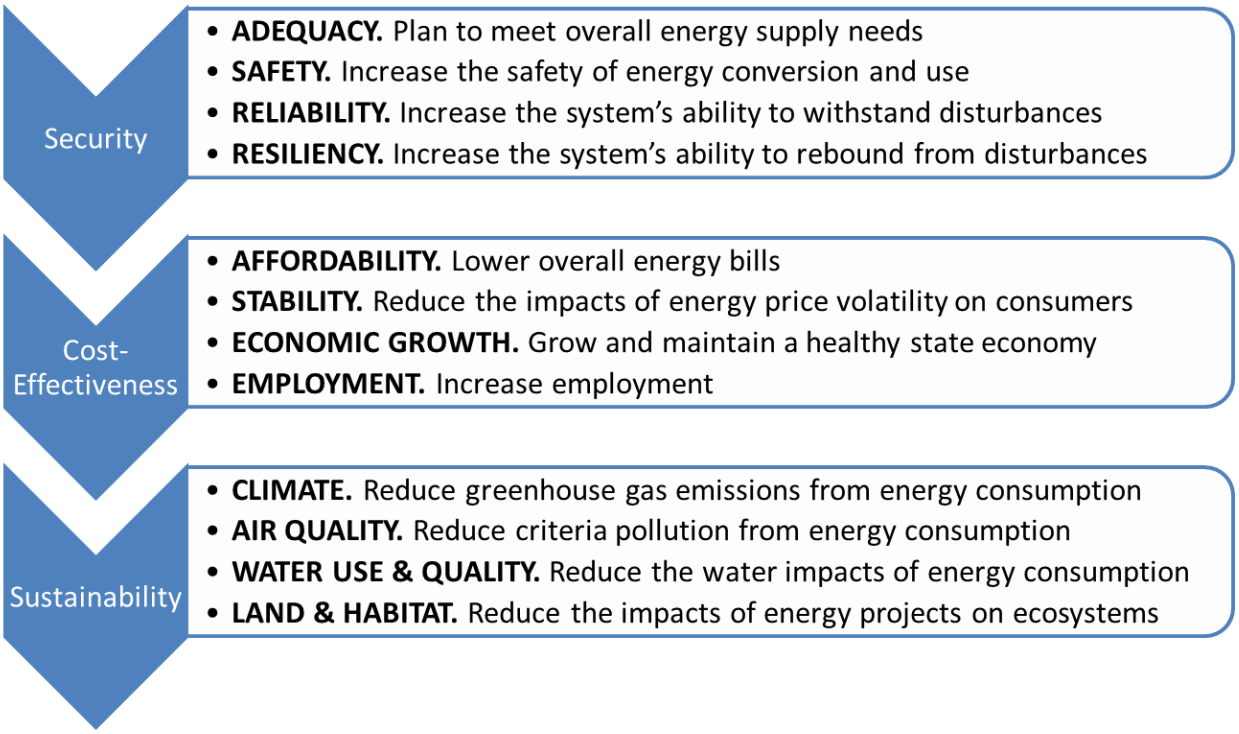


Figure 19. Energy 2035 goals, organized according to each Energy 2035 Vision theme.

With this framework of high-level goals in place, the Project Team and Advisory Council determined quantitative performance measure targets for each theme (Figure 21). Three primary sources of information supported the development of the performance measure targets: a scenario modeling analysis, a review of best practices, and stakeholder feedback.

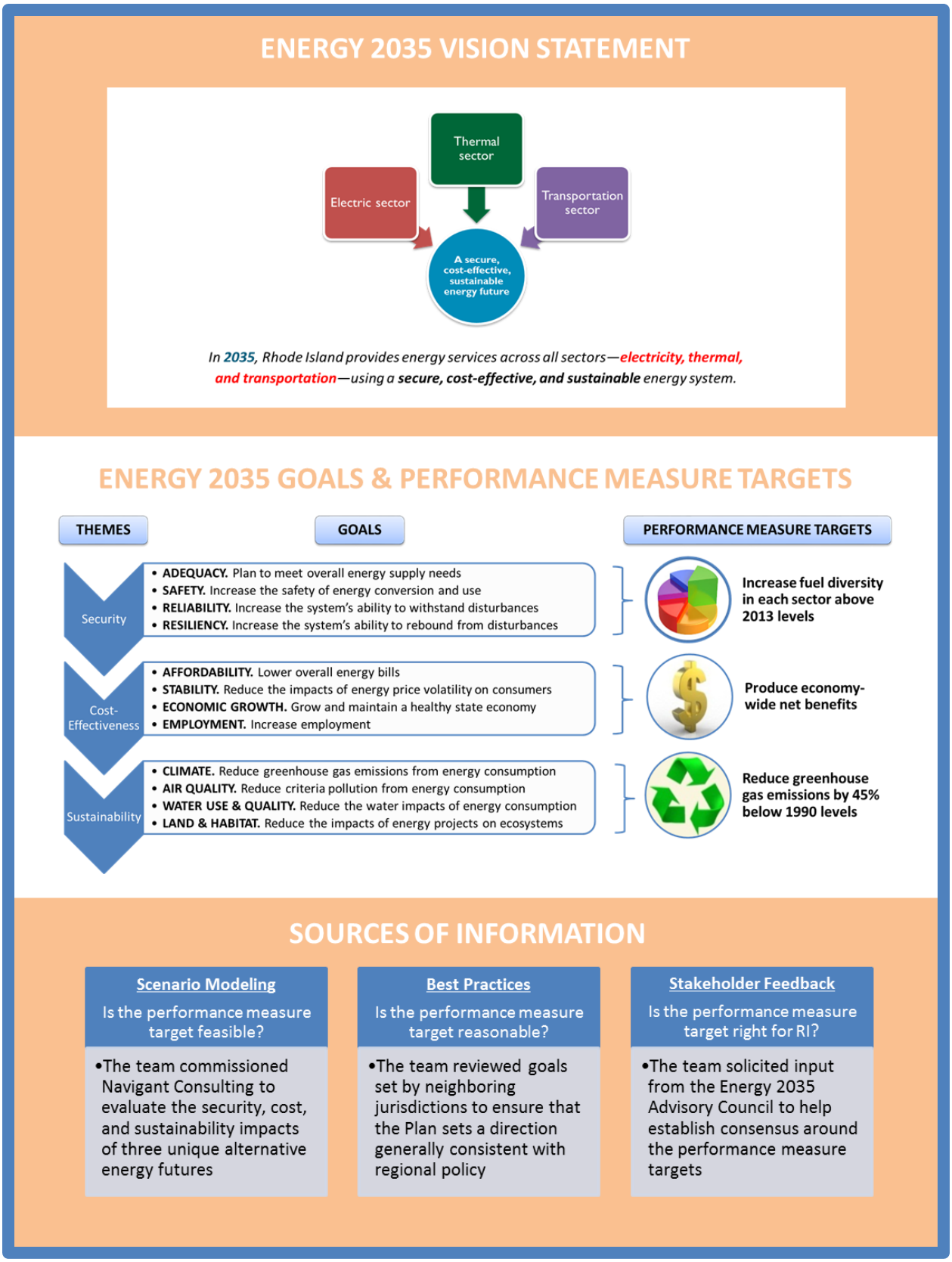


Figure 20. Process and methods in creating Energy 2035 goals and performance measure targets, and their corresponding Energy 2035 Vision themes.

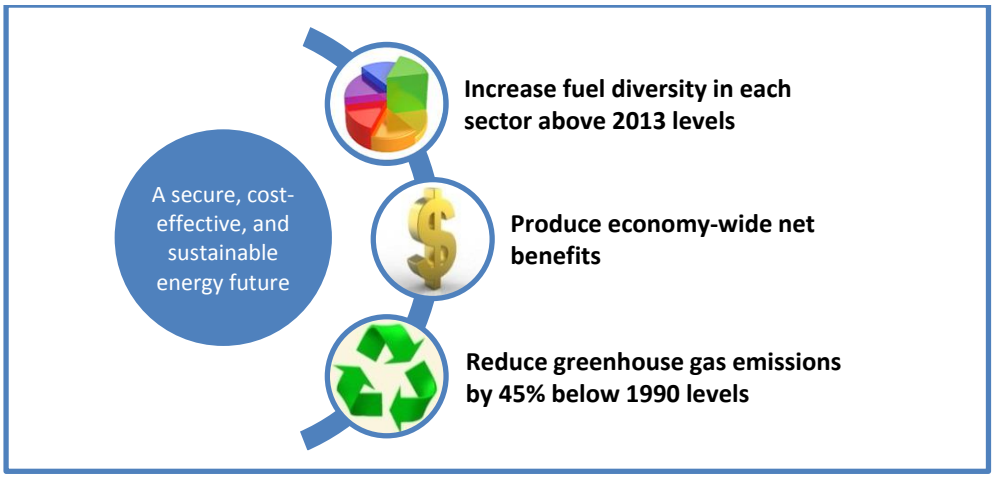


Figure 21. Energy 2035 performance measure targets.

In particular, the scenario modeling analysis conducted by Navigant Consulting (see Technical Report #2: *Rhode Island State Energy Plan Scenario Modeling Executive Summary & Results*) forms the quantitative backbone of the Energy 2035 performance measure targets. Educated decision making requires reliable information about potential benefits and impacts of different courses of action. The Navigant modeling helped support the Energy 2035 performance measure target-setting process by bracketing several plausible future outcomes if Rhode Island were to pursue major transformations of its energy system.

Navigant modeled three unique, independently viable scenarios, each addressing one of the three Energy 2035 themes, as shown in Figure 22**.** The scenario modeling examined different changes in Rhode Island's supply and demand profile, and those changes' resulting impacts on each Energy 2035 theme. Navigant presented the scenario results in contrast to a business-as-usual forecast developed by ENE (see Technical Report #1: *Rhode Island State Energy Plan Business-As-Usual Forecast*), which takes into account only current state and federal policies.

Scenario 1 (Security)	• Prioritizes energy security through fuel diversification and grid modernization
Scenario 2 (Cost-Effectiveness)	• Prioritizes cost-effectiveness and economic development while hitting key targets for GHG reduction
Scenario 3 (Sustainability)	• Prioritizes the sustainability of Rhode Island's energy economy through the widespread deployment of renewables, thermal alternatives, and vehicle electrification

Figure 22. Three Energy 2035 scenarios, according to Energy 2035 Vision themes.

The purpose of the scenario modeling was to look at order-of-magnitude impacts, recognizing that no economy-wide energy modeling has been done in Rhode Island to date. The intent of the exercise was not to provide detailed information on program- or resource-level benefits and impacts. Rather, Navigant designed the model to answer high-level questions: What are the estimated cross-sector impacts of significant transformations of our energy system? What are realistic and feasible changes that Rhode Island can achieve in 20 years? What are the overarching benefits and costs of different courses of action?

THEME #1: SECURITY

The Plan sets four goals for a secure energy future in Rhode Island: adequacy, safety, reliability, and resiliency (Figure 23). The Project Team and Advisory Council decided on an overarching performance measure target to gauge success in achieving the security goals: **increase fuel diversity in each sector above 2013 levels**.

Energy 2035 defines *fuel diversity* as a risk management strategy that seeks to mitigate the potentially harmful effects of disproportionate reliance on certain fuels by expanding the portfolio of demand and supply sources used to provide energy services. Fuel diversity is measured here in terms of percentage market share of the dominant fuel source in each sector. For the electric sector, this percentage is measured in terms of in-state generation plus electricity imports, with the sources attributed to imports prorated by each source's share in the overall regional mix.

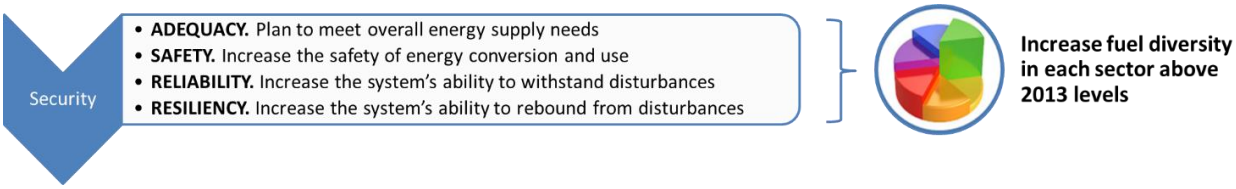


Figure 23. Energy 2035 energy security goals and performance measure target.

Although many indicators of energy security are difficult to quantify, fuel diversity is a reasonable proxy for other security measures of adequacy, safety, reliability, and resiliency. Fuel diversity can help achieve the Plan's security goals via the following mechanisms:

- Increased system redundancies
- Increased consumer choices
- Reduced impacts of price volatility
- Decreased potential harm of supply disruptions
- Increased potential for synergistic energy resources

FUEL DIVERSITY: BUSINESS-AS-USUAL

How will Rhode Island's fuel diversity change between now and 2035, given projected market conditions and absent any changes to state or federal policy? Under business-as-usual conditions, Rhode Island's demand resource portfolio will expand dramatically, while the supply portfolio in 2035 will largely resemble today's energy mix. In other words, total energy demand is projected to drop in each sector; however, the forecast shows few major changes in the overall composition of fuels that serve demand (Figure 24).

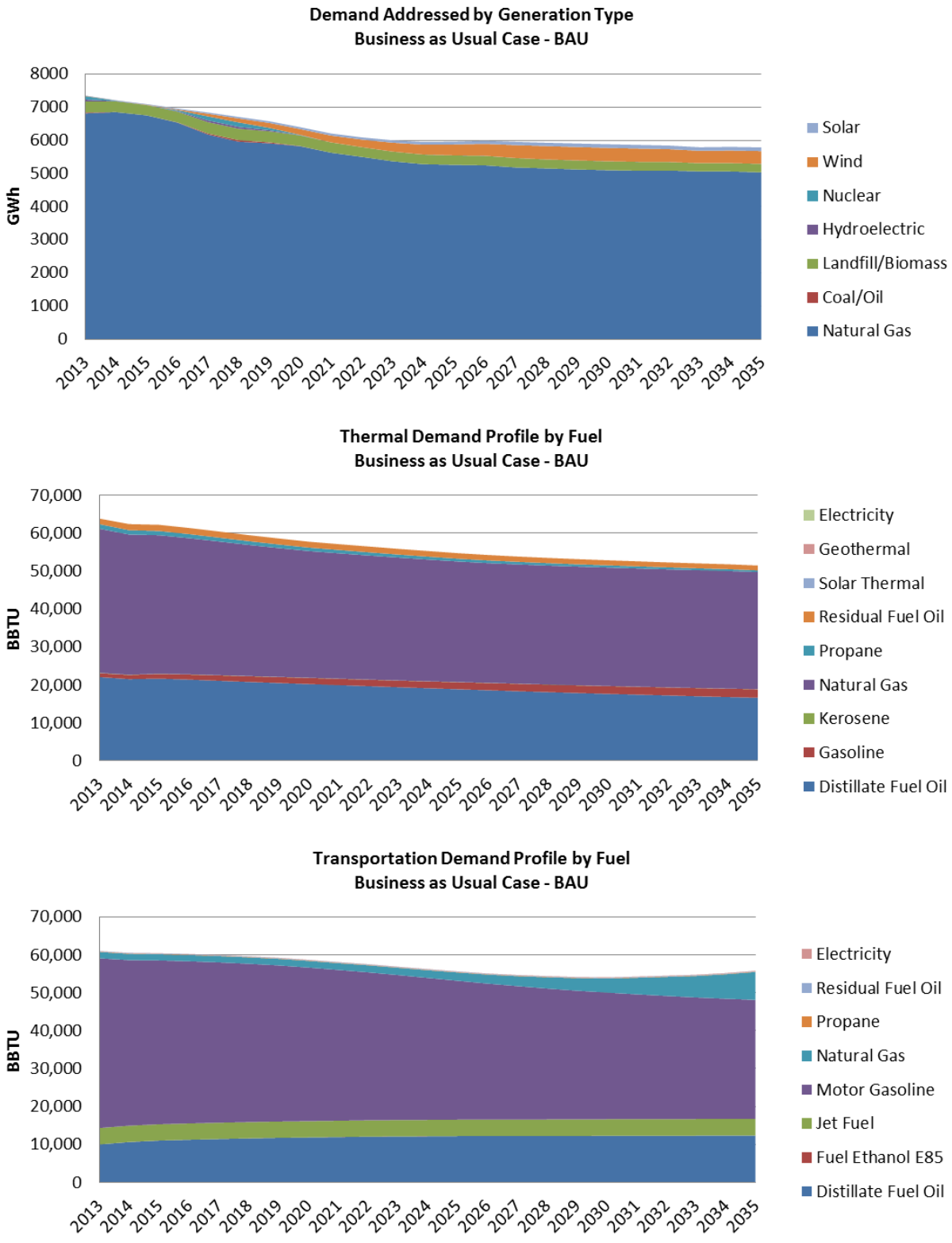
In the electric sector, business-as-usual energy reductions of 21 percent occur, due to the impact of annual investments in electric energy efficiency through Rhode Island's Least-Cost Procurement mandate. Electricity supply, however, remains heavily reliant on natural gas,[30] due to existing state and regional dependence on the fuel and continued low projected prices. Increased generation from renewable energy, dominantly offshore wind, provides only a minor contribution to the overall supply portfolio. Renewable

[30] Although Rhode Island is part of a larger, integrated regional grid, nearby generating resources typically serve the state's electric load. This occurs because electricity generally flows the shortest distance to where it is needed as power is dispatched on the system. Because Rhode Island's in-state generating capacity currently consists almost entirely of natural gas, most electrons used to meet demand originate from local gas-fired power plants.

energy growth occurs primarily from the effects of Rhode Island policies, including the Renewable Energy Standard (RES), Long-Term Contracting Standard for Renewable Energy (LTC), and the Distributed Generation (DG) Standard Contracts Program. Continued participation in the Regional Greenhouse Gas Initiative (RGGI) also encourages a shift toward cleaner generation through investments in energy efficiency and renewable energy.

In the thermal sector, business-as-usual energy reductions of 19 percent occur, due to effects from annual investments in natural gas energy efficiency through Rhode Island's Least-Cost Procurement mandate. Natural gas and distillate fuels continue to dominate thermal supply. Projected increases in the price of oil, relative to natural gas, result in slight decreases in distillate fuel consumption. Rhode Island's 5 percent biofuel blend mandate will increase the penetration of biodiesel, but with negligible impact on the overall portfolio of thermal fuels.

In the transportation sector, business-as-usual energy reductions of 8 percent occur, primarily due to the impact of federal Corporate Average Fuel Economy (CAFE) standards. Unlike the other sectors, significant changes to the composition of fuels serving transportation demand occur. Gasoline's market share falls about 17 percent, largely displaced by natural gas and distillate fuel. Natural gas consumption increases because of low projected prices relative to oil; distillate fuel consumption increases due to growing demand from heavy-duty vehicles. Additionally, Rhode Island's participation in a multi-state effort to put 3.3 million zero-emission vehicles (ZEVs) on the road by 2025 will increase ZEV use.



Source: Navigant scenario modeling

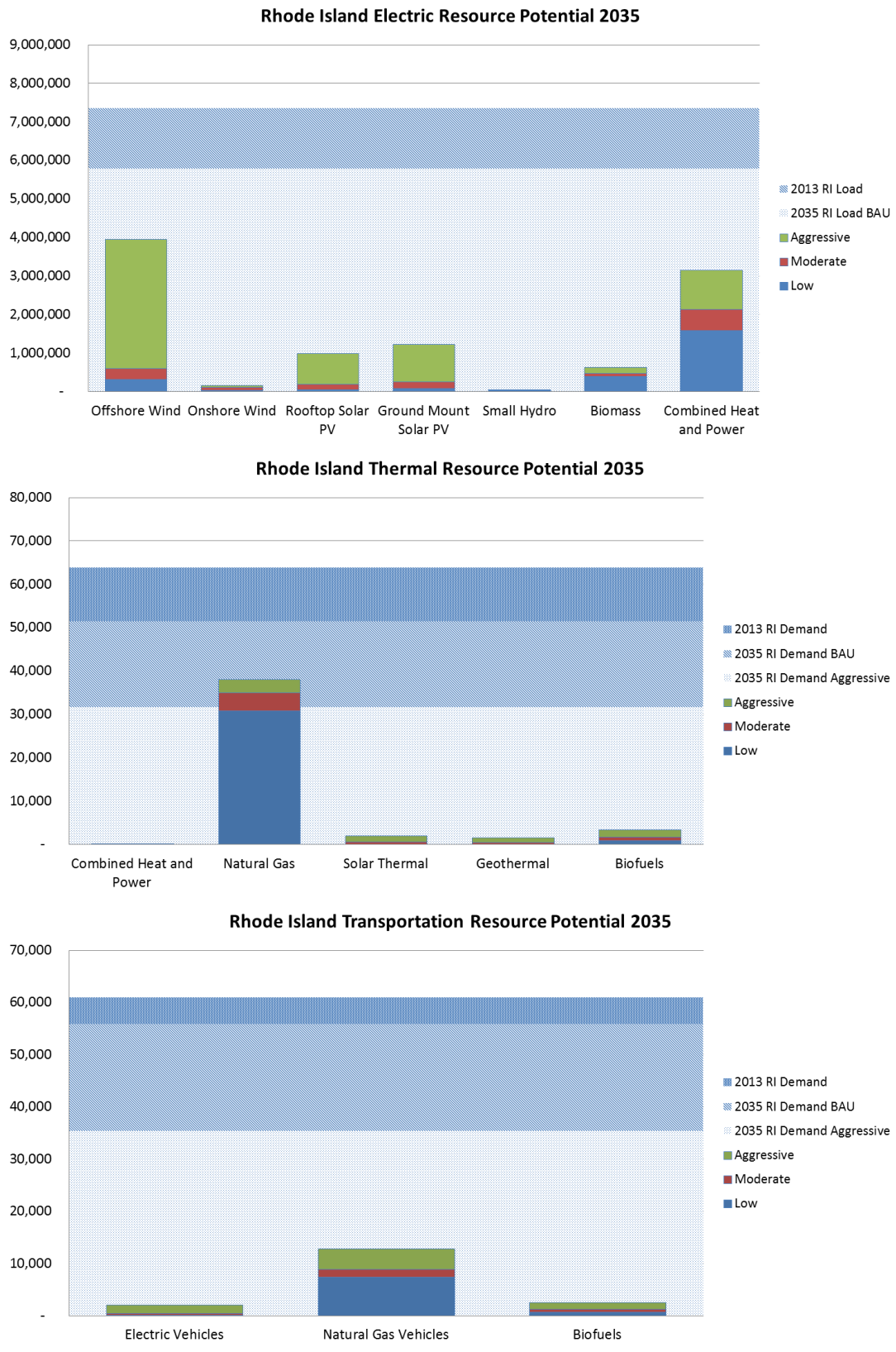
Figure 24. Trend for the 2035 energy portfolio for Rhode Island, under business-as-usual policy conditions in 2013.

FUEL DIVERSITY: RESOURCE POTENTIAL

Can Rhode Island increase the diversity of fuels that provide energy services and if so, by how much? Figure 25 summarizes demand-side and supply-side resource potential to meet Rhode Island energy demand in each sector in 2035. The quantitative estimates are based on data collected in Navigant's scenario modeling report and ENE's business-as-usual report (see Technical Reports #1 and 2). These data include publicly available information on resource potential, market information on cost and rates of adoption, effects of existing policy mandates, technical documentation, stakeholder input, and expert opinion. For each resource, the graph brackets the full range of estimated achievable potential for low, moderate, and aggressive levels of incremental deployment. It is important to note that sections of each bar on the graph in Figure 25 represent incremental MWh or BBTU to meet the next level of increased deployment. Estimates of demand-side reduction potential, represented as levels of annual demand in 2013 and 2035, are obtained from forecast data based on projections of efficiency potential and implementation. In the transportation sector, estimates of demand-side reduction potential involve improvements in vehicle average efficiency, reductions in vehicle miles traveled (VMT), and increases in public-transit ridership.

As detailed in Figure 25, viable demand- and supply-side options exist for Rhode Island to increase in-state fuel diversity and increase energy security by shifting away from dependence on fuels like natural gas and gasoline. By far, Rhode Island's greatest available resource is energy efficiency. By maximizing demand reduction in all energy sectors, the state could cut economy-wide energy use by more than one third. Supply-side resources with the most significant potential future contributions are offshore wind, combined heat and power, distributed photovoltaic solar power, and natural gas.[31] No single in-state resource, however, can meet Rhode Island's energy needs alone. This observation reinforces the importance of diversifying the state energy portfolio. Furthermore, in the electric sector, out-of-state resources—including low- and no-carbon energy sources such as wind and hydropower—could play an important role in helping Rhode Island diversify its fuel supply.

[31] Navigant's modeling did not consider highly efficient cold-climate air-source heat pumps or biomass thermal heating systems (such as wood and wood pellets). These renewable heating technologies will likely provide important additional contributions for diversifying Rhode Island's thermal supply portfolio.

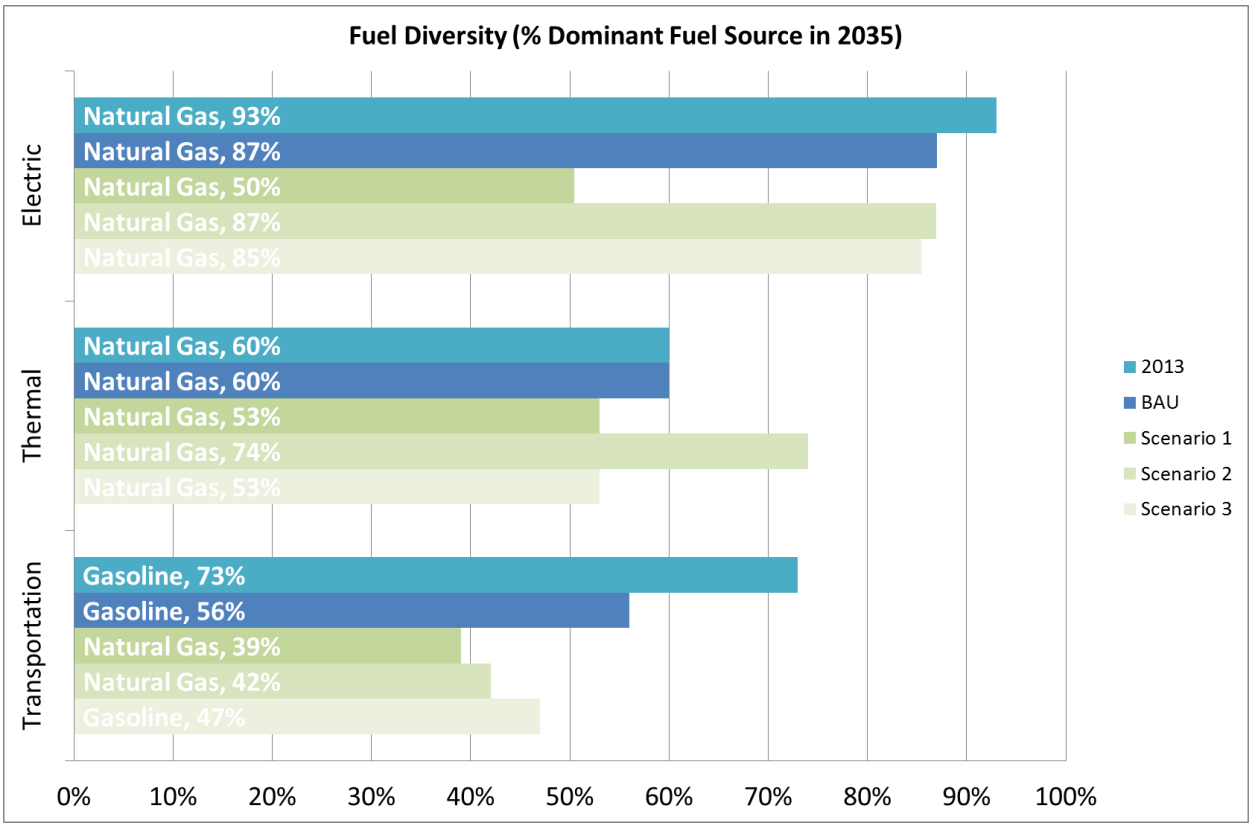


Sources: Navigant scenario modeling; ENE business-as-usual forecast

Figure 25. Rhode Island resource potential.

Fuel Diversity: Energy 2035 Performance Measure Target

What level of increase in the fuel diversity of Rhode Island's energy portfolio is possible between now and 2035? The results of Navigant's scenario modeling show that fuel diversity gains are indeed achievable in each individual sector (Figure 26). The most promising opportunities for increasing fuel diversity are likely in the transportation sector, where every scenario showed potential to reduce reliance on the dominant fuel. In fact, in Scenario 1 and Scenario 2, natural gas replaced gasoline as the dominant fuel in the transportation sector. Fuel diversification appears more challenging in the thermal sector, where Scenario 1 and Scenario 3 each shows an opportunity to decrease the market share of the dominant fuel (natural gas) by 7 percent, but Scenario 2, which prioritized cost-effectiveness, shows an increase of 14 percent in the use of that fuel. This finding reflects the fact that natural gas often provides a lower-cost option to existing heating fuels, such as home heating oil or electric resistance heating. The electric sector offers the potential for the most dramatic increases (> 30 percent) in diversity, but these changes are presumed to be expensive under current projected market conditions. Scenario 3 shows limited increases in electric sector fuel diversity because the State can meet its environmental goals by procuring renewable energy certificates (RECs) from out of state, thus negligibly changing the in-state fuel mix.



Source: Navigant scenario modeling

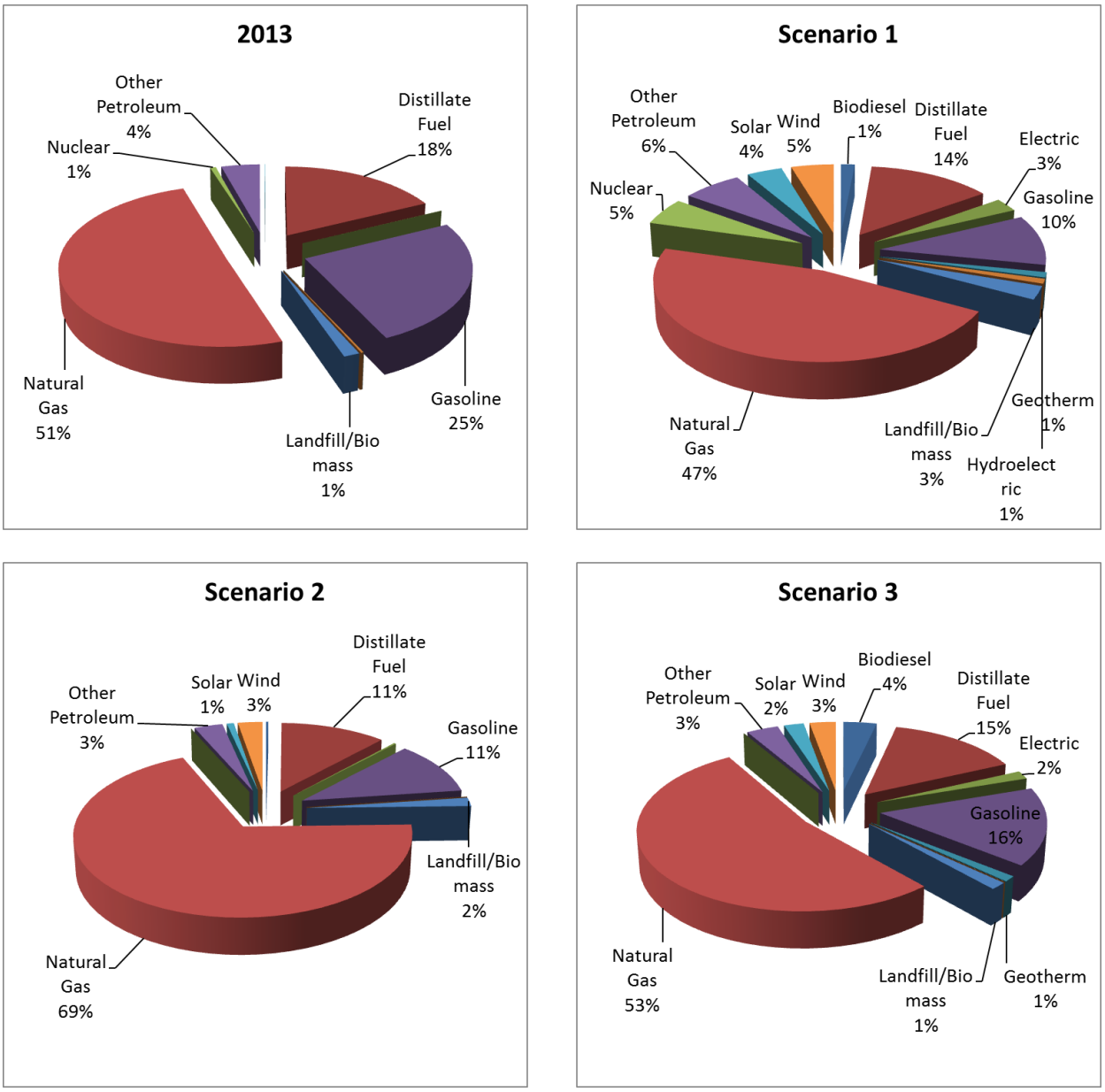
Figure 26. Rhode Island's projected fuel diversity, compared to a 2013 baseline, by each of the energy sectors, under scenarios 1, 2, and 3.

Although clear fuel diversification opportunities exist in each individual sector, a more nuanced picture emerges when looking at Rhode Island's economy-wide supply portfolio (Figure 27). Rhode Island's primary challenge is to move away from its heavy reliance on natural gas, which today supplies more than 50 percent of Rhode Island's energy needs. Dependence on natural gas exposes the state to a substantial

amount of price risk and potentially a supply risk, since Rhode Island sits at the end of a long stretch of pipeline infrastructure. The challenge is underscored by natural gas's important role across multiple sectors: natural gas provides fuel for nearly all in-state generating capacity, and is the dominant heating fuel in the thermal sector. Moreover, natural gas generation accounts for more than 50 percent of regional electric generation, so electricity imports to Rhode Island are also heavily dependent on natural gas.

In the three alternative energy futures in the scenario modeling, natural gas' share of total economy-wide fuel consumption either increases, or at most, ticks down a few percentage points (Scenario 1). The crux of the issue is a general tension between reducing natural gas' share of total fuel consumption and concurrently increasing fuel diversity in the transportation sector. In Scenario 1, which most heavily emphasizes fuel diversification, natural gas falls to only 47 percent of the economy-wide supply portfolio. That is, whereas diversification in the electric and thermal sectors means a shift away from natural gas, diversification in the transportation sector generally entails an increase in natural gas, as an important alternative fuel for the heavy-duty and public-transit vehicle market.

Due to the challenges of displacing overall natural gas consumption as a portion of total fuel use in Rhode Island, it might not be possible, across the Plan's horizon, to significantly reduce Rhode Island's reliance on natural gas. Despite this, feasible opportunities for fuel diversification do appear to exist in each sector individually. Ability to diversify the fuel mix notwithstanding, Rhode Island possesses many other tools for increasing the energy security of the state: strategic energy resiliency investments in critical infrastructure; grid modernization efforts; energy storage deployment; and most cost-effectively, energy efficiency (see **Part 3: Policies and Strategies**).



Source: Navigant scenario modeling

Figure 27. Rhode Island's total fuel diversity in 2035, assuming an average heat rate of 8,000 BTU / kWh for all electric sector power generation.

Because fuel diversity gains are achievable in individual sectors, but difficult to attain economy-wide, Energy 2035 recommends that Rhode Island:

Increase fuel diversity in each sector above 2013 levels

THEME #2: COST-EFFECTIVENESS

The Plan sets four goals for a cost-effective energy future in Rhode Island: affordability, stability, economic growth, and employment (Figure 28)**.** The Project Team and Advisory Council decided on an overarching performance measure target to gauge success in achieving the cost-effectiveness goals: **produce economy-wide net benefits**.

The Plan defines *net benefits* as the product of an economic policy that prioritizes prudent, strategic energy system investments that generate long-term energy savings and more stable energy costs for consumers, businesses, and institutions in Rhode Island. Net benefits are measured in terms of total, economy-wide power and fuel expenditures, minus capital expenditures relative to business-as-usual projections,[32] discounted over the period spanning 2013 to 2035, and expressed in millions of 2012 dollars.

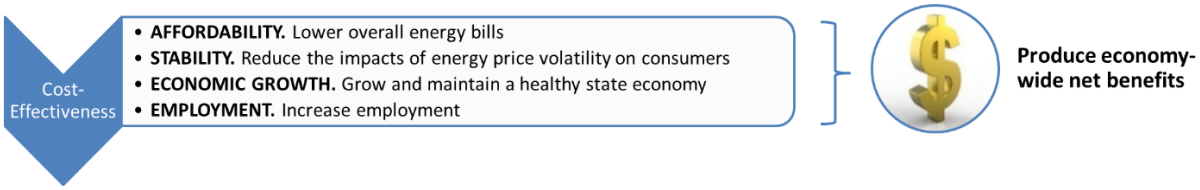


Figure 28. Energy 2035 cost-effectiveness goals and performance measure target.

Many indicators of cost-effectiveness exist; net benefits represents a reasonable cross-cutting proxy for other economic measures of affordability, stability, economic growth, and employment. Producing net economic benefits can help achieve Energy 2035's cost-effectiveness goals via the following mechanisms:

- Increased price stability and savings by reducing reliance on volatile national and global energy markets
- Economic growth as lowered energy costs increase disposable income and business revenue
- Job creation (direct, indirect, and induced) stimulated by economic development and growth of new sectors

ENERGY COSTS: BUSINESS-AS-USUAL

How cost-effective is Rhode Island's current resource portfolio for providing energy services? Under business-as-usual conditions, Rhode Island will spend over $83 billion on energy between today and 2035. This is equivalent to over $3.6 billion in average annual energy costs. In comparison, Navigant's scenario modeling results showed multiple viable pathways to cheaper alternative energy futures. Even with significant changes to Rhode Island's energy economy, the state could realize substantial energy savings for consumers, businesses, and institutions. In fact, business-as-usual represents the most expensive path of each of the three distinct scenarios modeled by Navigant. Over the life of the Energy 2035 planning horizon, business-as-usual could cost Rhode Island between $6.6 billion and $15.4 billion (8 percent to 19 percent) more in fuel costs, compared to alternative energy futures (Figure 29). Depending on the scenario modeled, the average Rhode Island household could save between $290 and $670 in annual energy costs compared to the business-as-usual condition. This suggests that pursuing aggressive fuel diversity and / or greenhouse gas (GHG) reduction performance measure targets is likely to present more cost-effective

[32] For more information on the Energy 2035 business-as-usual forecast assumptions for population and economic growth, see Technical Report #1: *Rhode Island State Energy Plan Business-As-Usual Forecast*.

courses of action for the state than business-as-usual policies, and would actually bolster Rhode Island's long-term economic health.

Energy Costs, 2013-2035 (Power and Fuel Expenditures) ($2012 Millions)

	AVERAGE ANNUAL				TOTAL
	Electric	*Thermal*	*Transportation*	*All Sectors*	*All Sectors*
BAU	846	1,075	1,697	3,618	83,209
Scenario 1	884	1,038	1,382	3,303	75,978
Scenario 2	848	788	1,308	2,945	67,730
Scenario 3	851	968	1,511	3,330	76,585
Scenario Avg	**861**	**931**	**1,400**	**3,193**	**73,431**

Source: Navigant scenario modeling

Figure 29. Rhode Island energy costs, under each of the three scenarios, compared to business-as-usual policies.

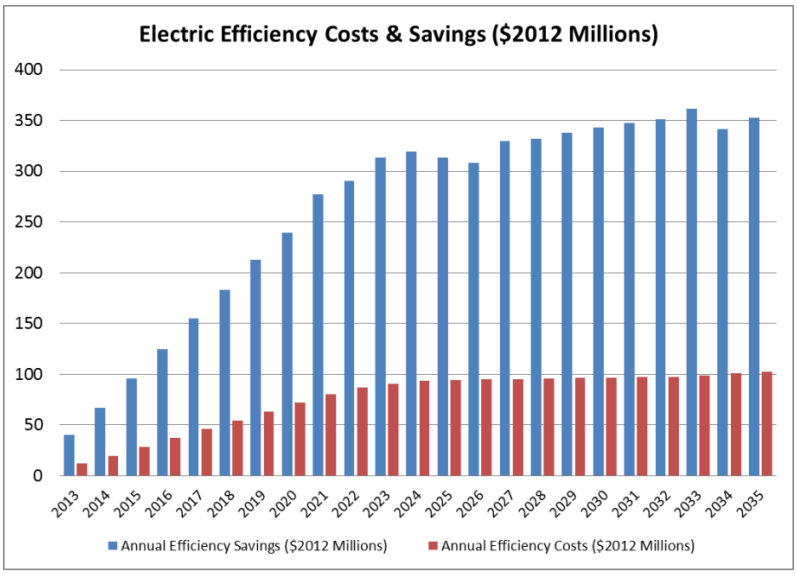
Net Benefits: Energy 2035 Performance Measure Target

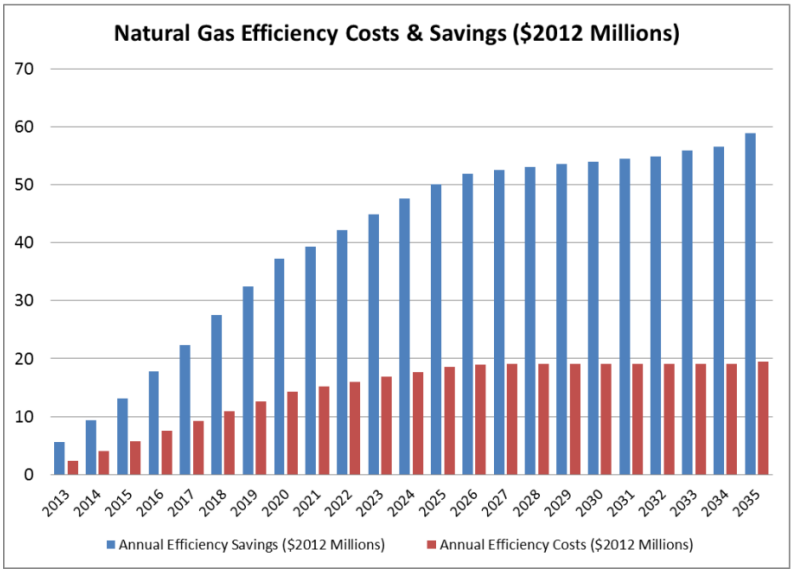
What are the costs and benefits of strategic energy investments in different sectors of Rhode Island's energy economy? The results of ENE's business-as-usual forecast and Navigant's scenario modeling demonstrate that with substantial investments, the state can achieve significant net economic benefits. According to the Plan analysis, aggregate capital investments of between $6.8 billion and $7.3 billion in the efficiency, electric, thermal, and transportation sectors could generate between $8.8 billion and $14.5 billion in power and fuel expenditures in net present value terms over the life of the Energy 2035 planning horizon (Figure 30). Total net present value benefits range from $1.6 billion to $7.7 billion, depending on the scenario. This suggests that taking ambitious action to improve Rhode Island's energy security, cost-effectiveness, and sustainability of its energy system is a good investment decision and a powerful economic strategy for generating long-term growth.

Source: Navigant scenario modeling, ENE business-as-usual forecast

Figure 30. Net benefits from energy savings achieved via Scenario 1, 2, and 3, in each of the energy sectors.

In the area of energy efficiency, business-as-usual investments in demand reduction—through an assumed continuation of the Least-Cost Procurement mandate—generate very large economic benefits. Projected investments of nearly $1.4 billion in energy efficiency over the life of the Energy 2035 planning horizon yield a total of over $2.8 billion in electric benefits and almost $390 million in natural gas benefits (net present value) (Figure 31).





Source: ENE business-as-usual forecast

Figure 31. Energy efficiency costs and savings, for electricity and natural gas.

In the electric sector, investment costs outweigh the benefits, when measured solely in economic terms. Capital expenditures of between approximately $550 million and $2.6 billion (net present value) are associated mainly with compliance costs of meeting Renewable Portfolio Standards and construction costs of energy storage. The cost of transmission builds is contained within the business-as-usual condition. Additional incremental power and fuel expenditures of between $26 million and $537 million chiefly represent above-market energy costs associated with the procurement of renewable energy.

Although the modeling for the electric sector projects net negative economic benefits, three critical caveats should be considered. First, Navigant applied current overnight cost data on renewable energy technologies across the whole planning horizon, without any modeled decline over time. Based on the significant drops in costs of such technologies in recent years, this assumption could result in arguably quite conservative results. Second, electric energy efficiency investments are disaggregated from the electric sector net

benefits calculation. The substantial benefits of electric energy efficiency investments far outstrip the negative costs of increased electric sector energy costs, demonstrating how Least-Cost Procurement policies can provide room for more costly renewable energy. Finally, if natural gas prices increase beyond the low projections seen in the business-as-usual condition, then the economics will shift further in favor of renewable energy. Absolute cost aside, increasing amounts of renewable energy will likely produce other benefits and savings to consumers in the form of price hedging against volatile fossil fuel prices and wholesale power market price suppression.

The largest opportunities for net economic benefits are likely in the thermal and transportation sectors. This reflects Rhode Island's lack of comprehensive state policies for investing in all forms of cost-effective thermal (outside natural gas) and transportation demand reduction. Additional opportunities exist in these sectors from economic benefits associated with fuel-switching to natural gas. Such fuel-switching offers savings relative to comparatively higher-priced petroleum-based fuels. In the thermal sector, capital expenditures of between $480 million and $1.3 billion are calculated to yield energy savings of between $600 million and $4.3 billion (net present value). In the transportation sector, capital expenditures of between $2 billion and $3.5 billion yield energy savings of between $2.6 billion and $5.6 billion (net present value).

The nature and absolute amount of net benefits notwithstanding, Rhode Island will likely witness substantial additional human, economic, and environmental benefits from major investments in its energy systems and infrastructure. The job creation benefits alone could be substantial. The results of Navigant's scenario modeling show that each alternative energy future generates first-order job growth, relative to the business-as-usual condition. Navigant estimates the creation of more than 20,000 jobs in each scenario it modeled (Figure 32). This level of job growth suggests that investments in Rhode Island's energy economy could serve as a powerful agent in resolving the state's unemployment crisis. Further refined economic analysis is needed to address the second-order job creation as the effects of reduced spending on power and fuels, increased disposable income and revenue, and other system impacts ripple through Rhode Island's economy.

Sector	Scenario 1	Scenario 2	Scenario 3
Electric	3,444	20	1,170
Thermal	6,707	21,153	16,129
Transportation	12,895	8,027	10,346
Total	**23,046**	**29,200**	**27,645**

Source: Navigant scenario modeling

Figure 32. Projected job creation under each scenario, categorized by energy sector.

Because Rhode Island can produce net economic benefits through strategic energy system investments, Energy 2035 recommends that Rhode Island:

Produce economy-wide net benefits

THEME #3: SUSTAINABILITY

The Plan sets four goals for a sustainable energy future in Rhode Island: climate, air quality, water use and quality, and land and habitat (Figure 33). The Project Team and Advisory Council decided on an overarching performance measure target to gauge success in achieving the sustainability goals: **reduce greenhouse gas emissions by 45 percent below 1990 levels**.

The Plan defines *GHG reductions* as a long-term, fundamental obligation to increase the human and environmental health of our state and planet. GHG reductions are measured in terms of the reduction in system GHGs resulting from Rhode Island policy, using CO_2 emissions as a proxy indicator for overall greenhouse gas emissions. For instance, Rhode Island receives credit for GHG reductions due to out-of-state renewable generation financed through increased RPS requirements, even though the in-state generation mix and emissions profile is not significantly altered. GHG reductions that occur from lower demand or in-state fuel switching also count toward emissions reductions.

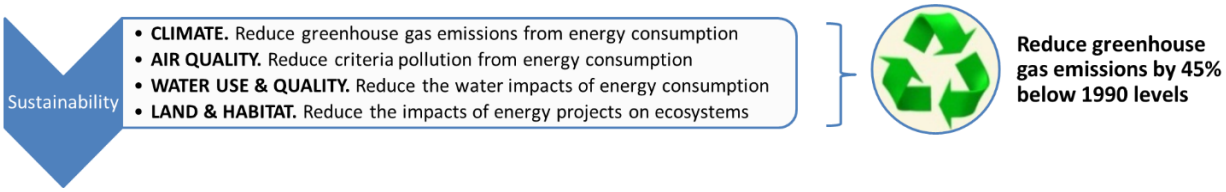


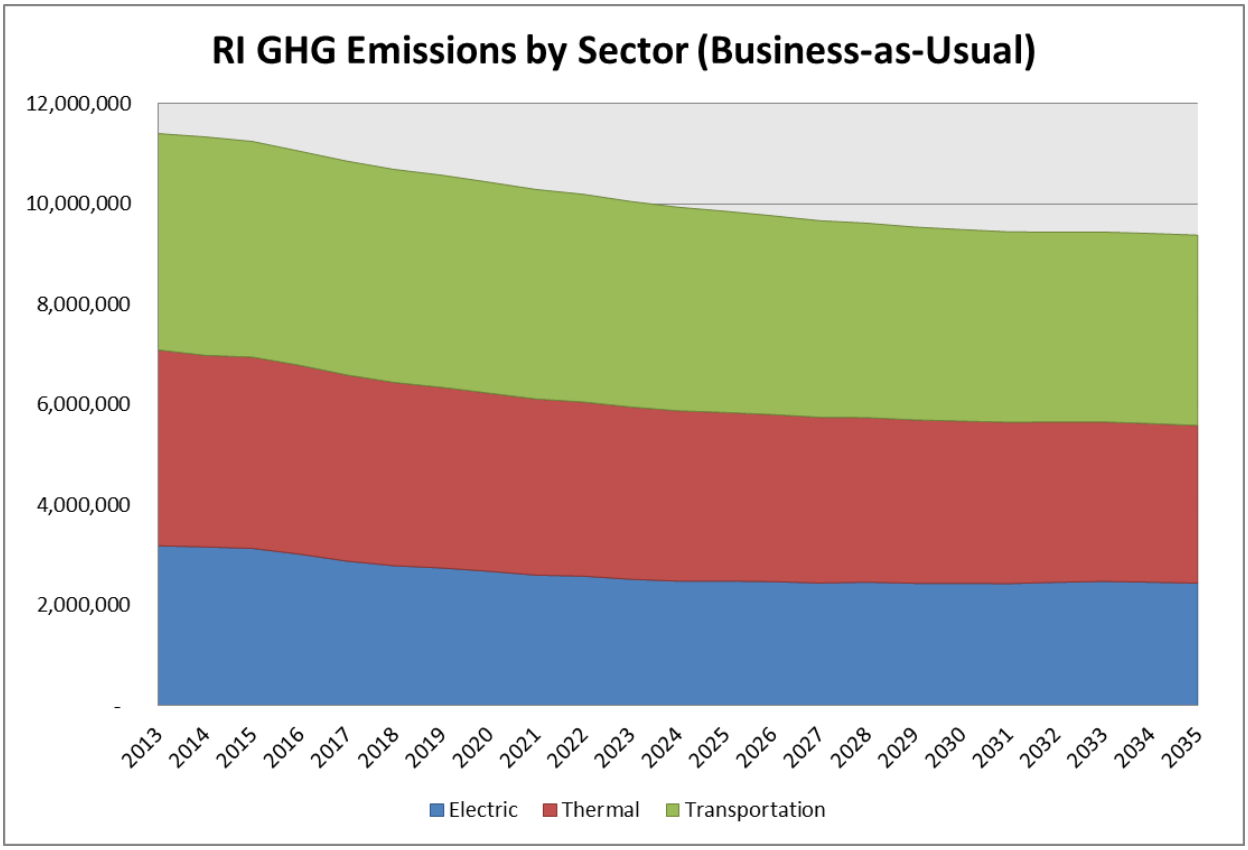
Figure 33. Energy 2035 sustainability goals and performance measure target.

Of all sustainability indicators, GHG reductions represent an overarching proxy generally yielding uniform improvements in other sustainability measures of air quality, water use and quality, and land and habitat. GHG reductions can contribute to meeting the Plan's sustainability goals via the following mechanisms:

- Reductions in other, non-GHG air pollutants
- Reduced acid rain impacts from decreased emissions of criteria pollutants
- Lower water consumption with reduced fossil fuel power generation
- Natural resource and land conservation benefits, depending on the relative emphasis of habitat preservation, increased renewable development, and fossil fuel generation

GHG REDUCTIONS: BUSINESS-AS-USUAL

How will Rhode Island's GHG emission profile change between now and 2035, given projected market conditions and absent any changes to state or federal policy? Under business-as-usual conditions, Rhode Island GHG emissions will fall approximately 18 percent below 2013 levels by 2035 (Figure 34). Modeling shows that GHG reductions occur in each sector directly in response to policy- and market-driven changes in the state's total energy demand and supply portfolio. The primary drivers are Rhode Island's Least-Cost Procurement mandate for electricity and natural gas, continued dependence on natural gas (and fuel-switching to natural gas), federal fuel economy standards, renewable energy policy mandates, and participation in RGGI (see the section **Fuel Diversity: Business-as-Usual**, for more information). Business-as-usual GHG emissions decrease 23 percent in the electric sector, 20 percent in the thermal sector, and 12 percent in the transportation sector below 2013 levels. In absolute terms, however, the thermal sector contributes greater GHG reductions than the electric sector, likely due to projected displacement of higher carbon intensity fuels by natural gas.



Source: Navigant scenario modeling

Figure 34. Rhode Island's projected GHG emissions by sector under the business-as-usual condition.

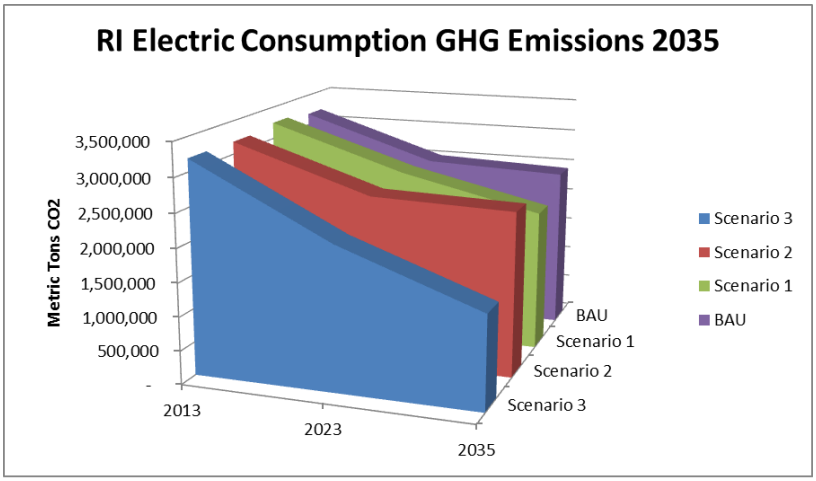
GHG Reductions: Sector Potential

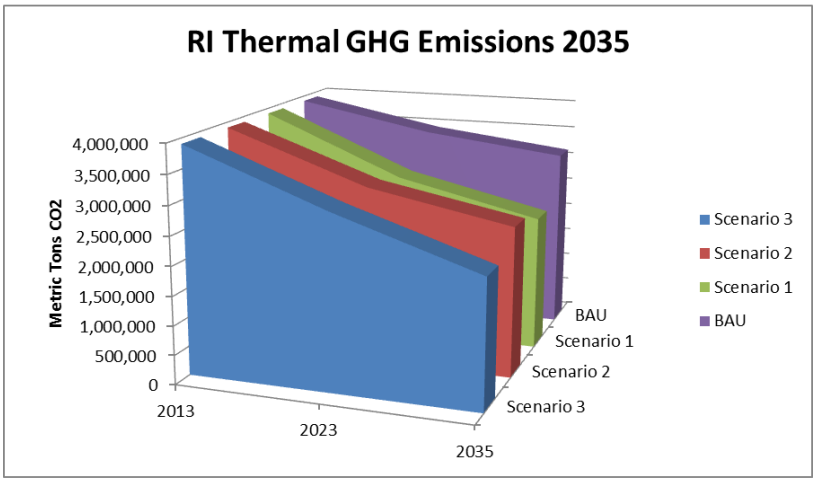
What opportunities exist in each sector of Rhode Island's energy economy to achieve GHG emission reductions beyond the business-as-usual condition? The results of Navigant's scenario modeling demonstrate ample potential for decreasing GHG emissions in each sector. In fact, GHG emissions fall below the business-as-usual condition in each sector for every modeled alternative energy future (Figure 35).

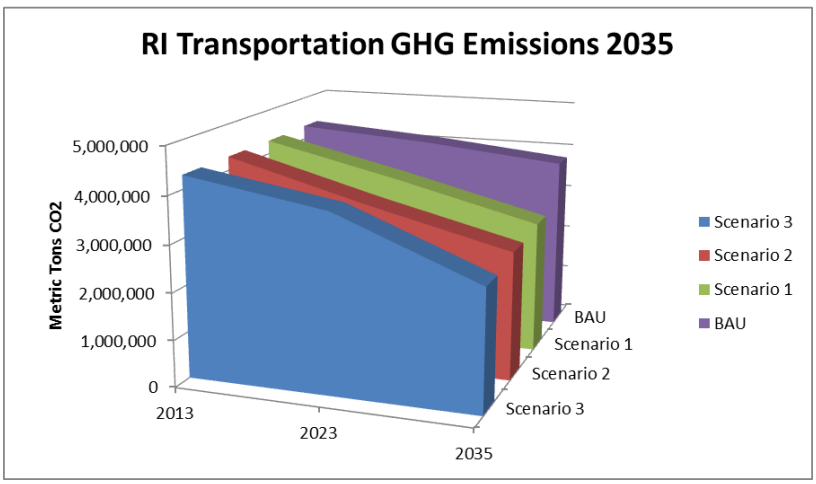
In the electric sector, business-as-usual GHG emission reduction projections include investment in all cost-effective energy efficiency through an assumed continuation of the Least-Cost Procurement mandate. In order to decrease the electric sector carbon footprint further, Rhode Island must address supply-side GHG emissions, via displacement of fossil fuel generation by renewable energy generation. This can be achieved either through the promotion of renewable energy development in state or out of state. Supporting renewable energy development might occur through direct power procurement, purchasing of renewable energy credits, or both.[33] For instance, in Scenario 1, which prioritizes energy security through the development of a diverse in-state portfolio of generating resources, electric sector GHG emission levels fall 35 percent below 2013 levels by 2035. In Scenario 3, which prioritizes sustainability by maximizing GHG reductions, mainly via procurement of out-of-state renewable energy credits, electric sector GHG emission levels fall 56 percent below 2013 levels by 2035. Renewable Portfolio Standard targets in the modeling are

[33] For more information on the renewables build in each scenario, see **Strategy 8, Expand Renewable Energy Procurement** in **Appendix B: A Portfolio of Strategies**.

set at 40 percent by 2035 for Scenario 1, 25 percent by 2035 for Scenario 2, and 75 percent by 2035 for Scenario 3.







Source: Navigant scenario modeling

Figure 35. Rhode Island projected GHG reductions by sector, by 2035.

In the thermal sector, business-as-usual GHG emission reduction projections include investment in all cost-effective natural gas energy efficiency through an assumed continuation of the Least-Cost Procurement mandate. To decrease the thermal sector carbon footprint further, Rhode Island must find additional demand reduction opportunities and provide fuel-switching options to lower- and no-carbon heating fuels. The scenario modeling suggested substantial potential for reducing thermal sector GHG emissions, but the nature of those reductions differ markedly by scenario. For instance, GHG emissions fell 34 percent in Scenario 2; however, the drop in emissions largely occurs from fuel-switching to natural gas, which does not produce sustained GHG emission reductions. In Scenarios 1 and 3, on the other hand, GHG emissions fell 40 percent and 44 percent, respectively, due primarily to investment in alternative heating fuels, producing GHG reductions that are sustained in nature.

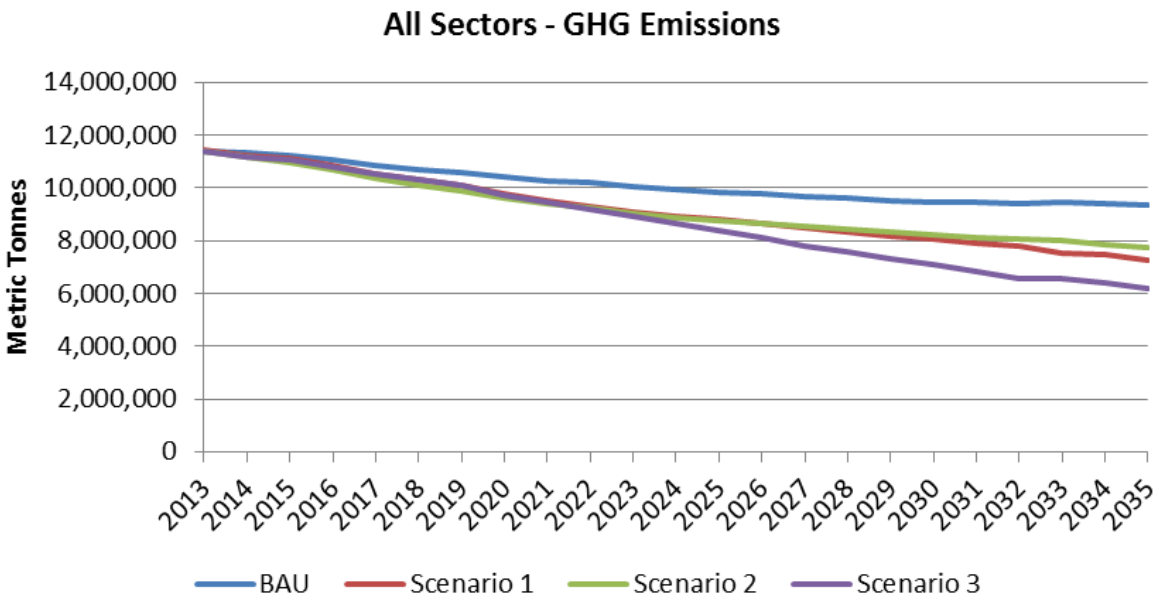
In the transportation sector, business-as-usual GHG emission reduction projections include the impacts of federal fuel economy standards. To decrease the transportation sector carbon footprint further, Rhode Island must find ways to scale the use of lower- or no-carbon transportation fuels, or reduce the total number of vehicle miles traveled. The scenario modeling results suggest that the transportation sector offers some of the most promising opportunities for GHG reductions beyond the business-as-usual condition. GHG emissions fell only 12 percent under that condition; however, emissions fell 34 percent in Scenario 1, 36 percent in Scenario 2, and 40 percent in Scenario 3, respectively. Incremental potential for reducing transportation GHG emissions above the business-as-usual condition is high because Rhode Island lacks comprehensive state policies for investing in all cost-effective transportation demand reduction. Furthermore, the petroleum-based fuels that dominate the sector have a higher carbon intensity than that for natural gas, which plays a primary role in the electric and thermal sectors.

GHG Reductions: Energy 2035 Performance Measure Target

By how much can Rhode Island reduce its total carbon footprint by 2035? The results of the scenario modeling show that substantial GHG emission reductions are feasible under each of the three distinct scenarios (Figure 36). The average GHG reduction among the scenarios is 38 percent below 2013 levels by 2035. The maximum reduction is seen in Scenario 3: 46 percent below 2013 levels by 2035 (Figure 37).

The modeling shows that viable paths exist for Rhode Island to shift to a sustainable, low-carbon future, while simultaneously producing net economic benefits and increasing sector fuel diversity. Choosing a 45 percent reduction performance measure target (below 1990 levels) by 2035 corresponds to a 2 to 2.5 percent reduction per year and would set Rhode Island on pace to achieve approximately 80 percent GHG reductions by 2050. This 2050 threshold is a generally accepted target to avoid the worst consequences of climate change.[34] Every other state in the Northeast has adopted a legislative or executive goal of approximately 80 percent carbon emission reductions by 2050.[35]

[34] The 80 percent target is often given relative to a 1990 baseline. Rhode Island's economy-wide GHG emissions today are very similar to levels in 1990. In 2010, emissions totaled 11,330,473 tons; 1990 emissions were 11,378,895 tons.
[35] For more information, see **Strategy 19, Develop a Carbon Reduction Strategy** in **Appendix B: A Portfolio of Strategies**.



Source: Navigant scenario modeling

Figure 36. Rhode Island's projected GHG emissions 2035, all sectors, and under three scenarios and the business-as-usual condition.

GHG Reductions - RI Load Served (% Below 2013 levels)

	ALL SECTORS		INDIVIDUAL SECTORS - 2035		
	2023	*2035*	*Electric*	*Thermal*	*Transportation*
BAU	12%	18%	23%	20%	12%
Scenario 1	21%	36%	35%	40%	34%
Scenario 2	21%	32%	23%	34%	36%
Scenario 3	22%	46%	56%	44%	40%
Scenario Avg	**21%**	**38%**	**38%**	**39%**	**37%**

Source: Navigant scenario modeling

Figure 37. Rhode Island GHG emissions, projected for 2035, by sector, with comparison to projections for 2023.

Rhode Island has established that the State must address its greenhouse gas emission rates and reduce local impacts on climate change. Its continued participation in RGGI and the passage of the Resilient Rhode Island Act reflect the importance of this policy goal. Consistent with the scenario modeling results detailed above, the state should:

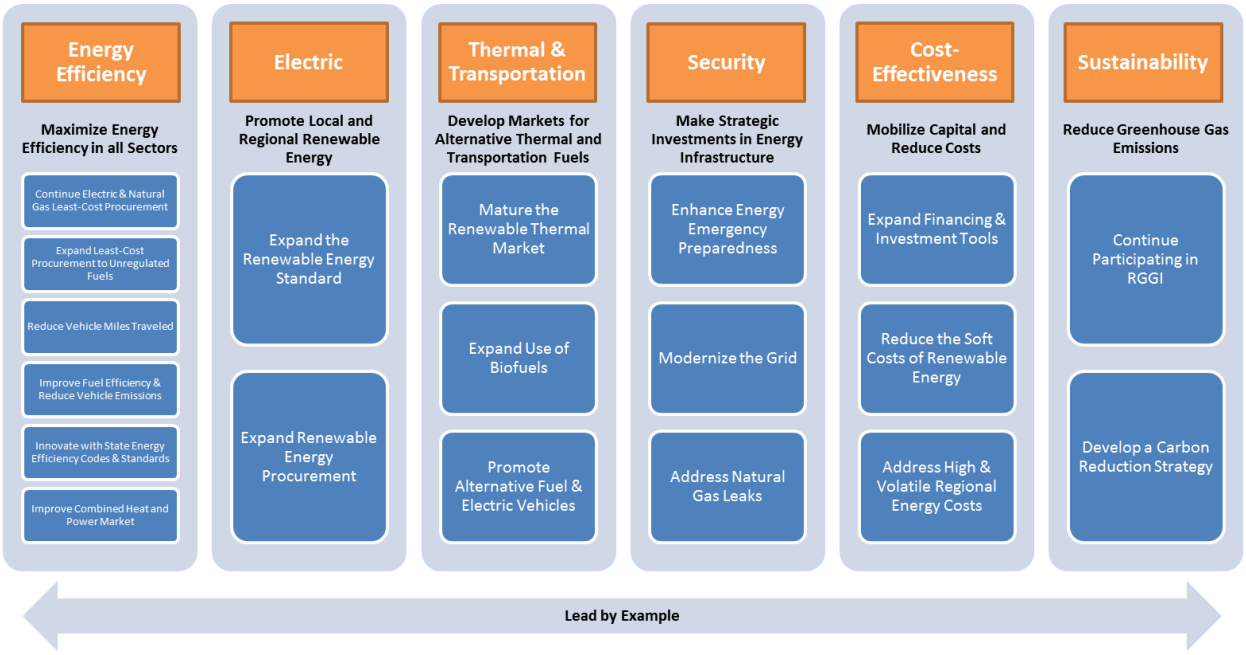
Reduce greenhouse gas emissions by 45% below 1990 levels

PART 3: POLICIES AND STRATEGIES

How can Rhode Island achieve its vision of a secure, cost-effective, and sustainable energy future? This section presents a comprehensive suite of policies and strategies that can assist the State with meeting the energy security, cost-effectiveness, and sustainability goals and performance measure targets established in **Part 2: Goals and Performance Measure Targets**. The policies and strategies that follow are meant to provide decision makers with a complete picture of the near- and long-term actions Rhode Island should consider in each sector of the economy—electric, thermal, and transportation.

A dramatic transformation of Rhode Island's existing energy systems requires commensurately ambitious action at the state and local levels. To achieve the goals and performance measure targets laid out in the Plan, Energy 2035 recommends an "all-of-the-above" clean energy framework. This framework centers on strategic investments that provide long-term energy, economic, and environmental benefits, setting Rhode Island firmly on a path to a lower-risk, lower-cost, and lower-impact energy future.

Rhode Island's all-of-the-above clean energy framework should maximize energy efficiency in all sectors; promote local and regional renewable energy; develop markets for alternative thermal and transportation fuels; make strategic investments in energy infrastructure; mobilize capital and reduce costs; reduce greenhouse gas emissions; and lead by example.



Part 3: Policies and Strategies describes a suite of 20 different strategies that Rhode Island can pursue in order to achieve the Energy 2035 Vision. More detailed descriptions of the 20 strategies can be found in **Appendix B: Portfolio of Strategies**.

METHODS AND PROCESS

To develop policies and strategies, the Project Team and Advisory Council began with the performance measure targets established in **Part 2: Goals and Performance Measure Targets** of the Plan: increase sector fuel diversity above 2013 levels, produce economy-wide net benefits, and reduce greenhouse gas emissions by 45 percent below 1990 levels. The Project Team and Advisory Council then identified a portfolio of 20 different strategies designed to achieve long-term outcomes set by the performance measure targets (Figure 38). The 20 strategies were nested into six major policy areas, plus an additional cross-cutting "Lead by Example" policy area. Three primary sources of information supported this effort: the Navigant scenario modeling analysis, an examination of best practices, and stakeholder feedback.

In developing the strategies, the Project Team aligned strategies with the data-driven goals and performance measure targets established in the Plan. The strategies were selected for (1) *consistency:* to address each of the three themes for providing energy services identified in the Energy 2035 Vision Statement—energy security, cost-effectiveness, and sustainability; and (2) *comprehensiveness:* to address each of the three sectors of energy use considered in the Plan—the electric, thermal, and transportation sectors. Each strategy is designed to drive increased fuel diversity in Rhode Island's energy portfolio, capitalize on the most cost-effective approaches and methods, and be sized commensurate with the estimated levels needed to meet greenhouse gas emission reductions of 45 percent below 1990 levels.

Substantial stakeholder input informed the development of the Plan's policies and strategies. The Project Team drafted a list of strategies from an initial brainstorming session with the Energy 2035 Implementation Group, comprising stakeholders with subject matter expertise in energy. Representation on the Implementation Group included state and local government, utilities and regulators, private sector and industry, and consumer and environmental advocates. The Project Team then vetted individual straw man strategies with sector-specific focus groups composed of representatives from the Implementation Group. The Project Team then finalized the strategies with input from the Advisory Council.

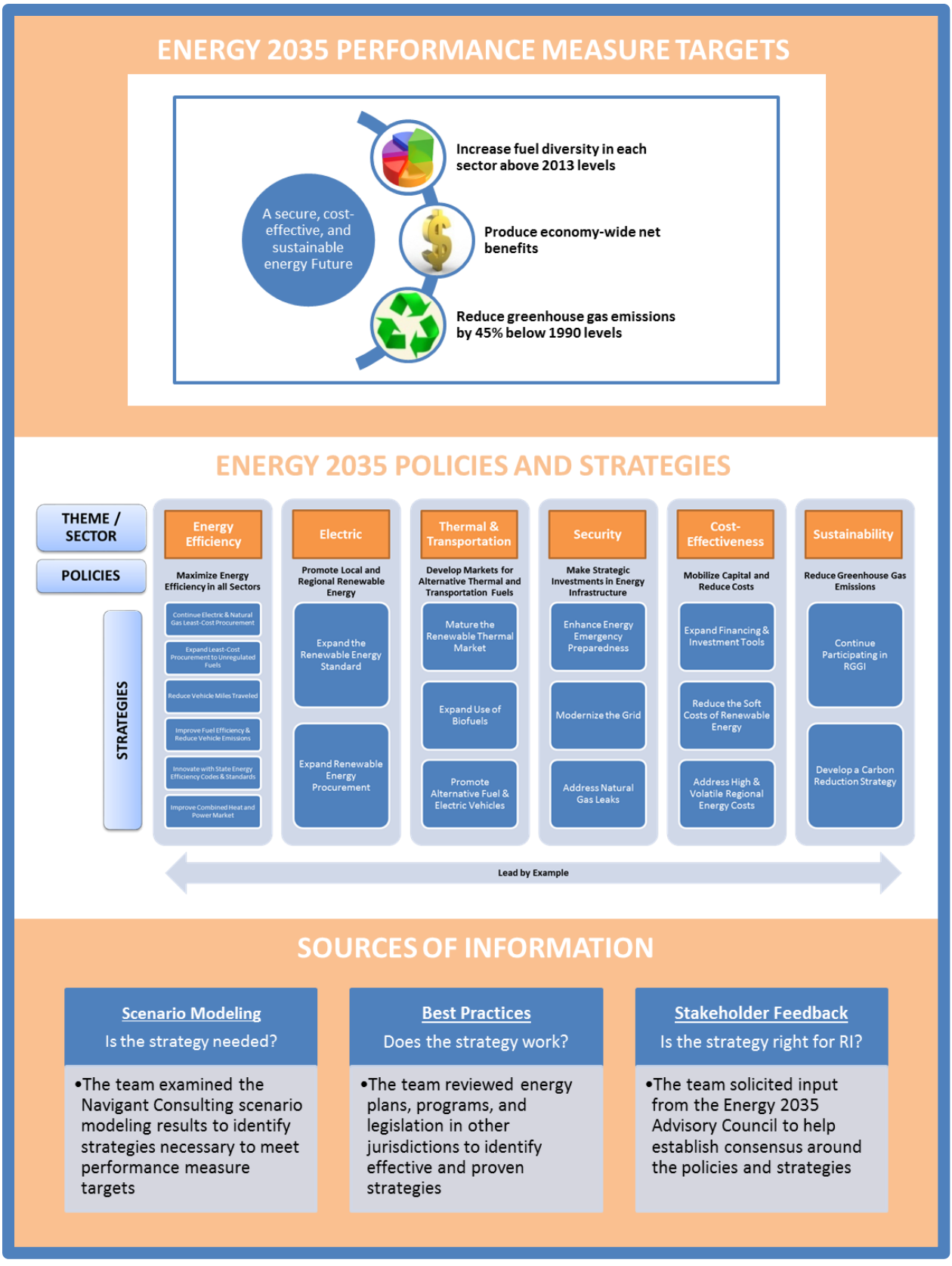


Figure 38. Energy 2035 policies and strategies, showing the Project Team's methods and process.

OVERVIEW OF POLICIES AND STRATEGIES

Achieving the Energy 2035 Vision will require ambitious action in all sectors of Rhode Island's energy economy. To meet the security, cost-effectiveness, and security goals and performance measure targets set in the Plan, Energy 2035 recommends an "all-of-the-above" clean energy framework, composed of 20 strategies in six major policy areas, plus a cross-cutting policy area encouraging state and municipal governments to "Lead by Example" by promoting public investment in energy-saving measures and clean sources of energy. This section presents summaries of the strategies. **Appendix B: A Portfolio of Strategies** provides additional detail on each strategy presented as individual, concise policy briefs.

The Energy 2035 policies and strategies are intended to provide policy makers with a high-level implementation plan for achieving the long-term goals and performance measure targets set in the Plan. When viewed collectively, the strategies should help policy makers acquire a broad, clear picture of the actions Rhode Island can undertake to maximize energy, economic, and environmental benefits. Furthermore, the strategies will help policy makers identify existing policy gaps and ascertain the order of magnitude degree of change that will likely be needed in different sectors of the state's energy economy.

The Project Team has not treated the strategies at the level of individual policy design, which requires its own detailed analysis. The strategies are instead intended to serve as a departure point for policy makers and stakeholder groups as they consider proposing new legislation or amending existing policies. State agency decision makers may also use Energy 2035 strategies to inform future programming and funding allocation decisions. Additionally, although many of the Plan's strategies are long range in nature, the Plan also presents near- and intermediate-term actions to ensure that Rhode Island's energy needs are served in a secure, cost-effective, and sustainable manner. Overall, these policies and strategies will provide all stakeholder groups with a common understanding of the long-term vision and direction toward which we want to move in the Ocean State.

Perspective:
Looking forward by looking back

Rhode Island must take bold steps to achieve the long-term, ambitious goals in Energy 2035. These steps involve continuing and expanding current energy policies and programs. They also involve substantial investments in undeveloped markets and end use sectors. Compared to Rhode Island's existing energy policies, the Plan's strategies could be viewed as exceptionally ambitious. Policy makers might draw different conclusions, however, when the strategies are considered from another vantage point. The Plan proposes policies and strategies with a planning horizon of 20 years. For perspective, it is important to note that 20 years ago, none of Rhode Island's nation-leading energy efficiency programs and renewable procurement mandates existed. Natural gas played only a minor role in regional electricity generation. In fact, Rhode Island's electric markets were not even restructured yet, and retail choice was yet to be introduced. From this standpoint, it is possible to imagine an energy future 20 years from now that is materially different from our current energy landscape.

MAXIMIZE ENERGY EFFICIENCY IN ALL SECTORS

Energy efficiency is the state's centerpiece policy for achieving the Energy 2035 Vision. The state is already a nationally recognized leader in energy efficiency, due to its "Least-Cost Procurement" mandate for electric and natural gas resource acquisition planning. Least-Cost Procurement ensures that Rhode Island maximizes the use of the lowest-risk, lowest-cost, and arguably most sustainable energy resource available: energy efficiency.

As Rhode Island looks ahead to 2035, the State should reaffirm its commitment to leadership in energy efficiency by instituting an economy-wide, all-fuels approach to least-cost resource acquisition. To begin with, Rhode Island should continue securing all cost-effective electric and natural gas energy efficiency by renewing the existing Least-Cost Procurement mandate past 2018. Second, the state should extend the benefits of comprehensive energy efficiency services beyond electric and natural gas customers to all end users in all sectors—namely, delivered fuel heating customers and the transportation sector. Developing an integrated Least-Cost Procurement strategy for these petroleum fuel-dominated market sectors could yield even greater benefits relative to current Least-Cost Procurement programs by investing in cost-effective energy efficiency that displaces higher-priced and higher-carbon-emitting fuels than natural gas.

The potential impact of an economy-wide, comprehensive Least-Cost Procurement public policy could be substantial. The results of the scenario modeling performed for this Plan suggest that Rhode Island could reduce economy-wide energy consumption by over one-third of present-day levels by 2035 (Figure 39). Such reductions involve a continuation of current nation-leading electric and gas savings targets, complemented by aggressive delivered fuel and transportation sector investments in energy efficiency and demand reduction.

RI Energy Consumption - Scenario Modeling Maximum Demand Reductions by Sector (BBTU)

	2013	*2023*	*2035*	*Total Reduction*	*% Reduction*
Electric	58,830	48,016	46,310	12,520	21%
Thermal	63,784	42,694	31,599	32,185	50%
Transportation	60,973	45,383	35,392	25,581	42%
Total	**183,587**	**136,094**	**113,301**	**70,286**	**38%**

Source: Navigant scenario modeling

Figure 39. The total energy savings potential for Rhode Island, by energy use sector.

Energy 2035 recommends six strategies that will enable Rhode Island to maximize energy efficiency in all energy use sectors:

1. *Continue electric and natural gas Least-Cost Procurement*
   Rhode Island's landmark Comprehensive Energy Conservation, Efficiency, and Affordability Act of 2006 established Least-Cost Procurement as the State's overarching resource acquisition strategy for electricity and natural gas. The Least-Cost Procurement policy requires electric and natural gas distribution companies to invest in all cost-effective energy efficiency (for example, higher-efficiency lighting, HVAC systems, and appliances; insulation; and air-sealing) before procuring more expensive, conventional supply resources. Under the Least-Cost Procurement mandate, the State currently invests over $100 million annually in energy efficiency programs that achieve electric savings exceeding 2.5 percent of load, and gas savings exceeding 1 percent of load. The

benefits of Least-Cost Procurement are proven and are paying dividends today: savings from ratepayer-funded energy efficiency investments made during the past ten years are supplying approximately 12 percent of the state's electricity demand today, at an average lifetime cost of under 4 cents / kWh. Total economic benefits to Rhode Island from these investments exceed $1 billion. To continue securing the benefits of least-cost energy efficiency for all Rhode Island consumers, the State should renew the Least-Cost Procurement mandate's key provisions that expire in 2018, including System Reliability and Energy Efficiency Procurement Plans and collection of the electric and gas System Benefits Charge. Scenario modeling for this Plan suggests that extending Least-Cost Procurement to 2035 could deliver approximately 20 percent total energy savings in both the electric and thermal sectors of Rhode Island's economy over the life of this Plan's horizon.

2. *Expand Least-Cost Procurement to unregulated fuels*

   Nearly 40 percent of Rhode Island homes heat with unregulated, petroleum-based delivered fuels such as home heating oil and propane. The state's current Least-Cost Procurement mandate, however, addresses only regulated fuels—electricity and natural gas. As a consequence, no dedicated energy efficiency program funding exists to serve delivered fuel customers. Because of this, significant consumer, economic, and environmental benefits have been left on the table. Developing a long-term strategy for sustainably funding energy efficiency services for the unregulated fuel sector will help fully extend the benefits of Least-Cost Procurement to delivered fuel customers and potentially deliver 15 to 25 percent total energy savings in the thermal sector by 2035.

3. *Reduce vehicle miles traveled*

   Rhode Island's transportation sector relies almost exclusively on expensive, imported, petroleum-based fuels such as gasoline and diesel. Transportation represents Rhode Island's costliest and most environmentally damaging energy sector, with annual expenditures reaching nearly $1.4 billion and carbon dioxide emissions accounting for 40 percent of the state's total. As in other sectors, the least-cost way to reduce impacts of transportation energy use is by reducing demand—traditionally measured in terms of vehicle miles traveled (VMT). Many strategies can reduce VMT: investing in alternative modes of transportation, promoting sustainable development and land use practices, and piloting programs to incentivize reduced discretionary driving. The Plan recommends implementing these strategies to reduce VMT; many of them have already been proposed in multiple existing Rhode Island transportation, transit, and land use plans. To scale these investments, State policy makers should take advantage of ongoing interagency efforts to devise a creative transportation analog to the electric and gas Least-Cost Procurement model. Such a model would be based on the enduring, compelling argument that inexpensive demand-side resources are Rhode Island's best way to secure long-term, significant net economic and environmental gains in all sectors of the energy economy.

4. *Improve fuel efficiency and reduce vehicle emissions*

   Apart from reducing VMT, Rhode Island can also promote energy efficiency in the transportation sector by setting standards for improved vehicle fuel economy. Although authority to set standards for fuel efficiency and motor vehicle emissions falls under the purview of the federal government, Section 177 of the Clean Air Act allows California to request a waiver to adopt stricter standards. States may establish stricter regulations by adopting California's standards, and Rhode Island is

one of 15 states that has done so, to date. Although federal standards are currently essentially aligned with California's, Rhode Island should continue to adopt the increasingly stringent vehicle emissions standards set by California, should federal standards be relaxed.

5. *Innovate with state energy efficiency codes and standards*
   Progressive energy efficiency codes and standards are some of the most simple and cost-effective policy tools for reducing energy use in appliances and buildings. Because the expected lifetimes of appliances and buildings are typically measured in decades, the base efficiency of these assets today will have a substantial and long-lasting impact on energy consumption, fuel expenditures, and emissions for years to come. Rhode Island should continue ongoing efforts to innovate with appliance and building codes and standards, and chart a long-term path to zero net energy buildings for the new construction / renovation and existing housing markets alike. In the buildings sector, the State should address policies that improve base code, provide incentives to exceed base code, and increase overall code compliance.

6. *Improve combined heat and power market*
   Combined heat and power (CHP), also called *co-generation,* refers to systems that generate both electricity and useful heat. CHP helps increase the efficiency of on-site energy use by recycling waste thermal energy, produced as a byproduct of power generation, for many end use applications including hot or chilled water, space conditioning, and process heat. The best available data suggest that approximately 100 MW of CHP installations currently exist in Rhode Island. Recent changes to Rhode Island law have helped support large new investments in CHP systems through state efficiency programs. Rhode Island should build on this progress and set an ambitious target of meeting the economic potential—an estimated 400 MW—for in-state CHP by 2035.

PROMOTE LOCAL AND REGIONAL RENEWABLE ENERGY

Rhode Island cannot achieve the Energy 2035 Vision without bold steps to increase the generation and use of clean, renewable sources of energy—wind, solar, hydropower, anaerobic digestion, and others. Renewable energy will diversify the state's energy supply portfolio, help mitigate long-term energy price volatility, stimulate the state's economy through industry growth and job creation, and set Rhode Island on pace to meet ambitious greenhouse gas emission reduction targets. Furthermore, as electricity use grows in the thermal and transportation sectors—through the proliferation of highly efficient cold-climate heat pumps and electric vehicles, for example—increasing amounts of renewable energy will assist in diversifying and decarbonizing these other sectors as well.

Energy 2035 recommends two strategies that will enable Rhode Island to promote local and regional renewable energy:

1. *Expand the Renewable Energy Standard*
   Policy makers should extend and expand the state's Renewable Energy Standard (RES) to send a long-term signal to the market that Rhode Island intends to source increasing amounts of its power supply from renewable energy. Rhode Island's current RES requires electric distribution companies and non-regulated power producers to supply 16 percent of their retail electric sales from renewable energy resources by 2019. Achieving this Plan's greenhouse gas emissions reduction performance measure target will require RES levels of at least 40 percent by 2035 (Figure 40).

2. *Expand renewable energy procurement*

Rhode Island's blueprint for a renewable energy future centers not only on an expanded RES, but also on direct renewable power procurement—through both local investments and actionable regional solutions. The state should aim to bring online over 500 MW of local renewable energy projects through expansion of the State's successful renewable energy procurement policies, such as the Distributed Generation Standard Contracts Program, and through support for state and federal offshore wind projects (Figure 40). Supporting the growth of in-state renewable energy generation will bring economic development, system reliability, and job creation benefits to the state. Increasing local renewable energy will need to be balanced with the ability of the electric distribution system to effectively and safely integrate such resources, and paced to enable technology solutions that facilitate greater penetration of distributed generation over time. On a regional level, Rhode Island should continue to play a leadership role in moving discussions forward with other New England states to facilitate the cost-effective development of transmission projects that allow for further integration of clean energy resources, including wind and large-scale hydropower. These resources will help decarbonize New England's power supply, provide resource diversification and system reliability benefits, and possibly help lower high and volatile regional energy costs.

	BAU	Scenario 1	Scenario 2	Scenario 3
RES (%)				
Target in 2035	16%	40%	25%	75%
In-State Power Procurement (MW)				
Wind	16	70	20	70
Offshore Wind	180	180	180	180
Solar	66	302	66	66
Biomass	-	7	-	-
	262	**560**	**266**	**316**
Out-of-State REC Purchases (MW)				
Wind	-	228	11	1,111
	-	**228**	**11**	**1,111**
GRAND TOTAL (MW)	**262**	**788**	**277**	**1,427**

Source: Navigant scenario modeling

Figure 40. Rhode Island's renewable energy targets, by scenario.

Develop Markets for Alternative Thermal and Transportation Fuels

A linchpin of Rhode Island's framework for achieving the Energy 2035 Vision is expanding the use of cleaner and cheaper alternatives to petroleum in the thermal and transportation sectors. In Rhode Island, most energy policy to date has focused on electric-sector technologies and markets. Low- and no-carbon resources, however, produce important energy security, cost-effectiveness, and sustainability benefits when displacing fossil fuels in the thermal and transportation sectors as well. In many cases, the benefits can actually be greater, because of the heavier reliance of the thermal and transportation sectors on higher-cost, higher-carbon-emitting petroleum fuels, compared to the natural-gas-dominated electricity sector. Finally, Rhode Island cannot afford to leave these opportunities on the table. In recent years, expenditures on gasoline, heating oil, and other petroleum products have climbed to nearly $2 billion, over 50 percent of total energy expenditures statewide. The vast majority of this expenditure flows out of the state and region because no petroleum resources are produced or refined in New England.

Energy 2035 recommends three strategies that will enable Rhode Island to develop markets for alternative thermal and transportation fuels:

1. *Mature the renewable thermal market*
   Renewable thermal fuels like biomass, solar hot water, ground- and air-source heat pumps, advanced biofuels, and biogas are already cost-competitive on a lifecycle basis with electric resistance heating, distillate fuel heating oil, and in some cases, natural gas. This Plan's scenario modeling suggests that renewable fuels could supply approximately 15 percent of Rhode Island's thermal energy needs by 2035. As Rhode Island plans to establish and mature markets for these alternative thermal fuels, the State should strategically address key market barriers to adoption. The most prominent of these barriers are the comparatively high upfront costs, poor public awareness, a dominant heating / cooling industry unfamiliar with marketing or delivering the products, and opaque regulatory standards.

2. *Expand use of biofuels*
   Biofuels are liquid fuels derived from renewable organic substances. Biodiesel, an important member of the biofuel family, can be blended with conventional petroleum products to create distillate fuel blends. The Plan's scenario modeling demonstrates that in Rhode Island, although thermal and transportation energy efficiency and fuel switching to cleaner fuels will help reduce Rhode Island's dependence on petroleum fuels, gasoline and distillate fuel will continue to supply significant portions of the state's thermal and transportation energy needs in 2035—under each of the three scenarios. Therefore, the State should encourage the increased use of biofuel in these sectors by expanding Rhode Island's current 5 percent biodiesel blending mandate in the thermal sector to at least 20 percent in both the thermal and transportation sectors by 2035.

3. *Promote alternative fuel and electric vehicles*
   In the transportation sector, compressed natural gas, electric vehicles, and biofuels provide cost-competitive and cleaner alternatives to gasoline and diesel fuel, which currently supply the vast majority of transportation energy needs. The Plan's scenario modeling estimates that alternative transportation fuels, including natural gas, could supply 25 to 40 percent of Rhode Island's transportation energy needs in 2035. Public efforts to hasten the adoption of these vehicles should target the expansion of fueling infrastructure, easing upfront costs for consumers, and addressing other market barriers to adoption.

MAKE STRATEGIC INVESTMENTS IN ENERGY INFRASTRUCTURE

Modern and resilient energy infrastructure is a necessary foundation for a secure, cost-effective, and sustainable energy system in Rhode Island. Investments in power resiliency, electric grid modernization, and natural gas leak repair will help the State address key safety and reliability issues. Such investments will also generate economic and environmental benefits through increased efficiencies; waste reduction; and opportunities for synergistic, clean, distributed-energy resources.

Rhode Island is already making significant progress in upgrading energy infrastructure statewide. The cost recovery mechanism established by the state's decoupling statute enables National Grid to make annual investments in capital improvements to Rhode Island's electric and natural gas distribution infrastructure. These investments currently total $66 million for electric infrastructure, and $72 million for natural gas. Rhode Island should investigate opportunities for further aligning the levels, types, and pace of this capital investment with public policy objectives of system reliability, economic development, and reductions in greenhouse gas emissions. Investments continued at current levels could account for a grand total of over $3 billion of targeted capital investment in Rhode Island's electric and gas distribution systems, over the span of this Plan's horizon.

Energy 2035 recommends three strategies that will enable Rhode Island to make strategic investments in energy infrastructure:

1. *Enhance energy emergency preparedness*
   In recent years, severe weather events (for example, Superstorm Sandy and Winter Storm Nemo) crippled large parts of the Northeast, including Rhode Island. These storms contributed to widespread electric power outages, disruptions to the regional liquid fuel supply chain, and damage to property. Together, they highlighted the need for (1) updated energy emergency plans and procedures; and (2) resiliency improvements to energy infrastructure and critical facilities. To position the state to weather future storm events, Rhode Island should build on past and current inter-agency efforts to develop a comprehensive energy emergency preparedness strategy. To increase power resiliency, the strategy should explore the innovative use of microgrids and backup generation to keep critical infrastructure online during severe weather events.

2. *Modernize the grid*
   Rhode Island can improve the everyday operation of its energy infrastructure by continuing the key investments that will repair, upgrade, and modernize the state's electric and gas distribution systems. On the electric side, the state should develop recommendations for electric grid, rate, and regulatory modernization to enable a "utility of the future" distribution planning model. The utility of the future will be able to fully incorporate and take advantage of customer-sited energy efficiency, demand response, distributed generation, storage, and other clean energy resources, as system assets. The goal of this shift should be to produce greater net benefits for consumers, to improve system reliability, and to reduce environmental impacts.

3. *Address natural gas leaks*
   Fugitive natural gas leaks in the gas distribution system represent safety and reliability risks to communities, an unaccounted-for cost to consumers, and a major environmental issue. In Rhode Island, gas distribution system leaks represent the seventh largest source of greenhouse gas emissions in the state, as of 2012. To address the issue, National Grid has developed an aggressive

multi-year natural gas distribution system investment plan. The state should continue supporting National Grid's annual investments in gas distribution upgrades and leak repair.

Mobilize Capital and Reduce Costs

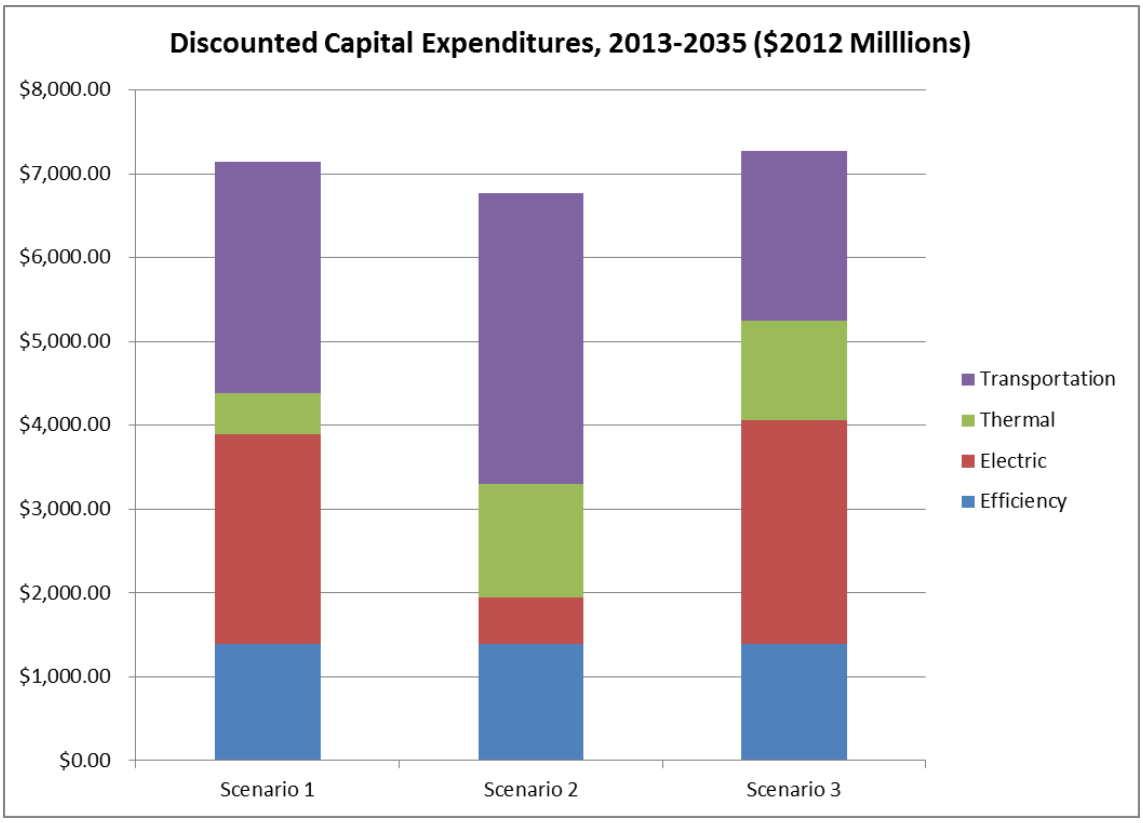
Rhode Island's economic health depends on affordable and manageable energy costs. Today, however, Rhode Islanders face high and burdensome energy costs on the order of approximately $3.6 billion each year. To reduce energy costs over the long run, Rhode Island needs energy policies designed around a long-term vision, rather than repeated short-term investment decisions. The Plan recognizes that achieving a least-cost energy future depends on a proper accounting of the lifetime net costs and benefits of energy procurement in all sectors. Rhode Island should make informed, yet bold, strategic investments, while continuing a tradition of prudently ramping up programs—prioritizing investments with the highest cost-effectiveness, and building on programs with demonstrated and proven success.

The Plan's scenario modeling revealed a major finding about Rhode Island's energy costs: Rhode Island's current business-as-usual path is the most expensive course of action the State can take. Furthermore, the State can achieve viable lower-cost alternative energy futures and generate substantial economic benefits—over $8 billion (net present value). To attain these cost savings and economic benefits, Rhode Island must make a long-term commitment to shift the state to a more energy-efficient economy supplied by a portfolio of cleaner, lower-lifecycle-cost energy resources in all energy use sectors.

Energy 2035 recommends three strategies that will enable Rhode Island to mobilize capital and reduce costs:

1. *Expand financing and investment tools*

   The Plan's scenario modeling estimates that this transition might require approximately $7 billion (net present value) in capital investment over the life of the Plan's horizon (Figure 41). This level of investment suggests that Rhode Island will need to supplement its public investments in energy efficiency and renewable energy with new, innovative sources of private capital and financing. Rhode Island should carefully evaluate how an expanded marketplace for clean energy financing—in the electric, thermal, and transportation sectors—could help the state achieve the levels of investment needed to achieve the aggressive Plan performance measure targets for fuel diversification, economic net benefits, and greenhouse gas reduction.



Source: Navigant scenario modeling

Figure 41. Total capital investment needed to meet energy use sector goals.

2. *Reduce the soft costs of renewable energy*

   As the costs of many renewable energy technologies have fallen precipitously in recent years, the non-hardware "soft" costs associated with siting, permitting, zoning, and interconnection now comprise an increasing portion of project costs. Rhode Island should reduce these costs by addressing key regulatory barriers, establishing uniform standards, and advancing streamlined permitting processes wherever possible. By providing the private sector with a simplified environment for doing business, the state will help developers of renewable energy offer products to consumers at a lower cost.

3. *Address high and volatile regional energy costs*

   Rhode Island should continue its leadership in regional efforts to address high and volatile energy costs in New England. In recent years, growing demand for natural gas in the power generation and thermal sectors have placed increasing pressures on the region's limited interstate gas pipeline infrastructure. These constraints have led to significant wholesale energy price spikes and instability; increased use of peaking oil power plants, which have higher greenhouse gas emission profiles than gas generators; and substantial reliability concerns. To ameliorate the regional electricity and gas constraints and attendant soaring costs, Rhode Island should coordinate with other states to explore the range of available solutions—from local, customer-sited resources such as energy efficiency, demand response, renewable energy, combined heat and power, and storage, to infrastructure investments in the region's electric and natural gas transmission systems.

REDUCE GREENHOUSE GAS EMISSIONS

As a coastal state, Rhode Island is already experiencing the impacts of a changing climate. By fully committing to long-term, aggressive reduction goals for greenhouse gas emissions, Rhode Island will contribute its part in the global effort to address the main causes of climate change. Reducing emissions, however, is also a prudent policy for long-term risk mitigation and economic growth. Lowering Rhode Island's carbon footprint will wean the state off of dependence on volatilely-priced fossil fuels, keep more of our energy dollars in the state and region, insulate citizens and businesses from the effects of a future price on carbon, and help develop the local clean energy industries and businesses of the future.

Many of the strategies outlined in the Plan will assist in achieving the performance measure target of 45 percent reductions in greenhouse gas emissions, below 1990 levels. The recommended strategies decrease the state's reliance on greenhouse gas-emitting fossil resources by stimulating markets for energy efficiency, renewable energy, and clean fuels. In addition to pursing these other strategies, Rhode Island should build on important executive and legislative steps already taken by the state to address climate change.

Energy 2035 recommends two strategies that will enable Rhode Island to reduce greenhouse gas emissions:

1. *Continue participating in RGGI*
   Rhode Island should continue its participation in the Regional Greenhouse Gas Initiative (RGGI), the nation's first market-based cap-and-trade program designed to reduce electric power sector emissions. Participating states invest the auction proceeds in energy efficiency and clean energy programs that deliver economic benefits to consumers throughout the region. Ongoing involvement in RGGI will drive down regional power sector greenhouse gas emissions, generate net economic benefits to Rhode Island and the region, and help position the participating states as leaders in national efforts to limit carbon emissions.

2. *Develop a carbon reduction strategy*
   The passage of the 2014 Resilient Rhode Island Act helped institutionalize GHG reduction commitments made through the New England Governors / Eastern Canadian Premiers and 2002 Rhode Island Greenhouse Gas Process by setting statutory goals for GHG reductions. Codified near- and long-term greenhouse gas emission reduction goals bring a much-needed comprehensive view to the state's policies on energy efficiency, renewable energy, and alternative thermal and transportation fuels. Policy makers should develop plans to achieve the GHG emissions reduction goals set in the statute using strong data analysis, coordinated input from key stakeholders and state decision makers, and strategic harmonization with ongoing and new implementation efforts.

LEAD BY EXAMPLE

State and local governments each have a key role to play in helping Rhode Island achieve its energy goals. Government can lead by example through strategic investments in energy efficiency, renewable energy, and alternative transportation. Such measures can present cost-effective opportunities to reduce public sector energy consumption and generate cost savings that provide relief for constrained budgets and the taxpayers who support them.

In addition to direct public investments, governments can also enable private investment in Rhode Island's clean energy economy by establishing favorable regulatory environments for businesses to offer energy efficiency and renewable energy products and services to consumers. Such efforts might involve streamlining or simplifying licensing, permitting, zoning, and taxation requirements, and otherwise mitigating regulatory barriers to implementing clean energy solutions.

Another key aspect of leading by example is public education on energy issues. State government has a role to help promote public education on energy issues. Although current resources are limited to offer formal programs, the State does provide educational material through the information presented in this Plan and on OER's website.

Rhode Island law requires that every municipality must adopt a comprehensive community plan that is consistent with the State Guide Plan, including goals established in Energy 2035. To meet the Plan's energy goals and performance measure targets, Rhode Island cities and towns could consider a mix of implementation actions across municipal energy sectors that are tailored to local needs and are best suited for their community. A sampling of such opportunities and potential implementation actions is presented in Table 4. Although these implementation actions are not mandatory, municipalities are encouraged to pursue these opportunities as part of their comprehensive plans. For example, municipalities are not required to support the siting of renewables in specific locations, but are encouraged to adopt local siting standards that best fit their municipal energy needs, resources, and capacities. For additional guidance or assistance on developing energy implementation actions for comprehensive plans, municipal officials can reach out to OER or the Division of Planning, as well as consult the DOP's guidance handbooks that provide information on the preparation and adoption of comprehensive plans.

Municipalities commonly face a variety of barriers to leading by example. Such barriers typically include limited access to staff capacity, technical expertise, and funding resources. To address these barriers, OER performs regular outreach to municipalities to offer technical assistance on energy issues. OER convenes a regular working group for municipal planners and officials to learn about statewide energy programs and policies, as well as provide feedback to state officials on municipal issues of importance related to energy. The working group allows OER to promote the awareness of currently available funding and technical assistance opportunities for cities and towns; solicit input as OER develops new programs and guidance materials for municipalities; and share information about best practices related to the implementation of clean energy projects and programs throughout Rhode Island.

Table 4. Potential municipal energy implementation actions for comprehensive community plans

Municipal Energy Sectors	Sample Implementation Actions
Energy Efficiency and Buildings	Conduct a municipal energy use baseline and develop a plan to reduce public sector energy consumption
	Seek Property Assessed Clean Energy (PACE) designation for the community

Municipal Energy Sectors	Sample Implementation Actions
Renewable Energy	Adopt zoning and siting standards for renewable energy projects
	Use an expedited application and permit process for renewable energy facilities
Transportation and Land Use	Replace end-of-life municipal-owned vehicles with high fuel efficiency and/or electric vehicles
	Adopt zoning and land use policies that preserve open space and promote compact growth

Energy 2035 recommends six strategies that will enable Rhode Island to lead by example:

1. *Conduct a municipal energy use baseline and develop a plan to reduce public sector energy consumption*
   Municipalities can achieve significant cost savings by identifying and implementing energy efficiency projects in public buildings and facilities. To identify opportunities for energy savings, a municipality starts by completing an analysis of the baseline energy consumption in its public facilities. The findings of the baseline analysis can be used to establish an energy reduction goal (e.g. 20% reduction in all municipal facilities by a certain year) and a plan to achieve that goal. Such plans typically outline the steps the community will take over the next few years to more thoroughly assess opportunities (usually through third party energy audits) and implement energy efficiency projects. Other plan components often include potential funding sources and financing mechanisms; an individual or team that will be responsible for driving the efforts; an energy policy that commits the community to prioritizing energy investments; and a protocol for continuing to monitor energy consumption and maintain equipment efficiency.

2. *Seek Property Assessed Clean Energy (PACE) designation for the community*
   Property Assessed Clean Energy (PACE) is a financing program that allows residential and commercial property owners to repay the costs of energy efficiency or renewable energy projects in conjunction with their property tax payments. PACE helps address the upfront costs of clean energy improvements, frequently cited as one of the primary barriers for homeowners or businesses who want to invest in energy efficiency or renewable energy. In Rhode Island, PACE is a voluntary program for cities and towns; therefore, municipalities must opt in to the program in order to participate.

3. *Adopt zoning and siting standards for renewable energy projects*
   Municipalities can develop siting standards and zoning that provide predictability for property owners and companies who want to develop renewable energy projects. Cities and towns can identify certain zoning districts as preferred areas for developing renewable energy. Furthermore, municipalities can adopt siting standards within such districts that regulate the placement of renewable energy systems. Such standards and zoning establish a framework for guiding the development of renewable energy projects toward locations that maximize benefits to local communities and reduce potential impacts on neighbors.

4. *Use an expedited application and permit process for renewable energy facilities*
   By using online permitting, municipalities can simplify the business of installing renewable energy systems and reduce transactional costs faced by renewable energy companies. Rhode Island's

Office of Management and Budget and Office of Digital Excellence are currently piloting an online permitting program for municipalities. As online permitting capability becomes move widely used by municipalities, cities and towns can take additional steps to streamline permitting processes for renewable energy systems installed in their respective jurisdictions. Potential actions may include developing standardized permits and fees, or other measures to reduce costs such as exempting renewable energy systems from property taxes.

5. *Replace end-of-life municipal-owned vehicles with high fuel efficiency and/or electric vehicles*
   Vehicles with high fuel economy—including electric vehicles—provide environmental benefits and reduce the need to spend limited public funds on fuel for state and municipal fleets. Cities and towns can consider adopting a policy of replacing end-of-life fleet vehicles with vehicles that meet certain fuel efficiency ratings.

6. *Adopt zoning and land use policies that preserve open space and promote compact growth*
   Municipalities can support efforts to reduce vehicle miles traveled (VMTs) by implementing land use policies that encourage sustainable development practices. Tools such as adopting zoning regulations that encourage compact growth and mixed use development can help. Several existing State Guide Plan Elements already provide goals and policies in this area including *Transportation 2035* and *Land Use 2025.* The 2015 challenge grant product from the Division of Planning and DEM, *Village Guidance: Tools and Techniques for Rhode Island Communities*, provides more detailed guidance for the implementation of compact growth and mixed use development.

TRACKING PROGRESS

This Plan's findings indicate that pursuing a suite of "all of the above" clean energy policies and strategies can set Rhode Island on track for meeting ambitious energy security, cost, and sustainability goals and performance measure targets, generating substantial energy, economic, and environmental benefits for the Ocean State. To ensure that Rhode Island achieves the Energy 2035 Vision, the State must carefully monitor implementation of Plan policies and strategies, and track progress toward goals.

A structure for tracking progress is already built into Rhode Island's statutory requirements for regular review and update of the State Energy Plan. Rhode Island General Law § 42-140-3 requires the Office of Energy Resources to assist the State Planning Council and the Division of Planning in developing, maintaining, and implementing State Guide Plan elements pertaining to energy and renewable energy.[36] The law requires that the Energy Element of the SGP be reviewed and amended, if necessary, every five years. Revisiting the Plan periodically will keep all information, analysis, and recommendations up to date and relevant for policy making.

Tracking progress toward achieving the Energy 2035 Vision, however, should also occur on a more frequent basis than during Plan updates. A yearly status report should be institutionalized through the Office of Energy Resources' existing statutory requirement to submit an Annual Report to the Governor and General Assembly. The OER Annual Report should contain information on (1) progress toward implementing each of the 20 recommended strategies; and (2) progress toward achieving the Plan goals and performance measure targets. Ongoing performance evaluation will highlight areas in which Rhode Island is on pace to achieve the Energy 2035 Vision, and areas in which additional resources must be dedicated in order to stay on track.

Table 5 displays an implementation matrix illustrating the relationship of the proposed policies and strategies to the vision, themes, goals, themes, and sectors discussed throughout this Plan. The matrix provides a framework that outlines statewide energy issues and the strategies for addressing those issues. For each strategy, the matrix identifies the corresponding theme, lead actor, timeframe, strategy type, and applicable sector.

[36] http://webserver.rilin.state.ri.us/Statutes/TITLE42/42-140/42-140-3.HTM

Table 5. Energy 2035 Implementation Matrix

Vision
In 2035, Rhode Island will provide energy services across all sectors—electricity, thermal, and transportation—using a secure, cost-effective, and sustainable energy system.

Theme	Goals	
Security	1. **ADEQUACY.** Plan to meet overall energy supply needs	3. **RELIABILITY.** Increase the system's ability to withstand disturbances
	2. **SAFETY.** Increase the safety of energy conversion and use	4. **RESILIENCY.** Increase the system's ability to rebound from disturbances
Cost-Effectiveness	5. **AFFORDABILITY.** Lower overall energy bills	7. **ECONOMIC GROWTH.** Grow and maintain a healthy state economy
	6. **STABILITY.** Reduce the impacts of energy price volatility on consumers	8. **EMPLOYMENT.** Increase employment
Sustainability	9. **CLIMATE.** Reduce greenhouse gas emissions from energy consumption	11. **WATER USE & QUALITY.** Reduce the water impacts of energy consumption
	10. **AIR QUALITY.** Reduce criteria pollution from energy consumption	12. **LAND & HABITAT.** Reduce the impacts of energy projects on ecosystems

Policy Area	Strategy	Theme			Lead	Timeframe	Type	Sector		
		Security	Cost-Effectiveness	Sustainability				Electricity	Thermal	Transportation
Energy Efficiency in all Sectors	1. Continue electric and natural gas Least-Cost Procurement	✓	✓	✓	EERMC	Near Term	Existing	✓	✓	
	2. Expand Least-Cost Procurement to unregulated fuels	✓	✓	✓	EERMC	Near Term	Expanded		✓	
	3. Reduce vehicle miles traveled	✓	✓	✓	EC4	Long Term	Expanded			✓
	4. Improve fuel efficiency and reduce vehicle emissions	✓	✓	✓	DEM	Long Term	Existing			✓
	5. Innovate with state energy efficiency codes and standards	✓	✓	✓	EERMC	Near & Long	Expanded	✓	✓	
	6. Improve combined heat and power market	✓	✓	✓	EERMC	Long Term	Expanded	✓	✓	
Local and Regional Renewable Energy	7. Expand the Renewable Energy Standard			✓	GA	Long Term	Expanded	✓		
	8. Expand renewable energy procurement	✓		✓	DG Board	Near & Long	Expanded	✓		
Alternative Thermal and Transportation Fuels	9. Mature the renewable thermal market	✓	✓	✓	OER	Near Term	New		✓	
	10. Expand use of biofuels	✓		✓	OER	Long Term	Expanded		✓	✓
	11. Promote alternative fuel and electric vehicles	✓	✓	✓	OER	Near Term	Expanded			✓
Strategic Investments in Energy Infrastructure	12. Enhance energy emergency preparedness	✓			OER	Near Term	New	✓	✓	✓
	13. Modernize the grid	✓	✓	✓	EERMC	Near Term	New	✓		
	14. Address natural gas leaks	✓	✓	✓	DPUC	Near Term	Expanded		✓	
Capital Mobilization and Cost Reductions	15. Expand financing and investment tools		✓		OER	Near Term	Expanded	✓	✓	✓
	16. Reduce the soft costs of renewable energy		✓		OER	Near Term	Expanded	✓	✓	
	17. Address high and volatile regional energy costs	✓	✓	✓	OER	Near & Long	New	✓	✓	
Greenhouse Gas Emission Reductions	18. Continue participating in RGGI		✓	✓	DEM	Long Term	Existing	✓		
	19. Develop a carbon reduction strategy			✓	EC4	Long Term	New	✓	✓	✓
Lead by Example	20. Lead by example	✓	✓	✓	OER	Near Term	Expanded	✓	✓	✓
	A. Conduct an energy use baseline and develop a reduction plan	✓	✓	✓	Muni	Near Term	New	✓	✓	
	B. Seek Property Assessed Clean Energy (PACE) designation	✓	✓	✓	Muni	Near Term	Expanded	✓	✓	
	D. Adopt renewable energy zoning and siting standards	✓	✓	✓	Muni	Near Term	Existing	✓		
	E. Use expedited application and permitting processes	✓	✓	✓	Muni	Near Term	New	✓		
	F. Purchase high fuel efficiency and/or electric vehicles	✓	✓	✓	Muni	Near Term	New			✓
	G. Adopt zoning and land use policies that promote compact growth	✓	✓	✓	Muni	Near Term	New			✓

GLOSSARY

BIOMASS: Organic matter derived from sources such as plants, residue from agriculture and forestry, and the organic component of municipal and industrial wastes.

BRITISH THERMAL UNIT (BTU): A standard unit for measuring quantities of heat energy. One BTU equals the heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit at sea level. One MMBTU equals 1,000,000 BTUs.

COMBINED HEAT AND POWER (CHP): Combined heat and power (CHP), also called co-generation, refers to systems that generate both electricity and useful heat

DISTRIBUTION: Electric power distribution is the delivery of electric power from the electric transmission system to individual consumers.

ELECTRICITY: Rhode Island's electricity sector comprises end use electrical consumption such as lighting, air conditioning, appliances, and space and water heating.

ENERGY EFFICIENCY: Using less energy to provide the same service. Energy efficient technologies include higher efficiency lighting, HVAC systems, and appliances; insulation; and air-sealing.

FOSSIL FUELS: Combustible geologic deposits of organic materials, formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils.

GENERATION: Electricity generation, or power generation, is the process of generating electric power from other sources of primary energy, such as fossil fuels or renewable sources of energy.

GREENHOUSE GASES: Gases that trap heat in the atmosphere, such as carbon dioxide, methane, and nitrous oxide.

HYDROPOWER: A renewable source of energy, where power is derived from the energy of falling or running water.

KILOWATT (kW): A unit of electric power equal to 1,000 watts, or to energy consumption at the rate of 1,000 joules per second. One megawatt (MW) equals 1,000 kW.

KILOWATT-HOUR (kWh): A unit of electric energy equivalent to one kilowatt of power expended for one hour. One megawatt-hour (MWh) equals 1,000 kWh.

NATURAL GAS: A hydrocarbon gas mixture consisting primarily of methane.

PETROLEUM: A liquid mixture of hydrocarbons that can be extracted and refined to produce fuels including motor gasoline, diesel fuel, and heating oil.

RENEWABLE ENERGY: Energy that comes from resources which are naturally replenished on a human timescale such as sunlight, wind, rain, tides, waves and geothermal heat.

SOLAR: Solar photovoltaics (PV) is a method of converting renewable solar energy into direct current electricity using semiconducting materials. Solar energy can also be used in solar thermal applications for domestic hot water use.

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

TRANSMISSION: Electric power transmission is the bulk transfer of electrical energy at high voltages from power generating facilities to local electric distribution networks.

TRANSPORTATION: Rhode Island's transportation sector comprises energy used to move goods and people throughout the state.

WIND: A renewable source of energy, where wind turbines convert the kinetic energy from the wind into electrical power.

APPENDIX A: RHODE ISLAND ENERGY LAWS

Rhode Island public policy plays a direct role in shaping the markets, institutions, and regulatory regimes that affect energy use in the state. In recent years, state policy makers have pursued an increasingly proactive agenda on energy public policy. This evolving response has largely been prompted by changes in energy markets, as well as a growing recognition of the need for state and regional responses to energy security, cost, and environmental concerns.

Perhaps the single most defining change in state energy policy in recent history occurred during the 1990s, when Rhode Island joined four other New England states in restructuring the electric distribution companies operating in their respective jurisdictions.[37, 38] The Rhode Island Utility Restructuring Act of 1996 required utilities to sell off their generating assets, opening up the wholesale electric market to non-regulated power producers. Restructuring also introduced retail choice, effectively unbundling the energy supply and electric distribution functions of utilities like Narragansett Electric (National Grid's predecessor company). Under the restructured system, customers can remain under a default "standard offer" or "last resort" electric service provided by the electric distribution company or select a competitive supplier for electric service. In both instances, customers continue to receive distribution service from the electric distribution company.

During the two decades following restructuring, Rhode Island enacted subsequent major energy legislation addressing key areas of energy policy, primarily energy efficiency and renewable energy. Policy making has dominantly addressed the electric sector, with only secondary consideration to date on the thermal and transportation sectors. This appendix provides detailed summaries of a selection of policies representing the most significant energy legislation passed in Rhode Island since restructuring (Table **6**). Policies are ordered according to the year of enactment.

[37] http://www.ripuc.org/utilityinfo/electric/96H8124b.html
[38] http://www.ripuc.ri.gov/utilityinfo/electric/ura1996summ.html

Table 6. Major energy laws in Rhode Island

Statute Name	RI General Law	Year Established	Purpose
Renewable Energy Standard	39-26	2004	Requires state retail electricity providers to supply 16 percent of retail electricity sales from eligible renewable energy resources by 2019
Least-Cost Procurement	39-1-27.7	2006	Requires state utility providers to invest in all cost-effective energy efficiency before the acquisition of additional supply
Implementation of the Regional Greenhouse Gas Initiative Act	23-82	2007	Authorizes Rhode Island's participation in RGGI, the regional electric power sector carbon dioxide emissions cap-and-trade program
Long-Term Contracting Standard for Renewable Energy	39-26.1	2009	Requires electric distribution utilities to enter into long-term contracts for a minimum of 90 MW of newly developed renewable energy resources by December 31, 2014
Revenue Decoupling	39-1-27.1	2010	Established a new cost recovery mechanism for utility distribution system investments
Distributed Generation Standard Contracts Program	39-26.2	2011	Requires electric distribution utilities to enter into long-term contracts for 40 MW of newly developed renewable energy resources located in the electric distribution utility's load zone by December 30, 2014
Net Metering	39-26.4	2011	Establishes net metering for self-generator-sited renewable energy
LIHEAP Enhancement Plan	39-1-27.12	2011	Authorizes supplemental funding assistance for low-income energy customers in Rhode Island
Petroleum Savings and Independence Advisory Commission	42-140.4	2012	Created the Commission to make recommendations on how to reduce petroleum-based fuel consumption in Rhode Island
Biodiesel Heating Oil Act of 2013	23-23.7	2013	Requires all No. 2 distillate heating oil sold in the state to contain 5 percent of a bio-based product by 2017
Renewable Energy Growth Program	39-26.6	2014	Expands the Distributed Generation Standard Contracts Program by establishing a new tariff-based system designed to finance an additional 160 MW of renewable energy resources located in the electric distribution utility's load zone between 2014 and 2019
Affordable Clean Energy Security Act	39-31	2014	Establishes a coordinated process for Rhode Island to work with other New England states to make potential investments in large-scale hydropower, regional renewable energy resources, natural gas and infrastructure upgrades

Renewable Energy Standard

STATUTE & YEAR ENACTED	PURPOSE
• **Renewable Energy Standard** • R.I.G.L. § 39-26 • Enacted 2004	• Requires state retail electricity providers to supply 16 percent of retail electricity sales from eligible renewable energy resources by 2019

In 2004, the Rhode Island General Assembly enacted a Renewable Energy Standard (RES).[39] Now Rhode Island General Law § 39-26, the RES sets a statewide target of 16 percent renewable energy by 2019. Electric distribution companies and non-regulated power producers comply with the mandate by supplying an increasing percentage of their retail electric sales from renewable energy resources. Eligible renewable energy resources include solar, wind, wave, geothermal, small hydropower, biomass, and fuel cells.

RES compliance does not involve the physical procurement of power produced by renewable energy facilities. Instead, electricity providers meet the requirements of the RES mandate by purchasing renewable energy certificates (RECs), which represent 1 MWh of renewable energy generated and delivered to the electric grid. RES compliance can also be demonstrated by making alternative compliance payments (ACPs) to the Rhode Island Commerce Corporation (Commerce RI). The ACP functions as a price ceiling, allowing electricity providers to comply with the RES mandate if REC shortages occur. Commerce RI uses ACP payments to supplement the Renewable Energy Fund (REF), which supports the development of new renewable energy projects. In turn, these projects generate RECs, theoretically helping to ameliorate tightening of the REC market.

Least-Cost Procurement

STATUTE & YEAR ENACTED	PURPOSE
• **Least-Cost Procurement** • R.I.G.L. § 39-1-27.7 • Enacted 2006	• Requires state utility providers to invest in all cost-effective energy efficiency before the acquisition of additional supply

In 2006, the Rhode Island General Assembly passed legislation that established the Comprehensive Energy Conservation, Efficiency and Affordability Act.[40] The Act created a groundbreaking mandate termed "Least-Cost Procurement"[41]— a policy that requires Rhode Island electric and natural gas[42] distribution companies to invest in all cost-effective energy efficiency before the acquisition of additional supply. This strategy is "least-cost" because energy-saving measures—such as higher-efficiency lighting, HVAC systems, and appliances; insulation; air sealing—cost approximately 4 cents per kWh over their lifetime while electric supply costs between 8 cents and 12 cents per kWh.[43]

[39] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-26/INDEX.HTM
[40] http://www.ripuc.org/eventsactions/docket/3759-RIAct.pdf
[41] http://webserver.rilin.state.ri.us/Statutes/title39/39-1/39-1-27.7.HTM
[42] In 2010, Least-Cost Procurement was expanded to include natural gas.
[43] http://www.rieermc.ri.gov/documents/annual/3_EERMC_April%202013.pdf

Prior to Least-Cost Procurement, Rhode Island electric distribution companies did implement demand-side management programs. The cost of the programs was recovered through a System Benefits Charge (SBC) levied on the distribution service portion of customer utility bills. The SBCs, however, were set at a fixed rate of 0.2 cents / kWh,[44] limiting program funding to far below the amount needed to procure all cost-effective energy efficiency (as of 2013, the SBC was 0.906 cents / kWh).[45] In contrast, under Least-Cost Procurement, National Grid sizes yearly program budgets to meet ambitious annual targets for electricity and natural gas savings, which are based on a detailed analysis of the amount of available cost-effective energy efficiency. To achieve the targets, National Grid creates and implements annual "energy efficiency procurement plans,"[46] working under the oversight and expert guidance of a consumer stakeholder committee, the Energy Efficiency and Resource Management Council (EERMC).[47] The plans are composed of a portfolio of energy efficiency programs targeting different market sectors of energy consumers: residential, income-eligible, and commercial / industrial. The plans also contain an important component addressing system reliability, which considers the potential of "non-wires alternatives"—energy efficiency, demand response, distributed generation, and other innovative methods—to curtail electric load in constrained areas of the distribution network.[48]

Regional Greenhouse Gas Initiative

STATUTE & YEAR ENACTED	PURPOSE
• **Implementation of the Regional Greenhouse Gas Initiative Act** • R.I.G.L. § 23-82 • Enacted 2007	• Authorizes Rhode Island's participation in RGGI, the regional electric power sector carbon dioxide emissions cap-and -trade program

In 2007, the Rhode Island General Assembly passed legislation enabling state participation in the Regional Greenhouse Gas Initiative (RGGI). RGGI is the first market-based cap-and-trade program in the United States designed to reduce electric power sector greenhouse gas emissions. Nine states currently participate in the effort: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The program, which began in 2009, establishes a declining regional emissions cap and requires electric generators greater than 25 MW to purchase emissions allowances through quarterly auctions. Participating states invest the auction proceeds in energy efficiency and clean energy programs that deliver economic benefits to consumers throughout the region.

[44] http://www.synapse-energy.com/Downloads/SynapseReport.2007-05.Raab.Least-Cost-Elec-Procurement-in-RI.07-012.pdf
[45] http://www.nationalgridus.com/narragansett/non_html/rates_tariff.pdf
[46] http://www.ripuc.org/eventsactions/docket/4366-NGrid-2013EEPP(11-2-12).pdf
[47] http://webserver.rilin.state.ri.us/Statutes/TITLE42/42-140.1/INDEX.HTM
[48] http://www.ripuc.org/eventsactions/docket/4367-NGrid-SRP-2013Plan(11-2-12).pdf

Long-Term Contracting Standard for Renewable Energy

STATUTE & YEAR ENACTED	PURPOSE
• **Long-Term Contracting Standard for Renewable Energy** • R.I.G.L. § 39-26.1 • Enacted 2009	• Requires electric distribution utilities to enter into long-term contracts for a minimum of 90 MW of newly developed renewable energy resources by December 31, 2014

Enacted in 2009, the Long-Term Contracting Standard for Renewable Energy (LTC) requires electric distribution companies to annually solicit proposals from renewable energy developers and to enter into long-term contracts with terms of up to 15 years for a total of 90 MW of renewable capacity by December 2014.[49] The Long-Term Contracting Standard also provides for power purchase agreements specifically for an offshore wind demonstration project at Block Island and a utility scale offshore wind project in federal waters.

Whereas the RES requires electricity providers to purchase only RECs, the LTC requires the electric distribution company to purchase a bundled commodity of capacity, energy, and attributes. The 90 MW requirement is "adjusted by capacity factor," meaning that a 10 MW facility with a 30 percent capacity factor would be counted as providing 3 MW to the minimum LTC capacity obligation.

Revenue Decoupling

STATUTE & YEAR ENACTED	PURPOSE
• **Revenue Decoupling** • R.I.G.L. § 39-1-27.1 • Enacted 2010	• Established a new cost recovery mechanism for utility distribution system investments

Revenue Decoupling was enacted in 2010, and removed a major barrier to utility investment in all cost-effective energy efficiency by breaking the link between utility profits and sales volume.[50] Decoupling changed the way utilities in Rhode Island recover the fixed costs of maintaining the electric and gas distribution systems. Before decoupling, utilities collected distribution charges on a per kWh or BTU basis, which meant that customer investments in energy efficiency reduced utility revenue. Decoupling resolved this discrepancy by tying the size of the distribution charge to the actual costs of maintaining the distribution system (the utility's revenue requirement), rather than the amount of energy sold. The utility must justify these costs in a rate proceeding before the Rhode Island Public Utilities Commission. If the utility over-collects, customers receive a credit on their bills; if the utility under-collects, customers pay a surcharge.

[49] http://webserver.rilin.state.ri.us/Statutes/title39/39-26.1/INDEX.HTM
[50] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-1/39-1-27.7.1.HTM

Distributed Generation Standard Contracts Program

STATUTE & YEAR ENACTED	PURPOSE
• **Distributed Generation Standard Contracts Program** • R.I.G.L. § 39-26.2 • Enacted 2011	• Requires electric distribution utilities to enter into long-term contracts for 40 MW of newly developed renewable energy resources located in the electric distribution utility's load zone, by December 30, 2014

The Distributed Generation (DG) Standard Contracts Program supports the development of new, locally-based renewable energy projects. Enacted in 2011, the program requires electric distribution companies to enter into long-term contracts at a fixed price (with terms of up to 20 years) for 40 MW of newly developed distributed generation projects in the Rhode Island load zone by December 30, 2014. The 40 MW DG program is "carved-out" of the 90 MW LTC capacity obligation (see the summary above on the Long-Term Contracting Standard for Renewable Energy). Although the LTC obligation is "adjusted by capacity factor," the DG program is not. Therefore, a 10 MW facility with a 30 percent capacity factor would be counted as providing 10 MW to the minimum DG capacity obligation. As with the LTC projects, the electric distribution company is required to purchase capacity, energy, and attributes, not simply RECs. Unlike the LTC projects, DG projects must be interconnected to the Rhode Island distribution system, so that contracted resources physically meet Rhode Island loads through direct delivery to the Rhode Island distribution system. The DG program created a simple, standard contract for project developers to obviate the need for negotiating complex contracts with the utility. The Distributed Generation Standard Contracts Board sets annual ceiling prices for categories of different renewable energy technologies.

Net Metering

STATUTE & YEAR ENACTED	PURPOSE
• **Net Metering** • R.I.G.L. § 39-26.4 • Enacted 2011	• Establishes net metering for self-generator-sited renewable energy

Net metering requires electric distribution companies to credit power produced by small renewable energy systems (under 5 MW) installed behind a customer meter.[51] Eligible systems must be sized to meet on-site loads, based on a three-year average of electricity consumption at the property. Customers receive credit at the electric distribution company's avoided cost rate for excess generation produced by a net-metered system, up to 125 percent of the customer's own consumption during a billing period. To participate in net metering, a renewable energy system must be sited on the customer's premises, with certain exceptions for public sector and farm projects. Net metering was enacted in 2011; the state limit on net metering, formerly 3 percent of the electric distribution company's historical peak load (1,932 MW as of 2013), was removed in 2014.[52]

LIHEAP Enhancement Plan

[51] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-26.4/INDEX.HTM
[52] https://www.nationalgridus.com/narragansett/business/energyeff/4_net-mtr.asp

STATUTE & YEAR ENACTED	PURPOSE
• **LIHEAP Enhancement Plan** • R.I.G.L. § 39-1-27.12 • Enacted 2011	• Authorizes supplemental funding assistance for low-income energy customers in Rhode Island

In 2011, the Rhode Island General Assembly passed the Henry Shelton Act, which established a Low Income Home Energy Assistance Program Enhancement Plan (LIHEAP Enhancement Plan).[53] The LIHEAP Enhancement Plan created a funding stream to supplement federal LIHEAP funding, which provides short-term assistance to low-income households to address home heating and cooling costs. The Act authorizes an annual LIHEAP Enhancement Charge on all electric and natural gas customer bills, intended to generate a total of between $6.5 and $7.5 million per year for additional direct rate relief to customers already receiving federal LIHEAP assistance payments.

Petroleum Savings and Independence Advisory Commission

STATUTE & YEAR ENACTED	PURPOSE
• **Petroleum Savings and Independence Advisory Commission** • R.I.G.L. § 42-140.4 • Enacted 2012	• Created the Commission to make recommendations on how to reduce petroleum-based fuel consumption in Rhode Island

Established in 2012, the Petroleum Savings and Independence Advisory Commission was charged with making recommendations on how to reduce petroleum-based fuel consumption in Rhode Island. The Commission must consider targets for reducing petroleum consumption of 30 percent below 2007 levels by 2030, and 50 percent below 2007 levels by 2050.

Biodiesel Heating Oil Act of 2013

STATUTE & YEAR ENACTED	PURPOSE
• **Biodiesel Heating Oil Act of 2013** • R.I.G.L. § 23-23.7 • Enacted 2013	• Requires all No. 2 distillate heating oil sold in the state to contain 5 percent of a bio-based product by 2017

To promote the production and use of biofuels in the state, the Rhode Island General Assembly passed the Biodiesel Heating Oil Act of 2013.[54] The Act sets a compliance schedule ramping up to a 5 percent biofuel blend minimum standard for all heating oil sold in the state by July 1, 2017.

[53] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-1/39-1-27.12.HTM
[54] http://webserver.rilin.state.ri.us/Statutes/TITLE23/23-23.7/INDEX.HTM

Renewable Energy Growth Program

STATUTE & YEAR ENACTED	PURPOSE
• **Renewable Energy Growth Program** • R.I.G.L. § 39-26.6 • Enacted 2014	• Expands the Distributed Generation Standard Contracts Program by establishing a new tariff-based system designed to finance an additional 160 MW of renewable energy resources located in the electric distribution utility's load zone between 2014 and 2019

Enacted in 2014, the Renewable Energy Growth Program (REG) expanded the successful 40 MW DG Program by an additional 160 MW, for a total of 200 MW of local renewable energy projects in Rhode Island by 2019. The REG Program replaced the contract-based DG Program with a new system of performance-based incentives set in tariffs filed at and approved by the Public Utilities Commission. The REG Program also extended the ability for small-scale solar projects to participate in the program.

Affordable Clean Energy Security Act

STATUTE & YEAR ENACTED	PURPOSE
• **Affordable Clean Energy Security Act** • R.I.G.L. § 39-31 • Enacted 2014	• Establishes a coordinated process for Rhode Island to work with other New England states to make potential investments in large-scale hydropower, regional renewable energy resources, natural gas and infrastructure upgrades

The 2014 Affordable Clean Energy Security Act establishes a framework for the Public Utilities Commission, Division of Public Utilities and Carriers, and the Office of Energy Resources to work with the state's electric and gas distribution companies and other New England states to make strategic investments in upgrades for large-scale hydropower, regional renewable energy resources, natural gas, and infrastructure.

APPENDIX B: A PORTFOLIO OF STRATEGIES

Policy Area	Strategy	Estimated Need / Impact by 2035	Legislation Required?	Lead
Energy Efficiency in all Sectors	**1. Continue electric and natural gas Least-Cost Procurement**	~20% reductions in electricity and thermal energy use	Yes	EERMC
	2. Expand Least-Cost Procurement to unregulated fuels	15-25% reductions in thermal energy use	TBD	EERMC
	3. Reduce vehicle miles traveled	~40% reductions in transportation energy use, including ≥ 5% VMT reductions, ≥ doubling of public transit ridership, and 12% reductions in transportation GHGs	TBD	EC4
	4. Improve fuel efficiency and reduce vehicle emissions		No	DEM
	5. Innovate with state energy efficiency codes and standards	N/A	Yes	EERMC
	6. Improve combined heat and power market	Total of 400 MW	TBD	EERMC
Local and Regional Renewable Energy	**7. Expand the Renewable Energy Standard**	≥ 40% Renewable Energy Standard	Yes	General Assembly
	8. Expand renewable energy procurement	500 MW distributed generation (including offshore wind); 1,200 MW of imported hydropower	Yes	DG Board
Alternative Thermal and Transportation Fuels	**9. Mature the renewable thermal market**	15% of the state's thermal energy needs are met by renewable energy	TBD	OER
	10. Expand use of biofuels	≥ B20 standard	Yes	OER
	11. Promote alternative fuel and electric vehicles	25 - 40% of the vehicle market powered by alternative fuels	TBD	OER
Strategic Investments in Energy Infrastructure	**12. Enhance energy emergency preparedness**	N/A	TBD	OER
	13. Modernize the grid	N/A	TBD	EERMC
	14. Address natural gas leaks	N/A	TBD	DPUC
Capital Mobilization and Cost Reductions	**15. Expand financing and investment tools**	Total of ~$7 billion in investments (net present value)	TBD	OER
	16. Reduce the soft costs of renewable energy	N/A	No	OER
	17. Address high and volatile regional energy costs	N/A	No	OER
Greenhouse Gas Emission Reductions	**18. Continue participating in RGGI**	≤ 23% reductions in GHGs from electric energy use	No	DEM
	19. Develop a carbon reduction strategy	45% total GHG reductions	No	EC4
Lead by Example	**20. Lead by example**	N/A	TBD	OER

1. CONTINUE ELECTRIC AND NATURAL GAS LEAST-COST PROCUREMENT

Renew Rhode Island's commitment to leadership in energy efficiency by extending the Least-Cost Procurement mandate and its associated provisions to 2035

ESTIMATED IMPACT: ~20% REDUCTIONS IN ELECTRICITY AND THERMAL ENERGY USE

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

In 2006, the Rhode Island General Assembly passed legislation that established the Comprehensive Energy Conservation, Efficiency and Affordability Act.[55] The Act created a groundbreaking mandate termed "Least-Cost Procurement"[56]—a policy that requires Rhode Island electric and natural gas[57] distribution companies to invest in all cost-effective energy efficiency before the acquisition of additional supply. This strategy is "least-cost" because energy-saving measures—such as higher-efficiency lighting, HVAC systems, and appliances; insulation; air sealing;—cost approximately 4 cents per kWh over their product lifetime while electric supply currently costs between 8 and 12 cents per kWh.[58]

Prior to Least-Cost Procurement, Rhode Island electric distribution companies did implement demand-side management programs. The cost of the programs was recovered through a System Benefits Charge (SBC) levied on the distribution service portion of customer utility bills. The SBCs, however, were set at a fixed rate of 0.2 cents per kWh[59] limiting program funding to far below the amount needed to procure all cost-effective energy efficiency (as of 2013, the SBC was 0.906 cents per kWh).[60] In contrast, under Least-Cost Procurement, National Grid sizes yearly program budgets to meet ambitious annual targets for electricity and natural gas savings, which are based on a detailed analysis of the amount of available cost-effective energy efficiency. To achieve the targets, National Grid develops and implements annual "energy efficiency

[55] http://www.ripuc.org/eventsactions/docket/3759-RIAct.pdf
[56] http://webserver.rilin.state.ri.us/Statutes/title39/39-1/39-1-27.7.HTM
[57] In 2010, Least-Cost Procurement was expanded to include natural gas.
[58] http://www.rieermc.ri.gov/documents/annual/3_EERMC_April%202013.pdf
[59] http://www.synapse-energy.com/Downloads/SynapseReport.2007-05.Raab.Least-Cost-Elec-Procurement-in-RI.07-012.pdf
[60] http://www.nationalgridus.com/narragansett/non_html/rates_tariff.pdf

procurement plans,"[61] working under the oversight and expert guidance of a consumer stakeholder committee, the Energy Efficiency and Resource Management Council (EERMC).[62] The plans are composed of a portfolio of energy efficiency programs targeting different market sectors of energy consumers: residential, income-eligible, and commercial / industrial. The plans also contain an important component addressing system reliability, which considers the potential of "non-wires alternatives"—energy efficiency, demand response, distributed generation, and other innovative methods—to curtail electric load in constrained areas of the distribution network.[63] Under the Least-Cost Procurement mandate, the State currently invests over $100 million annually in energy efficiency programs that achieve electric savings that exceed 2.5 percent of load, and natural gas savings that exceed 1 percent of that fuel's load.[64]

Summary

Least-Cost Procurement is one of Rhode Island's cornerstone energy policies. The mandate ensures that energy procurement decisions maximize use of the lowest-risk, lowest-cost, and arguably most sustainable resource available for supplying energy needs: energy efficiency. Major legislative provisions supporting Least-Cost Procurement will sunset in 2018, including the development of System Reliability and Energy Efficiency Procurement Plans and collection of the electric and gas System Benefits Charge**. This strategy recommends renewing Rhode Island's commitment to leadership in energy efficiency by extending the Least-Cost Procurement mandate and its associated provisions to 2035.** Continuing the mandate to procure all cost-effective energy efficiency is perhaps the single most important step that state policy makers can take toward ensuring a secure, cost-effective, and sustainable energy future for Rhode Island.

Experience in Other States

In New England, Connecticut,[65] Maine,[66] Massachusetts,[67] and Vermont[68] all have similar policies to that in Rhode Island, mandating the procurement of all cost-effective energy efficiency. The American Council for an Energy-Efficient Economy (ACEEE) currently ranks five Northeast states—Massachusetts, New York, Connecticut, Rhode Island, and Vermont—among the top 10 energy-efficient states in the country.[69]

[61] http://www.ripuc.org/eventsactions/docket/4366-NGrid-2013EEPP(11-2-12).pdf
[62] http://webserver.rilin.state.ri.us/Statutes/TITLE42/42-140.1/INDEX.HTM
[63] http://www.ripuc.org/eventsactions/docket/4367-NGrid-SRP-2013Plan(11-2-12).pdf
[64] http://www.rieermc.ri.gov/documents/annual/4_EERMC_April%202014.pdf
[65] http://www.cga.ct.gov/2007/act/pa/2007pa-00242-r00hb-07432-pa.htm
[66] http://www.mainelegislature.org/legis/bills/bills_124th/billpdfs/HP103801.pdf
[67] https://malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25/Section21
[68] http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=30&Chapter=005&Section=00209
[69] http://aceee.org/energy-efficiency-sector/state-policy/aceee-state-scorecard-ranking

RATIONALE

Need

Energy efficiency is the single most cost-effective method for improving energy security and sustainability. The Least-Cost Procurement model maximizes economic and environmental benefits to consumers and the broader economy by ensuring that cheap energy efficiency measures are used before more expensive energy supply. Without a strategy to procure all cost-effective energy efficiency available, Rhode Island limits the access of all electric and gas customers to the lowest-cost energy source available.

> Continuing the mandate to procure all cost-effective energy efficiency is perhaps the single most important step that state policy makers can take.

Alignment with Performance Measure Targets and Modeling

For all the scenarios, Navigant modeled changes incremental to the ENE Business-As-Usual Forecast, which assumed a continuation of Least-Cost Procurement through 2035. The impact of this assumption cannot be overstated: With an extension of the mandate, the models project BAU energy reductions of approximately 21 percent in the electric sector and 19 percent in the thermal sector between 2013 and 2035. These savings represent a significant component of the energy security, cost, and sustainability benefits modeled in each scenario. Because these scenarios formed the basis for setting the Energy 2035 performance measure targets, none of the performance measure targets proposed in this Plan will be attainable unless the state extends Least-Cost Procurement.

IMPLEMENTATION

Legal Authority

Rhode Island Public Law Chapters 236[70] and 237[71] originally set forth Least-Cost Procurement. Key chapters of Rhode Island General Law include § 39-1-27.7 (System Reliability and Least-Cost Procurement), § 39-1-27.8 (Supply Procurement Portfolio), and § 39-2-1.2 (Utility Base Rate – Advertising, Demand-Side Management and Renewables).

Lead and Supporting Actors

LEAD	SUPPORTING
Energy Efficiency and Resource Management Council	• General Assembly • Office of Energy Resources • Public Utilities Commission • Division of Public Utilities and Carriers • Electric and Gas Distribution Companies

Expected Costs / Potential Funding

By design, Least-Cost Procurement reduces costs by eliminating the need to purchase expensive energy supply resources. For example, the 2012 Energy Efficiency Program cost $59.5 million, but it is expected to generate $183.55 million in economic savings for Rhode Island homes and businesses.[72] In fact, savings from ratepayer-funded energy efficiency investments made during the past ten years are supplying approximately 12 percent of the state's electricity demand today,[73] at an average lifetime cost of under 4

[70] http://webserver.rilin.state.ri.us/PublicLaws/law06/law06236.htm
[71] http://webserver.rilin.state.ri.us/PublicLaws/law06/law06237.htm
[72] http://www.rieermc.ri.gov/documents/annual/3_EERMC_April%202013.pdf
[73] http://www.rieermc.ri.gov/documents/annual/4_EERMC_April%202014.pdf

cents per kWh.[74] Total economic benefits generated from these investments exceed $1 billion. Funding for the programs comes principally from system benefits charges on customer electric and natural gas bills, set according to rate tariffs for electric distribution[75] and natural gas service.[76]

Design or Implementation Issues

The structure for implementing Least-Cost Procurement already exists.

[74] http://www.rieermc.ri.gov/documents/annual/3_EERMC_April%202013.pdf
[75] http://www.nationalgridus.com/narragansett/non_html/rates_tariff.pdf
[76] http://www.nationalgridus.com/rigas/non_html/rigas_firm_rates.pdf

2. EXPAND LEAST-COST PROCUREMENT TO UNREGULATED FUELS

Develop a long-term strategy for sustainably funding energy efficiency programs for delivered fuels customers

ESTIMATED IMPACT: 15-25% REDUCTIONS IN THERMAL ENERGY USE

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY	•EXISTING	•NEAR TERM (0-5 YEARS)
•COST-EFFECTIVENESS	•EXPANDED	•LONG TERM (0-20 YEARS)
•SUSTAINABILITY	•NEW	
•ELECTRIC		
•THERMAL		
•TRANSPORTATION		

STRATEGY DESCRIPTION

Background

Nearly 40 percent of Rhode Island homes heat with petroleum-based delivered fuels such as home heating oil and propane.[77] However, no dedicated energy efficiency program funding yet exists to serve these customers. Current funding for the efficiency programs under Least-Cost Procurement derives solely from electric and natural gas demand-side management charges, leaving unregulated fuel users with historically limited access to the program offerings. Energy efficiency funding for delivered fuels customers in Rhode Island has come from a variety of sources in past years. In 2010, the Office of Energy Resources (OER) allocated $2.3 million from the American Recovery and Reinvestment Act (ARRA) State Energy Program (SEP) Grant for energy efficiency improvements to homes using oil or propane for heating.[78] In subsequent years, National Grid offered oil customers a 25 percent rebate for weatherization services funded from the electric side of the energy efficiency program budget, on the premise that all customers use electricity, and weatherization of their buildings provides electric savings. In 2014, Regional Greenhouse Gas Initiative (RGGI) proceeds supported the continuation of weatherization services for delivered fuels customers.[79] The current piecemeal approach, however, creates recurring uncertainty in funding availability and scope, and precludes the design of more sophisticated, tailored delivered fuels energy efficiency offerings. To truly extend the benefits of Least-Cost Procurement to unregulated fuels customers, a sustained solution for funding energy efficiency for these users must be found.

[77] http://www.eia.gov/state/data.cfm?sid=RI#ConsumptionExpenditures
[78] http://www.ri.gov/press/view/11926
[79] http://www.energy.ri.gov/documents/rggi/2013%20Plan%20Items/Annual_RGGI_Allocation_Plan_2013_Final%20%20February%202014.pdf

Summary

This strategy recommends the formation of a working group to develop a long-term strategy for sustainably funding energy efficiency programs for delivered fuels customers. Expanding Least-Cost Procurement to unregulated fuels will address a major underserved population of energy users in Rhode Island. Dedicated energy efficiency programs for the users of petroleum-based heating fuels will generate substantial consumer, environmental, and economic benefits in the form of energy savings, emissions reductions, increased disposable income and revenue, and new business opportunities for delivered fuel distributors.

Experience in Other States

Other New England states have considered similar programs. A recent bill proposed in Massachusetts (H.2741) would establish a least-cost procurement method of offering energy efficiency incentives for customers heating with oil.[80, 81] The bill would establish an assessment of 2.5 cents per gallon of heating oil sold and enables oil dealers to provide energy efficiency offerings to their customers.

A comprehensive energy efficiency program for delivered fuels customers could potentially provide 15-25% thermal sector energy savings by 2035

RATIONALE

Need

Energy efficiency is the single most cost-effective method for improving energy security and sustainability. The Least-Cost Procurement model maximizes economic and environmental benefits to consumers and the broader economy by ensuring that installing cost-effective energy efficiency measures comes before the purchase of more expensive energy supply. Without a strategy to deliver energy efficiency resources to users of petroleum-based fuels, Rhode Island excludes nearly 40 percent of its heating customers from access to the lowest-cost energy source available.

Alignment with Performance Measure Targets and Modeling

According to Navigant's scenario modeling results, cost-effective opportunities exist beyond the BAU to capture thermal sector energy efficiency savings, including those for delivered fuels. The analysis projects BAU thermal sector energy reductions of approximately 19 percent between 2013 and 2035, and suggests that further opportunities to reduce thermal sector demand could exist, perhaps by as much as 50 percent below 2013 levels by 2035. Extending Least-Cost Procurement to petroleum-based heating fuels could provide a significant portion of these additional potential savings. Using the modeling results to calculate illustrative potential values[82] shows that up to approximately 27 percent delivered fuels savings (based on a 2013 baseline) could be achieved (Figure 1). This best available estimate suggests that a comprehensive energy efficiency program for delivered fuels customers could potentially provide 15-25 percent thermal sector energy savings by 2035.

[80] https://malegislature.gov/Bills/188/House/H2741
[81] http://www.neep.org/Assets/uploads/files/public-policy/outreach-and-analysis/MA-Oil-Heat-Facts-Jan-4.-2013.pdf
[82] Efficiency potential is measured as the difference in consumption of thermal sector distillate fuel oil, gasoline, kerosene, propane, residual fuel oil, and biodiesel between years 2013 and 2035. Only a portion of the difference reflects gains in efficiency; the remainder represents fuel switching to different heating sources, like natural gas. Therefore, the estimated efficiency potential values given are very rough figures. Further detailed analysis will assist in refining these market potential estimates.

Scenario	Delivered Fuels Efficiency Potential (BBTU)	% of Base Energy Use (2013 Consumption)	Simple Average Annual Savings
BAU	5,226	8%	0.4%
Scenario 1	8,964	14%	0.7%
Scenario 2	17,446	27%	1.4%
Scenario 3	8,366	13%	0.7%

Source: Navigant scenario modeling

Figure 1. Potential savings from energy efficiency in the delivered-fuels sector by 2035.

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 39-1-27.7 establishes Least-Cost Procurement, which currently does not include delivered fuels.

Lead and Supporting Actors

LEAD	SUPPORTING
Energy Efficiency and Resource Management Council	• Office of Energy Resources • Unregulated fuel distributors • Electric and gas distribution companies

Expected Costs / Potential Funding

By design, Least-Cost Procurement reduces costs by eliminating the need to purchase expensive energy supply resources. For example, the 2010 Deliverable Fuel Weatherization Program cost $2.3 million, but could generate $7 million in lifetime savings.[83] Despite the clear economic rationale, acquiring funding sources to support delivered-fuel efficiency programs is challenging. To eliminate cross-subsidization, program costs could be collected via an adder for non-gas electric customers or via a per-gallon energy efficiency charge affixed to delivered fuels, as was proposed in Massachusetts. Since 2011, however, Vermont has been the only jurisdiction to have such a mechanism in place.[84]

Design or Implementation Issues

Energy efficiency program design and implementation lend themselves well to least-cost procurement of electricity and natural gas, where costs are shared among a defined and discrete group of ratepayers. The delivered fuels market, on the other hand, is unregulated in Rhode Island, presenting special challenges for capturing all cost-effective efficiency. An important policy consideration is cross-state alignment of incentives. This alignment can prevent potential competition from out-of-state fuel dealers who might not face energy efficiency charges, and thus have a comparative advantage in the Rhode Island market.

[83] http://www.rieermc.ri.gov/documents/annual/1_EERMC_April%202011.pdf
[84] http://www1.eere.energy.gov/wip/solutioncenter/pdfs/fundingforenergyefficiencyprogramsforunregulatedfuels.pdf

3. REDUCE VEHICLE MILES TRAVELED

Invest in alternative modes of transportation; promote sustainable development and land use practices; and pilot programs incentivizing reduced discretionary driving

ESTIMATED NEED: ≥5% VMT REDUCTIONS & AND ≥DOUBLING OF PUBLIC TRANSIT RIDERSHIP

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

As with other sectors, the least-cost way to reduce impacts of transportation energy consumption is by reducing demand. In the transportation sector, energy use is a function of vehicle efficiency and vehicle miles traveled (VMT). In 2012, the most recent year with available data, Rhode Islanders drove an estimated 7,834 million miles.[85] Total VMT in Rhode Island actually declined between 2007 and 2012, by approximately 6 percent.

Several methods exist to reduce VMT. The simplest way is to decrease the absolute number of single-occupancy vehicle trips by promoting alternative modes of transportation. These alternative modes include mass transit (rail, bus, bus rapid transit, streetcars) and active transit (biking, walking). Ridesharing, car-share programs, and flexible workplace policies also accomplish this objective. A second option is reducing the absolute length of single-occupancy vehicle trips by encouraging higher-density patterns of development or changes in behavior. Promoting smart land use planning through the use of tools such as open space conservation, property tax policies, subdivision and zoning regulations, and strategic deployment of economic development funding can all assist in directing growth toward existing built-up areas. Innovative incentive or education programs can encourage drivers to modify driving habits and reduce their usual amount of traveling.

[85] http://www.dot.ri.gov/documents/highwaysafety/FFY_2014_Hwy_Safety_Plan_20130827.pdf

Several existing long-term policies, plans, and programs in Rhode Island address VMT reductions in Rhode Island. These include the Long Range Transportation Plan: *Transportation 2035* (LRTP 2035),[86] the *Growing Smart with Transit* Transit 2020 Working Group Report,[87] the *Providence Metropolitan Transit Enhancement Study*, commissioned by the Rhode Island Public Transit Authority (RIPTA) with support from the City of Providence,[88] and the Rhode Island State Land Use Policies and Plan: *Land Use 2025.*[89] The LRTP 2035 offers specific recommendations regarding VMT reductions, chiefly in the sections named *Transit, Bicycle, Pedestrian, Intermodal,* and *Land Use and Corridors.*

Summary

This strategy recommends investing in alternative modes of transportation; promoting sustainable development and land use practices; and piloting programs incentivizing reduced discretionary driving. Rhode Island should implement the recommendations proposed by the planning efforts of RIPTA, the Division of Planning, and the Department of Transportation, which project substantial security, economic, and sustainability benefits accruing to the state through various initiatives to reduce VMT. To do so, policy makers must find a long-term solution for sustainably funding mass transit and other transportation programs.

> The challenge for policy makers will be designing a creative transportation analog to the electric and natural gas Least-Cost Procurement model.

Experience in Other States

Many states have implemented policies and plans to reduce VMTs. The American Council for an Energy Efficient Economy (ACEEE) ranks California and Washington as the leading states for transportation system efficiency policies.[90] Washington has set a very aggressive 30 percent reduction target in annual VMT per capita by 2035.[91] In its *Clean Energy and Climate Plan for 2020*, Massachusetts described several transportation policies for reducing VMT including a "Pay As You Drive (PAYD)" auto insurance pilot, sustainable development principles, GreenDOT, and a "Smart Growth Policy Package."[92] Further, Massachusetts devotes nearly six times as much funding per capita as Rhode Island for statewide transit systems.[93]

RATIONALE

Need

VMT reductions are a form of reducing demand—the single most cost-effective method to improve energy security and sustainability. Rhode Island energy policy, however, has historically placed much greater focus on least-cost procurement of demand resources in the electric and thermal sectors. The state cannot afford to neglect demand reduction in a sector that accounts for approximately one third of all energy consumption in Rhode Island.

Alignment with Performance Measure Targets and Modeling

The results of Navigant's scenario modeling demonstrate ripe opportunities for transportation sector demand reduction beyond levels seen in the BAU forecast. In every scenario, transportation fuel

[86] http://www.planning.ri.gov/documents/trans/LRTP%202035%20-%20Final.pdf
[87] http://www.transit2020.com/report.php
[88] http://www.transit2020.com/study/
[89] http://www.planning.ri.gov/documents/121/landuse2025.pdf
[90] http://aceee.org/sector/state-policy/transportation-system-efficiency
[91] http://aceee.org/energy-efficiency-sector/state-policy/washington/218/all/207
[92] http://www.mass.gov/eea/docs/eea/energy/2020-clean-energy-plan.pdf
[93] http://www.transit2020.com/study/report/RIPTA%20TransitStudy%20ExecSummary.pdf

consumption dropped by at least an additional 25 percent below the BAU (**Figure 2**). Although some of this reduction in overall demand can be accounted for by increases in average vehicle efficiency, a significant and material component is attributable to reductions in VMTs.

Transportation Sector Aggregate Demand, 2013-2035

	DEMAND (BBTU)			% REDUCTION
	2013	*2023*	*2035*	*2013 - 2035*
BAU	60,973	56,906	55,811	8%
Scenario 1	60,973	48,187	38,616	37%
Scenario 2	60,973	45,383	35,392	42%
Scenario 3	60,973	51,514	40,364	34%

Source: Navigant scenario modeling

Figure 2. Scenario modeling results, showing aggregate demand for energy in the transportation sector, 2013-2035, under three scenarios and compared to the business-as-usual condition.

Reductions in VMTs modeled by Navigant represent both non-transit related activities (telecommuting, bicycling, walking) and reductions from the expansion of public mass transit (expanded RIPTA ridership and light and heavy rail service). Only Scenario 3 involved VMT reductions from non-transit-related activities, targeting a somewhat modest 5% reduction from current levels. In contrast, all scenarios considered increases in mass transit. The moderate increase in RIPTA ridership modeled in Scenario 1 and Scenario 2 (35 million annual rides in 2035) is generally consistent with the LRTP 2035 transit performance measure target of 31 million annual rides in 2030 (T.4.c). Scenario 3, however, modeled aggressive increases in public transit ridership corresponding to the additional expansion of light and heavy rail options, with concomitant RIPTA ridership increases. Total ridership in 2035 under this scenario represents an approximate threefold increase above present day levels, a considerably ambitious target.

The VMT reductions modeled in every scenario place Rhode Island squarely on a path toward meeting the Plan's cost and sustainability performance measure targets. All scenarios display substantial reductions in fuel expenditures below the BAU, an expected impact of aggressive investment in efficiency measures, which to date has been lacking in Rhode Island's transportation sector compared to other sectors. All scenarios also show significant GHG emissions reductions; however, the modeling results do not indicate which component of transportation demand reduction yields the greater GHG impact—vehicle efficiency improvements or VMT reductions. Future greenhouse gas policy should be informed by more detailed analyses to better determine the exact level and areas of transportation sector efficiency investments required to achieve the Plan's performance measure target of 45% reductions from 1990 levels in GHGs by 2035.

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 42-13 establishes the Rhode Island Department of Transportation. Rhode Island General Law § 42-11-10 establishes the Statewide Planning Program. Rhode Island General Law § 39-18 designates the Rhode Island Public Transit Authority as Rhode Island's Mobility Manager.

Lead and Supporting Actors

LEAD	SUPPORTING
Executive Climate Change Coordinating Council	• Department of Environmental Management • Department of Transportation • Division of Planning • Office of Energy Resources • Rhode Island Public Transit Authority

Expected Costs / Potential Funding

VMT reductions achieved through compact growth development patterns or changes in behavior will impose negligible incremental costs on Rhode Island consumers and businesses. Beyond the potential need for modest administrative funds, such programs simply attempt to influence investment or behavioral decisions that would occur anyway.

Mass transit programs, on the other hand, are expensive. Implementing the recommendations of the Providence Metropolitan Transit Enhancement Study would cost nearly $127 million.[94] The scenario modeling shows very high levels of total transportation sector capital investment, ranging from approximately $140 million to $240 million in average annual expenditures above the BAU. Only a portion of this investment, however, represents upgrades to public transit; the remainder represents purchases of alternative fuel vehicles.

Transit programs suffer from a well-known crisis in sufficient and sustainable funding sources. Broader structural problems with transportation infrastructure funding are persistent at the state and national levels. It is beyond the scope of this policy brief to recap the issues in depth. Studies such as the 2008 Blue Ribbon Panel for Transportation Funding[95] and the 2011 Senate Commission on Sustainable Transportation Funding[96] closely examine transportation funding challenges in Rhode Island and propose solutions. Ultimately, the challenge for policy makers will be designing a creative transportation analog to the electric and natural gas Least-Cost Procurement model, based on the enduring, compelling argument that inexpensive demand-side resources are Rhode Island's best way to secure long-term, significant net economic and environmental gains in all sectors of the energy economy.

Design or Implementation Issues

Securing funding for public transit investments probably represents the most challenging obstacle to implementing cost-effective and sensible transportation sector programs for energy demand reduction. Promoting sustainable development principles requires inter-agency coordination and action at the municipal level.

[94] http://www.transit2020.com/study/report/RIPTA%20TransitStudy%20ExecSummary.pdf
[95] http://www.dot.ri.gov/blueribbon/
[96] http://webserver.rilin.state.ri.us/SenateFinance/special_reports/Sustainable%20Transportation%20Funding%20Report.pdf

4. IMPROVE FUEL EFFICIENCY AND REDUCE VEHICLE EMISSIONS

Continue to adopt the increasingly stringent vehicle emissions standards set by California until 2025 and thereafter

ESTIMATED IMPACT: MINIMUM 12% REDUCTIONS IN TRANSPORTATION GHGs, BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

Authority to set standards for fuel efficiency and motor vehicle emissions falls under the purview of the federal government. The two primary agencies responsible for developing national standards are the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) and the U.S. Environmental Protection Agency (EPA). NHTSA promulgates fuel efficiency regulations through the Corporate Average Fuel Economy (CAFE) standards.[97] The EPA sets vehicle pollution standards, including those for greenhouse gas emissions.[98] In 2010, the two agencies jointly issued a harmonized set of standards for the first time. Known as the *National Program*, the first phase covered vehicle model years 2012 through 2016 and required a fleet-wide average of 250 grams CO_2 per mile for light-duty vehicles in 2016, equivalent to 35.5 miles per gallon if met only through fuel economy improvements.[99] In 2012, the agencies finalized standards for model years 2017 through 2025, which set historic standards of 163 grams of emitted CO_2 per mile for average light-duty vehicles in 2025, equivalent to 54.5 miles per gallon if met only through fuel economy improvements.[100]

Although the federal government sets nationwide standards, Section 177 of the Clean Air Act allows California to request a waiver to adopt stricter standards.[101] Other states may adopt California's standards,

[97] http://www.nhtsa.gov/fuel-economy
[98] http://www.epa.gov/OTAQ/standards/index.htm
[99] http://www.epa.gov/otaq/climate/regulations/420f10014.pdf;http://www.gpo.gov/fdsys/pkg/FR-2010-05-07/pdf/2010-8159.pdf
[100] http://www.epa.gov/otaq/climate/documents/420f12051.pdf;http://www.gpo.gov/fdsys/pkg/FR-2012-10-15/pdf/2012-21972.pdf
[101] http://www.epa.gov/otaq/cafr.htm#state

which are promulgated by the California Air Resources Board (CARB). Rhode Island is one of 15 "Section 177 states" that opt to apply vehicle emissions standards set by California.[102] In Rhode Island, the standards are set through air pollution regulations promulgated by the Rhode Island Department of Environmental Management (DEM) Office of Air Resources. In July 2013, DEM amended Air Pollution Control Regulation No. 37[103] to reflect the most recent CARB Low Emission Vehicle (LEV) III standards[104] and Zero Emission Vehicle (ZEV) requirements.[105]

Because federal law preempts states from setting their own emissions standards, the option to adopt CARB standards is the way Rhode Island can establish stricter regulations that improve fuel economy and reduce vehicle emissions. As part of the landmark agreement that launched the National Program in 2010, however, California agreed to offer the CAFE standards as an alternative compliance method to meet the CARB standards.[106] This approach essentially aligns the CARB standards, and by extension, the Section 177 states, with the federal requirements. It is noteworthy, however, that if the CAFE standards are ever relaxed as a result of a mid-term evaluation planned for 2022, or for any other reason, auto manufacturers will still need to meet the CARB standards for vehicles sold in California and in the Section 177 states, including Rhode Island. This condition underscores the importance of Rhode Island continuing to adopt the California standards, particularly if even more states adopt them.

Summary

This strategy recommends that Rhode Island continue to adopt the increasingly stringent vehicle emissions standards set by California until 2025 and thereafter. Since federal law allows states to adopt only a single, more stringent standard as set by CARB, there is no legislative or regulatory action Rhode Island can pursue on its own. The State might also try to reduce vehicle emissions by stepping up enforcement of Rhode Island's provisions for reducing idling of diesel engines, under General Law § 23-23-29.2[107] and § 31-47.3-5.[108] State agencies should also consider pursuing highway system operation efficiency initiatives, which can improve the traffic flow and result in fuel savings. The State might also want to increase information-sharing and outreach promoting fuel economy and efficient driving habits.

Experience in Other States

Fifteen other states—including Connecticut, Maine, Massachusetts, New York, and Vermont—use CARB vehicle emission standards.

[102] http://iaspub.epa.gov/otaqpub/display_file.jsp?docid=24724&flag=1
[103] http://sos.ri.gov/documents/archives/regdocs/released/pdf/DEM/7323.pdf
[104] http://www.arb.ca.gov/regact/2012/leviiighg2012/levfrorev.pdf
[105] http://www.arb.ca.gov/regact/2012/zev2012/zev2012.htm
[106] http://www.epa.gov/otaq/climate/letters/carb-commitment-ltr.pdf; http://www.arb.ca.gov/regact/2012/leviiidtc12/leviiifsorrev.pdf
[107] http://webserver.rilin.state.ri.us/Statutes/TITLE23/23-23/23-23-29.2.HTM
[108] http://webserver.rilin.state.ri.us/Statutes/TITLE31/31-47.3/31-47.3-6.HTM

RATIONALE

Need

Rhode Island's transportation sector accounts for over 40 percent of economy-wide fuel expenditures and greenhouse gas emissions, despite comprising just one-third of total energy consumption.[109] This is due to the high cost and carbon intensity of petroleum-based transportation fuels relative to natural gas, which dominates the state's electric and, to a lesser extent, thermal supply portfolios. Fuel economy and improvements in vehicle emissions help promote energy efficiency in the transportation sector, the single most cost-effective method for improving energy security and sustainability. Because of the higher avoided cost of gasoline consumption, measures to reduce transportation demand represent some of the most cost-effective opportunities for energy efficiency of any sector. Furthermore, because vehicles bought today have expected lifetimes exceeding a decade, the base efficiency of these assets will have substantial and long-lasting impact on energy consumption, fuel expenditures, and emissions for years to come.

If the CAFE standards are relaxed, auto manufacturers will still need to meet the CARB standards for vehicles sold in California and the Section 177 states, including Rhode Island

Alignment with Performance Measure Targets and Modeling

The Plan's scenario modeling forecasts a 12 percent reduction in transportation sector carbon emissions, from 2013 levels by 2035, under the business-as-usual condition. The BAU model draws on information from the ENE Business-as-Usual Forecast, which includes the impacts of the most recent CAFE standards for model years 2017 through 2025. This suggests that simply achieving ambitious BAU emissions reductions—and concomitant cost savings—depends at least in part on realizing the vehicle efficiency and emissions improvements currently mandated by the federal program. Beyond 2025, additional fuel economy increases or vehicle emissions reductions will likely be necessary to meet the Energy 2035 security, cost, and sustainability performance measure targets. According to Navigant's resource potential targets, the average efficiency of registered vehicles in Rhode Island will rise from approximately 19 miles per gallon to almost 27 miles per gallon in 2035, under the BAU condition. With appropriate policies in place, however, a fleet-wide average of 35 miles per gallon might be achieved in the same period. Reaching this level of fuel efficiency will probably require adopting stricter CARB standards, absent a continuation of the federal program past 2025. Meeting that fuel efficiency target might also require consumer incentives to purchase higher efficiency vehicles already offered by auto manufacturers, as described in this Plan's **Strategy 11, Promote Alternative Fuel and Electric Vehicles**.

IMPLEMENTATION

Legal Authority

Section 177 of the Clean Air Act

Rhode Island General Laws § 23-23 *et seq*

Rhode Island Department of Environmental Management Regulation Air Pollution Control Regulation No. 37

[109] http://www.eia.gov/state/data.cfm?sid=RI#ConsumptionExpenditures

Lead and Supporting Actors

LEAD	SUPPORTING
Department of Environmental Management	• Rhode Island Governor • Office of Energy Resources

Expected Costs / Potential Funding

Aside from minor administrative costs, adopting CARB emissions standards requires no additional state funds for regulation or targeted enforcement. Implementing the standards might add a modest cost to the price of purchasing an automobile; however, fuel efficiency improvements produce cost savings for the consumer over the life of the vehicle. For instance, the EPA states that an average driver of a model year 2025 vehicle could realize an estimated $3,400 to $5,000 in net lifetime savings.[110] Finally, because the Rhode Island Department of Transportation (RIDOT) and the Rhode Island Public Transit Authority (RIPTA) have historically relied on state and federal gasoline taxes for funding transportation operations and infrastructure improvements, decreases in gasoline consumption from fuel efficiency improvements will reduce the state's ability to fund transportation activities, absent changes to these funding structures.

Design or Implementation Issues

Rhode Island does not have any direct authority to issue emissions standards; it can only opt to adopt more stringent CARB standards as they are promulgated.

[110] http://www.epa.gov/otaq/climate/documents/420f12051.pdf

5. INNOVATE WITH STATE ENERGY EFFICIENCY CODES AND STANDARDS

Strengthen appliance minimum standards, and develop an integrated, long-term strategy to transition to zero net energy buildings

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

Existing statutes in Rhode Island set minimum energy efficiency standards for appliances[111] and buildings.[112] In 2005, the Rhode Island General Assembly enacted Rhode Island General Law § 39-27, setting appliance and equipment efficiency standards for a diversity of energy-consuming products sold and installed in the state.[113] Subsequent federal legislation instituted nationwide standards, preempting many of Rhode Island's minimum standards.[114] Although the U.S. Department of Energy (DOE) prohibits states from setting standards for appliances covered by mandatory federal standards (though it can grant waivers to states wishing to establish stricter standards), states may set standards for products not covered by federal standards.

Rhode Island General Law § 23-27.3-100.1.5.4 establishes the State Energy Conservation Code. It currently requires that residential and commercial buildings meet some of the strictest international building code standards for energy efficiency. As of July 1, 2013, the State Building Code Standards Committee adopted 2012 International Energy Conservation Code (IECC) for both residential and commercial buildings.[115] Recent studies commissioned by National Grid, however, found widespread non-compliance. On average, just 56 percent of residential new construction[116] and 70 percent of commercial new construction[117]

[111] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-27/INDEX.HTM
[112] http://webserver.rilin.state.ri.us/Statutes/TITLE23/23-27.3/23-27.3-100.1.5.4.HTM
[113] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-27/INDEX.HTM
[114] http://aceee.org/energy-efficiency-sector/state-policy/Rhode%20Island/211/all/192
[115] http://sos.ri.gov/documents/archives/regdocs/released/pdf/BCSC/7284.pdf
[116] http://www.rieermc.ri.gov/documents/evaluationstudies/2012/Final-RI-RNC-2011-Baseline-Report-sent-10-8-12.pdf
[117] http://www.rieermc.ri.gov/documents/evaluationstudies/2012/RI%20Code%20Compliance%20Baseline%20Study%20%20Final%20Report%20-%20July%2023%202012.pdf

achieved compliance with existing energy codes. Moreover, the State Energy Conservation Code applies only to new and renovated structures, but does not apply to buildings constructed prior to the mandate.

In its 2013 Energy Efficiency Program Plan, National Grid launched an innovative Codes and Standards (C&S) Initiative, which is already helping to build on Rhode Island's existing energy efficiency regulations. Through this initiative, National Grid works closely with the Rhode Island Building Code Commission and other stakeholders to increase base code compliance, advocate for improvements to base code, design an additional, voluntary "stretch" code, and advocate expanding appliance efficiency standards.[118]

Summary

This strategy recommends (1) strengthening appliance minimum standards; and (2) developing an integrated, long-term strategy to transition to zero net energy buildings.

Appliance Standards: Policy makers should continually screen additional technologies for inclusion under the state appliance efficiency standards or consider requiring that Rhode Island standards match the latest standards established by California, which historically have set the precedent for subsequent federal standards.

Building Codes: Rhode Island should chart a path to zero net energy buildings. Setting a long-term goal and establishing a schedule that ratchets up energy efficiency requirements over time (that is, in the context of decades) to achieve the net zero target would send a clear, lasting signal to the market and provide sufficient time for the building community to adapt. The strategy must address the markets for both new construction / renovation and other existing buildings. Components of the plan will likely fall into the following broad categories: adopting policies that improve base code, providing incentives to exceed base code, and increasing overall code compliance.

To improve base code in new construction and renovations, Rhode Island should stay current with the latest IECC standards—at a minimum. Over the long-term, policy makers should consider transitioning from traditional "prescriptive" building codes toward "performance" oriented building codes. Performance-based energy codes will more directly address the goal of reducing wasted energy and will simplify compliance for developers by allowing them to make their own design decisions on how to meet energy reduction targets.

To achieve energy savings beyond base code in the new construction / renovation market, Rhode Island can allow cities and towns to opt for higher-efficiency "stretch" codes; and encourage them to consider tax credits, financing, or other assistance for meeting stretch code. In these same properties, Rhode Island can increase compliance with base and stretch codes by providing training and education, and by stepping up compliance enforcement through third-party inspections.

Existing housing stock is by far the largest segment of buildings in the state. For this market, building energy labeling[119] represents the most promising tool to encourage greater investment by the voluntary market in energy efficiency. Mandatory building energy labeling policies, which require the disclosure of building energy performance data to occupants, renters, potential buyers, and the public, could complement code enforcement in new construction and renovations. Further, policy makers should seriously consider pursuing fundamentally new approaches to speeding the pace of energy efficiency

[118] http://www.ripuc.org/eventsactions/docket/4366-NGrid-2013EEPP(11-2-12).pdf
[119] http://www.neep.org/Assets/uploads/files/public-policy/building-energy-rating/BER%20One%20Pager%20FINAL.pdf

improvements in the existing housing market. This can be accomplished by requiring that existing homes meet current code within a designated period of time (for example, within ten years) and by providing incentives to support compliance. This type of policy might be particularly effective in prompting efficiency investment in the rental market, where the well-known landlord / tenant "split incentive" financially discourages property owners and renters alike from implementing energy upgrades.

Experience in Other States

As of March 2012, twelve states had set minimum appliance efficiency standards for products not covered by mandatory federal standards.[120] Massachusetts has recommended universal adoption of zero net energy practices for new construction by 2030;[121] California set a net zero energy use goal for all new residential homes by 2020.[122] In 2009, Massachusetts developed an optional stretch code for municipalities wishing to achieve enhanced building energy efficiency.[123, 124] Many local and state jurisdictions across the country have implemented building energy rating policies,[125,126] including the City of Boston.[127] The City of Boulder, Colorado, required that all rental housing meet a minimum energy efficiency standard by 2019.[128] Since 1997, the City of Burlington, Vermont, has required rental units to meet cost-effective minimum energy efficiency standards at the time of sale.[129]

The base efficiency of these assets today will have a substantial and long-lasting impact on energy consumption for years to come

RATIONALE

Need

Codes and standards are one of the most simple and cost-effective policy tools for promoting energy efficiency in appliances and buildings. Because the expected lifetimes of appliances and buildings are typically measured in decades, the base efficiency of these assets today will have a substantial and long-lasting impact on energy consumption, fuel expenditures, and emissions for years to come. In the buildings sector in particular, certain energy-inefficient properties, especially in the rental market, can go for many years without upgrades. Addressing these issues through the prudent use of energy efficiency regulation is a proven method for providing enormous energy security, economic, and environmental returns.

Alignment with Performance Measure Targets and Modeling

The scenario modeling projected energy reductions of approximately 21 percent under the business-as-usual condition in the electric sector and 19 percent in the thermal sector between 2013 and 2035. The analysis suggests that further opportunities to reduce thermal sector demand could exist, perhaps by as much as 50 percent below current levels by 2035. Achieving these ambitious BAU savings, let alone further energy reductions, will require an "all-of-the-above" approach. Extending Least-Cost Procurement will help

[120] http://www.appliance-standards.org/sites/default/files/State_status_grid_MAR_2012_1.pdf
[121] http://www.mass.gov/eea/docs/eea/press/publications/zneb-taskforce-report.pdf
[122] http://www.cpuc.ca.gov/NR/rdonlyres/D8EBFEE4-76A5-47AC-A8F3 6E0DAB3A9E5D/0/DRAFTZNE_Action_Plan_Comment.pdf
[123] http://www.mass.gov/eopss/consumer-prot-and-bus-lic/license-type/csl/stretch-energy-code-information.html
[124] http://neep.org/Assets/uploads/files/public-policy/building-energy-codes/Massachusetts%20Stretch%20Code.pdf
[125] http://www.neep.org/public-policy/energy-efficient-buildings/building-energy-rating/index
[126] http://www.buildingrating.org/content/us-policy-briefs
[127] http://www.cityofboston.gov/news/Default.aspx?id=5997
[128] https://bouldercolorado.gov/plan-develop/smartregs
[129] http://www.burlingtonelectric.com/ELBO/assets/INTRODUCTION%20TO%20TOS%20ORDINANCE.pdf

deliver the bulk of the BAU savings; improved codes and standards will help provide a complementary policy mandate that lifts the baseline efficiency of appliances and housing.

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 39-27 provides the statutory basis for appliance and equipment energy efficiency standards. Rhode Island General Law § 23-27.3-100.1.5.4 establishes the State Energy Conservation Code.

Lead and Supporting Actors

LEAD	SUPPORTING
Energy Efficiency and Resource Management Council	• General Assembly • Office of Energy Resources • Electric and Gas Distribution Companies • Building Code Commission • Building Code Standards Committee

Expected Costs / Potential Funding

Although compliance costs exist, mandating improved energy efficiency codes and standards does not require funding and represents one of the most cost-effective ways to promote energy efficiency. For instance, according to the Appliance Standards Awareness Project, adopting new efficiency standards for twelve products could generate a remarkable 54,100 BBTU in cumulative energy reductions and $425 million in net present value cost savings by 2035.[130] The total energy reduction (54,100 BBTU) is equivalent to roughly one-third of Rhode Island's economy-wide energy consumption in the year 2035 (153,518 BBTU) under business-as-usual conditions; the anticipated annual electric savings in 2035 (325 GWh) represent more than double the electric sector annual savings of the 2013 National Grid Energy Efficiency Program (159 GWh).[131]

Similarly, in the building sector, higher upfront costs are offset by lifetime savings. Massachusetts estimated an incremental cost of between 1 and 3 percent for both residential and commercial buildings achieving a 20-30 percent energy reduction below base code.[132] Additionally, developers stand to benefit if consumers are willing to pay a premium for energy-efficient properties.

Finally, this policy brief proposes building energy labeling and mandatory building upgrade codes for rentals. Both of these strategies provide an added benefit of lowering the cost and increasing the reach of Rhode Island's existing energy efficiency programs.

Design or Implementation Issues

Tying Rhode Island appliance standards to California's standards would delegate authority to another state, creating some uncertainties. Any new standards for buildings or appliances must be developed in partnership with applicable private-sector stakeholders and must be implemented in a phased approach to minimize compliance costs and give industry time to adapt. Building energy labeling policies must be designed for both residential and commercial markets, and might take years to implement.

130 http://www.appliance-standards.org/sites/default/files/2011_Model_Bill-RI.pdf
131 https://www.nationalgridus.com/non_html/eer/ri/2013%20EEPP%20Final%20w%20Rev%20Att%205%2020121204.pdf
132 http://www.mass.gov/eea/docs/eea/energy/2020-clean-energy-plan.pdf

6. IMPROVE COMBINED HEAT AND POWER MARKET

Evaluate additional methods to speed the diffusion of CHP technologies into the Rhode Island marketplace

ESTIMATED NEED: 400 MW BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

Combined heat and power (CHP), also called *co-generation,* refers to systems that generate both electricity and useful heat. CHP technologies can use a variety of fuels, including natural gas. CHP helps increase the efficiency of on-site energy use by recycling waste thermal energy produced as a byproduct of power generation for a number of end use applications including hot or chilled water, space conditioning, and process heat.[133]

As of 2006, approximately 100 MW of installed CHP capacity existed in Rhode Island. A 2008 study conducted by Northeast States for Coordinated Air Use Management (NESCAUM) found that the total technical potential for in-state CHP likely falls between 350 MW and 714 MW.[134] The study estimated that up to 330 MW of new CHP capacity could be cost-effectively installed by 2020.

The Least-Cost Procurement statute in Rhode Island, which requires electric and gas distribution companies to invest in all cost-effective energy efficiency before the acquisition of additional supply, includes CHP as an eligible technology.[135] In 2012, the Rhode Island General Assembly modified the statute by further stipulating that annual energy efficiency procurement plans must contain "a plan for identifying and recruiting qualified combined heat and power projects, incentive levels, contract terms and guidelines, and achievable megawatt targets for investments in combined heat and power systems."[136] Following the favorable changes to the legislation, Rhode Island leveraged energy efficiency program funds to support

[133] http://www.epa.gov/chp/basic/
[134] http://www.env-ne.org/public/resources/pdf/NESCAUM_CHP_Report.pdf
[135] http://webserver.rilin.state.ri.us/Statutes/title39/39-1/39-1-27.7.HTM
[136] http://webserver.rilin.state.ri.us/BillText12/housetext12/h8233.pdf

the construction of a major new CHP installation—a 12.5 MW system at Toray Plastics, Inc. Despite the success of this effort, the best available estimates of existing in-state CHP capacity (approximately 100 MW) suggest that Rhode Island will need to maintain a similar pace of annual deployment to reach the economic potential for CHP by 2035 (an additional 330 MW).

Summary

This strategy recommends evaluating additional methods to speed the diffusion of CHP technologies into the Rhode Island marketplace. Policy makers might consider the suitability of adding CHP as an eligible technology under an expansion and carve-out of the Renewable Energy Standard (RES) or perhaps under the Distributed Generation Standard Contracts Program. Another option is to explore ways to promote district heating and cooling systems, which can serve as a platform not only for CHP, but also for renewable thermal energy technologies.

Experience in Other States

Like Rhode Island, Massachusetts supports cost-effective CHP systems through its efficiency program; however, additional support for the technology exists through the Alternative Energy Portfolio Standard (APS).[137] Assuming the APS Minimum Standard is met solely with CHP, Massachusetts will deploy 261 MW of new CHP by 2020.[138] Connecticut lists CHP as an eligible Class III resource in its Renewable Portfolio Standard, with a current target of 4 percent of load by 2020.[139] The Massachusetts Clean Energy Center currently is soliciting proposals for district energy systems, including those supporting CHP.[140]

"Achieving levels of CHP modeled in Energy 2035 will require a radical acceleration in the pace of deployment—an approximate quadrupling of in-state capacity over 20 years"

RATIONALE

Need

CHP systems provide energy security, economic, and sustainability benefits.[141] Like other distributed, customer-sited resources, CHP can provide electric system benefits through reduced line losses and possible deferred investments in distribution infrastructure. From a customer perspective, co-generation increases the efficiency of on-site energy use and produces cost savings. CHP also reduces carbon emissions and can displace the use of higher-emitting sources of electricity or thermal energy.

Alignment with Performance Measure Targets and Modeling

The Plan's scenario modeling estimated an upper bound for CHP market penetration of 400 MW by 2035, close to the economic potential identified by NESCAUM in its 2008 study. It is important to note that of all resources modeled in the scenarios, CHP alone was deployed at the "aggressive" target level of 400 MW in each scenario. This suggests that CHP offers a high-impact way to address each of the diverse Energy 2035 themes: energy security, cost-effectiveness, and sustainability. Achieving levels of CHP modeled in the Plan, however, will require a radical acceleration in the pace of deployment—an approximate quadrupling of in-state capacity over 20 years.

IMPLEMENTATION

[137] http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/rps-aps/rps-and-aps-program-summaries.html
[138] http://ccap.org/assets/Massachusetts-Policies-for-CHP_CCAP-Breger-Oct-2012.pdf
[139] http://www.ct.gov/pura/cwp/view.asp?a=3354&q=415186&puraNav_GID=1702
[140] http://www.masscec.com/solicitations/renewable-heating-and-cooling-and-district-energy-solicitation
[141] http://www.iea.org/media/files/chp/CHPbrochure09.pdf

Legal Authority

Rhode Island General Law § 39-1-27.7 provides the statutory basis for including CHP in Least-Cost Procurement. Rhode Island General Law § 39-26 establishes the Renewable Energy Standard (RES), which, with proper modifications, could potentially support CHP systems.

Lead and Supporting Actors

LEAD	SUPPORTING
Energy Efficiency and Resource Management Council	• Office of Energy Resources • Electric and gas distribution companies

Expected Costs / Potential Funding

Current incentives for CHP funding come from the general energy efficiency program budget, which ultimately is recovered from ratepayers. Like all of the program's measures, however, CHP projects must pass a cost-benefit screening analysis to demonstrate net economic savings. Therefore, the economic, environmental, and system benefits of installing CHP should outweigh the costs of promoting cost-effective projects in the state. Including CHP as an eligible technology under other existing renewable energy procurement policies might raise similar concerns regarding cost impacts to ratepayers.

Design or Implementation Issues

Including CHP under an expansion and carve-out of the RES would require modifications to the structure of the mandate and definitions of eligible technologies. Even with sufficient policy support in place, recruiting enough CHP projects to participate in programs could be challenging because of long project lead times and high upfront capital investments. According to National Grid's experience, some of the main market barriers to adoption of CHP in Rhode Island are (1) insufficient payback periods to meet customer requirements; (2) poor consumer awareness and information; and (3) lack of gas distribution infrastructure.[142]

[142] http://www.energy.ri.gov/efficiency/index.php - See September 17, 2013 EERMC Public Meeting on CHP.

7. EXPAND THE RENEWABLE ENERGY STANDARD

Increase the Renewable Energy Standard beyond 16% by 2019

ESTIMATED NEED: ≥40% RENEWABLE ENERGY STANDARD BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

In 2004, the Rhode Island General Assembly enacted a Renewable Energy Standard (RES)[143]. Now Rhode Island General Law § 39-26, the RES sets a statewide target of 16% renewable energy by 2019. Electric distribution companies and non-regulated power producers comply with the mandate by supplying an increasing percentage of their retail electric sales from renewable energy resources. Eligible renewable energy resources include solar, wind, wave, geothermal, small hydropower, biomass, and fuel cells. The current statute calls for the minimum RES level of 16 percent in 2019 to be "maintained unless the [Public Utility Commission] shall determine that such maintenance is no longer necessary for either amortization of investments in new renewable energy resources or for maintaining targets and objectives for renewable energy."[144]

Summary

This strategy recommends increasing the Renewable Energy Standard beyond 16 percent by 2019. Achieving the Energy 2035 security, cost-effectiveness, and sustainability performance measure targets will likely require a 40% RES by 2035 at a minimum, equivalent to a 1.5 percent annual increase in the mandate after 2019. The RES, however, is only one of several policy tools Rhode Island can use to achieve its electric sector clean energy supply goals. Therefore, in determining the appropriate level for the RES expansion, the General Assembly should deliberate closely with stakeholders to carefully analyze a portfolio of strategies: in-state renewable procurement, out-of-state renewable procurement, and the general RES market mandate. From these, it can select an optimal and prudent balance that sets the state

[143] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-26/INDEX.HTM
[144] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-26/39-26-4.HTM

on pace to meet the Energy 2035 security, cost-effectiveness, and sustainability performance measure targets.

Experience in Other States

As of March 2013, 30 states and the District of Columbia had enacted Renewable Portfolio Standards, and 8 other states had set voluntary goals.[145] Compared to existing RPS mandates and goals in other northeastern states, Rhode Island's standard of 16 percent by 2019 could be viewed as conservative, as shown in **Table 1**.

Table 1. Northeast states' RPS mandates and goals

State	Target
Connecticut	27% by 2020
Maine	40% by 2017
Massachusetts	15% by 2020, and 1% each year thereafter
New Hampshire	24.8% by 2025
New York	29% by 2015
Rhode Island	16% by 2019
Vermont	20% by 2017 (non-mandated goal)

Source: Database of State Incentives for Renewables & Efficiency, http://dsireusa.org/rpsdata/index.cfm

RATIONALE

Need

Market barriers prevent many types of renewable energy generation facilities from competing on a level playing field with their fossil fuel counterparts. For example, many of the harmful externalities associated with fossil fuel generation are never monetized, yet society fully bears the costs of these externalities—impacts on quality of life, human health, and the environment. Further, many renewable energy technologies are at an earlier stage of commercialization compared to more established fossil fuel-based technologies. Regulatory mandates like the Renewable Energy Standard are a proven method for addressing these market barriers, stimulating demand for and driving investment in more renewable energy generation.

Alignment with Performance Measure Targets and Modeling

Achieving the Energy 2035 security, cost-effectiveness, and sustainability performance measure targets will likely require a 40% RES by 2035, at a minimum

The Plan's modeling considered scenarios with substantial renewable energy expansion. Scenario 1 targeted a 40 percent RPS, resulting in electric sector GHG reductions of 35 percent achieved through a mix of in-state distributed generation and out-of-state procurement of renewables. Scenario 3 targeted a 75 percent RPS, resulting in electric sector GHG reductions of 56 percent achieved mostly through REC purchases from over 1,000 MW of on-shore wind in northern New England. Scenario 3 was the only scenario to meet the Energy 2035 performance measure target of 45 percent reductions in economy-wide GHG emissions. This suggests that a 75 percent RPS might be required to achieve the sustainability performance measure target, an exceptionally ambitious mandate by current standards. However, the Plan's analysis did not explicitly distinguish between overall RPS targets in the scenarios and the expansion of other key renewable energy policy levers that are currently mutually exclusive from the RES. These include the Long Term Contracting Standard for Renewable Energy (LTC), Distributed Generation (DG) Standard Contracts Program, and Net

[145] http://dsireusa.org/rpsdata/index.cfm

Metering. Combining a more modest RES increase with an expansion of these separate programs could result in an overall portfolio of clean energy procurement programs that combine to achieve the GHG performance measure target.

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 39-26 established the Renewable Energy Standard.

Lead and Supporting Actors

LEAD	SUPPORTING
General Assembly	• Office of Energy Resources • Public Utilities Commission • Electric distribution companies • Non-regulated power producers

Expected Costs / Potential Funding

During Compliance Year 2011, National Grid incurred an incremental cost of $8.43 million to comply with the RES.[146] These incremental costs are projected to rise as the mandate increases.[147] All costs associated with the electric distribution company's RES compliance—including the procurement of RECs—are passed on to Rhode Island's electric customers through a monthly charge on their electric bills. For the approximately 30 percent of customers served by competitive suppliers, it is assumed that RES compliance costs are similarly passed on to them in their electric rates, but this data is currently unavailable. Further increases in the RES will likely create additional costs to ratepayers. It is possible, however, that as the cost of renewable energy continues to decline, the pace of deployment could increase such that REC supply outstrips demand and the rate of growth in compliance costs slows. Furthermore, increasing amounts of renewable energy will produce other benefits and savings to consumers in the form of price hedging against volatile fossil fuel prices and wholesale power market price suppression.

Design or Implementation Issues

Renewable energy developers generally require the security of long-term power purchase agreements to obtain financing for project development. Since RES compliance requires only the purchase of RECs, not power, the mandate assures project developers only supplemental operating revenue in the form of RECs. It does not address upfront cost barriers. Therefore, policy makers should consider pairing increases in a RES policy with increases in long-term contracting provisions of existing law.

[146] http://www.ripuc.org/utilityinfo/PUC-RES-AnnualReport2011.pdf
[147] http://www.ripuc.org/eventsactions/docket/4404-NGrid-Presentation(10-3-13).pdf

8. EXPAND RENEWABLE ENERGY PROCUREMENT

Increase the share of renewable energy in Rhode Island's electricity supply portfolio through a mix of clean energy imports, distributed renewable generation, and utility-scale in-state projects

ESTIMATED NEED: ~500 MW RENEWABLE ENERGY SUPPLY BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

Over the past decade, Rhode Island's Renewable Energy Standard (RES) (R.I.G.L. §39-26) has remained the linchpin of state renewable energy policy. The RES requires electric distribution companies and non-regulated power producers to supply 16 percent of power sold to end users in Rhode Island from renewable resources by 2019.[148] In the years since its enactment in 2004, however, Rhode Island policy makers concluded that the RES does not on its own sufficiently address certain key market barriers that inhibit the increased adoption of renewable energy. The most fundamental barrier in question—a guaranteed revenue stream that renewable energy developers can "take to the bank" to attract investors and secure financing for project development.

In response to this concern, the General Assembly passed a series of laws mandating the procurement of renewable energy in Rhode Island. Unlike the RES, which requires electricity providers only to purchase renewable energy certificates (RECs), these procurement laws require Rhode Island's primary electric distribution company to enter into long-term power purchase agreements (PPAs) with renewable energy generators for both RECs and power.

The first of these laws, enacted in 2009, was the Long-Term Contracting Standard for Renewable Energy (LTC) (R.I.G.L. § 39-26.1). The LTC requires electric distribution companies to annually solicit proposals from renewable energy developers and to enter into long-term contracts, with terms up to 15 years, for a total of 90 MW of renewable capacity by December 2014.[149]The LTC also provides for PPAs specifically for

[148] http://webserver.rilin.state.ri.us/Statutes/title39/39-26/index.htm
[149] http://webserver.rilin.state.ri.us/Statutes/title39/39-26.1/INDEX.HTM

an offshore wind demonstration project at Block Island and a utility-scale offshore wind project in federal waters.

By 2011, there was a growing recognition that the LTC was not adequately supporting the development of small renewable energy projects in the state.[150] In response, the General Assembly passed a host of new laws encouraging the expansion of in-state renewable energy generating capacity, including a landmark renewable energy procurement provision establishing Distributed Generation (DG) Standard Contracts (R.I.G.L. § 39-26.2).[151] This law set forth minimum capacity targets for electric distribution companies to purchase RECs and power from renewable energy projects located in their load zone, ramping to 40 MW of nameplate capacity by the end of 2014. Because of the DG program's success, the General Assembly enacted the Renewable Energy Growth (REG) Program in 2014.[152] The REG Program expanded the 40 MW DG Program by an additional 160 MW, for a total of 200 MW of local renewable energy projects in Rhode Island by 2019. The REG Program replaced the contract-based DG Program with a new system of performance-based incentives, set in tariffs filed at and approved by the Public Utilities Commission. The REG Program also extended the ability for small-scale solar projects to participate in the program.

At the same time that Rhode Island lawmakers sought to promote in-state renewable generation, state and regional efforts signaled movement toward increasing clean energy imports into New England. In December 2013, the New England Governors announced a collaborative effort to develop a regional energy infrastructure plan that would guide strategic investments in natural gas infrastructure and electric transmission to access large-scale, low- and no-carbon resources, such as hydropower.[153] In 2014, the General Assembly passed, and Governor Lincoln D. Chafee signed, the Affordable Clean Energy Security (ACES) Act (R.I.G.L. § 39-31).[154] The law established a framework for the Public Utilities Commission, Division of Public Utilities and Carriers, and the Office of Energy Resources to work with the state's electric and gas distribution companies and other New England states to make strategic investments in large-scale hydropower, regional renewable energy resources, and natural gas; and in energy infrastructure upgrades.

Summary

This strategy recommends increasing the share of renewable energy in Rhode Island's electricity supply portfolio through a mix of clean energy imports, distributed renewable generation, and utility-scale in-state projects. This entails a long-term expansion of the LTC and / or DG programs, maintaining the state's commitment to offshore wind generation sited in Rhode Island state and federal waters, and participating in regional collaborations to expand New England's access to low- and no-carbon electric resources, such as Canadian hydropower and on-shore wind. Achieving the Energy 2035 security, cost-effectiveness, and sustainability performance measure targets will require procuring approximately 500 MW of total renewable generation capacity, inclusive of procurements from existing programs. Additional REC purchases or clean energy imports from renewable generation facilities located in neighboring states and regions will likely be needed to meet the overall GHG reduction performance measure target.

The most prudent way to craft a renewable procurement strategy that meets the Energy 2035 performance measure targets is to set a clear, long-term vision for renewable energy, and then to identify least-cost pathways to meeting the ultimate goal(s). To do so, Rhode Island must first determine and apply

[150] http://www.rilin.state.ri.us/Reports/REPORT%20%20Small%20Biz%20renenergy.pdf
[151] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-26.2/INDEX.HTM
[152] http://webserver.rilin.state.ri.us/BillText/BillText14/HouseText14/H7727Aaa.pdf
[153] http://www.nescoe.com/uploads/NewEngGovEng12-05-13.pdf
[154] http://webserver.rilin.state.ri.us/BillText/BillText14/HouseText14/H7991A.pdf

standardized cost / benefit metrics for renewable energy that will (1) support an advanced understanding of the net benefits that renewable energy procurement programs provide Rhode Island; and (2) help identify a least-cost combination of imports and in-state development that set the state on pace to achieve long-term clean energy goals.

Experience in Other States

Other states in New England have enacted renewable procurement policies similar to Rhode Island's. Section 83A of the Green Communities Act requires Massachusetts electric distribution companies to solicit proposals from renewable energy developers for long-term contracts for up to 4 percent of their annual load.[155] In Connecticut, Public Act 13-303 authorizes regional renewable energy solicitations and procurements.[156] All New England states are currently evaluating a regional strategy for increasing Canadian clean energy imports.[157]

RATIONALE

Need

Existing RPS mandates throughout New England help bolster demand for renewable energy in the region. Even with these policies in place, however, additional key market barriers impede the growth of renewable energy. A key hurdle is the high upfront capital and financing costs associated with the development of new renewable energy projects. Typically, developers need the security of a guaranteed, long-term revenue stream—often in the form of a PPA—to attract project financing. The term length of these PPAs can be 15 years or more. In restructured electric markets like New England, however, supply contracts between electric distribution companies and power generators are usually signed on much shorter terms—from several months to a few years. Long-term PPAs help ameliorate this issue.

Alignment with Performance Measure Targets and Modeling

The Plan's modeling considered scenarios with substantial renewable energy expansion. In-state renewable builds range from 266 MW to 560 MW among the scenarios (**Figure 3**). All scenarios assume that the 30 MW Block Island offshore wind demonstration project and the 150 MW utility scale offshore wind project (as provided for in the LTC mandate) are both built. Further, the modeling assumed that a new 1,200 MW transmission line from Canada comes online, bringing even more low-carbon hydropower generation into the New England regional power mix.

Achieving the Energy 2035 security, cost-effectiveness, and sustainability performance measure targets will require procuring approximately 500 MW of renewable generation capacity

To drive the overall level of electric sector renewable deployment, the modeling set overarching RPS targets for each scenario. To meet the RPS target for each scenario, the Plan modeled both procurement of actual power from in-state renewable resources and also REC purchases (not power) from renewable resources located out of state. The relative balance of power procurement versus REC purchases depended on the main focus of the scenario—security, cost-effectiveness, or sustainability. In Scenario 1, for example, prioritized energy security. The modeling for that scenario emphasized in-state renewable procurement to result in a more localized, resilient, and reliable Rhode Island power portfolio. Scenario 3, on the other hand, prioritized sustainability. That scenario emphasized REC purchases from regional renewable energy resources—

[155] https://malegislature.gov/Laws/SessionLaws/Acts/2012/Chapter209
[156] http://www.cga.ct.gov/2013/ACT/PA/2013PA-00303-R00SB-01138-PA.htm
[157] http://www.nescoe.com/uploads/NewEngGovEng12-05-13.pdf

northern New England wind—to meet aggressive carbon reduction targets at a presumably lower cost. The modeling recognized that the potential need for new transmission is a key unknown variable. In practice, Rhode Island policy makers will need to continually monitor the evolving renewable energy market to weigh the relative costs and benefits of localized and regional procurements. They must also take into account the overall amount of renewable energy necessary to meet energy goals; the highly uncertain costs of transmission expansion to interconnect more distant resources; and technological and other efficiency-related advancements that could tip the balance toward more cost-effective in-state development.

	BAU	Scenario 1	Scenario 2	Scenario 3
RES (%)				
Target in 2035	16%	40%	25%	75%
In-State Power Procurement (MW)				
Wind	16	70	20	70
Offshore Wind	180	180	180	180
Solar	66	302	66	66
Biomass	-	7	-	-
	262	**560**	**266**	**316**
Out-of-State REC Purchases (MW)				
Wind	-	228	11	1,111
	-	**228**	**11**	**1,111**
GRAND TOTAL (MW)	**262**	**788**	**277**	**1,427**

Source: Navigant scenario modeling

Figure 3. Rhode Island's renewable energy targets, by each modeled scenario.

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 39-26 et seq. establishes the bulk of renewable energy procurement programs. Rhode Island General Law § 39-31 establishes the Affordable Clean Energy Security (ACES) Act.

Lead and Supporting Actors

LEAD	SUPPORTING
Distributed Generation Standard Contracts Board	• General Assembly • Office of Energy Resources • Renewable Energy Coordinating Board • Commerce RI • Public Utilities Commission • ISO New England • Electric distribution companies • Non-regulated power producers

Expected Costs / Potential Funding

Electric ratepayers support all renewable energy procurement programs, through charges on the distribution portion of their utility bills. The cost of the programs grows as more new PPAs come online. The LTC and DG programs cost approximately $384,110 in 2012.[158] This figure is projected to grow to $21.5 million in 2015.[159] As renewable energy technologies and markets continue to mature, and technological advancements help drive down project costs, these programs may become increasingly cost-effective and competitive with purchases of conventional power. For example, pricing for some DG program contracts have fallen by approximately 50 percent since the start of the program.[160] In addition, during November 2013, the Rhode Island Public Utilities Commission approved a PPA for wind power and RECs between National Grid and Champlain Wind, LLC. The value of the agreement and the certificates are expected to be nearly $49 million below the standard electricity market price over the length of the contract.[161] Several Massachusetts electric distribution companies also signed below-market PPAs for on-shore wind power in the fall of 2013.[162] Aside from the energy security and sustainability benefits of the increased renewable power generation, the programs will likely produce other economic benefits for consumers including hedging against volatile fossil fuel prices, deferring costly transmission and distribution infrastructure investments, and reducing wholesale power market prices.

Design or Implementation Issues

Under Generally Accepted Accounting Principles (GAAP), electric distribution companies view power purchase contracts as debt on their balance sheets. The long-term liability can affect the company's cost of borrowing and in turn, shareholder interests. The 2014 Renewable Energy Growth (REG) Program helped ameliorate this issue by replacing the previous contract-based program with a new, tariff-based program, eliminating the need for electric distribution companies to enter into contracts with participating renewable energy projects.

Broader regional collaborations to increase clean energy imports require the complex balancing of multi-state interests and priorities. Siting and development of transmission lines necessary to deliver the power to load centers is a challenging, costly, and contentious process.

With the exception of the 30 MW Block Island Wind Farm under development by Deepwater Wind LLC, all other future offshore wind development is proposed in federal waters off Rhode Island.

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158 http://www.ripuc.org/eventsactions/docket/4391-4315-NGrid-RR(4-11-13).pdf
159 OER Data Request to National Grid.
160 http://www.ripuc.org/eventsactions/docket/4288-DGB-2014-DG-CP-Rept(12-16-13).pdf
161 http://www.ripuc.org/eventsactions/docket/4437-NGrid-Ord21234_11-4-13.pdf
162 http://www.mass.gov/eea/pr-2013/reneable-procurement.html

9. MATURE THE RENEWABLE THERMAL MARKET

Implement a market development strategy to stimulate increased adoption of renewable thermal fuels

ESTIMATED NEED: 15% RENEWABLE SUPPLY OF THERMAL ENERGY BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

Although thermal energy consumption represents approximately one-third of all energy use nationwide, policy support has traditionally been lacking for renewable thermal and heating fuels—biomass, solar hot water, ground- and air-source heat pumps, advanced biofuels, and biogas.[163] Rhode Island is no exception to this rule. Electric renewable energy technologies benefit from a wide variety of policy incentives, such as the Renewable Energy Standard (RES), Net Metering, Distributed Generation (DG) Standard Contracts, and Long Term Contracting (LTC) for Renewable Energy Standard statutes. Dedicated funding for these technologies exists through the Renewable Energy Fund (REF), which allocates an annual pool of approximately $2 million of ratepayer funds collected through a monthly renewable energy surcharge on electric customer utility bills. Alternative Compliance Payments (ACPs) paid by obligated entities under the RES further supply the REF with additional funds during periods of REC shortages. Such ACP payments can be significant; during RES Compliance Year 2011, the REF received over $5.2 million in ACPs.[164]

Renewable thermal technologies, however, do not benefit from the policy and funding structures that support electric technologies in Rhode Island. The REF lacks the ability to make substantial investments in thermal technologies because its funds originate from electric ratepayers. Other existing renewable policies allow participation only if electric technologies are involved. Therefore, to transform the thermal market and to increase penetration of renewable technologies within the thermal sector, a stable and consistent source of funding for renewable thermal energy is critical.

[163] http://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0711_full%20paper.pdf
[164] http://www.ripuc.org/utilityinfo/PUC-RES-AnnualReport2011.pdf

Summary

This strategy recommends implementing a market development strategy to stimulate increased adoption of renewable thermal fuels. The strategy should be designed to address major market barriers including comparatively high upfront costs; a dominant conventional heating and cooling industry unfamiliar with offering or delivering the technologies; poor public awareness of the economic, environmental, and societal benefits; and opaque regulatory standards.[165]

As part of the strategy, the General Assembly should examine options for an institutionalized funding mechanism to support the market for renewable thermal fuels. Policy makers might consider the suitability of expanding the existing Renewable Energy Standard with a "carve-out" designated specifically for renewable thermal technologies. An RES carve-out, if structured appropriately, could help stimulate the renewable energy thermal market in two major ways: (1) helping to defray upfront costs of renewable thermal fuel adoption, and (2) providing a performance-based subsidy in the form of renewable energy credit operating revenue.[166]

Experience in Other States

States in the Northeast and elsewhere have started recognizing and addressing the significant gap in integrated policy support for renewable thermal fuels. Several of these jurisdictions are experimenting with a familiar policy tool long used to incentivize renewable electric technologies—the Renewable Portfolio Standard, or RPS—as a new way of incentivizing the renewable thermal market. In 2012, legislation passed in New Hampshire creating a carve-out for eligible thermal renewable energy technologies in that state's RPS, and setting specific annual targets.[167] A legislative proposal in Massachusetts (SB1593, January 2013) included renewable thermal in the state's Alternative Portfolio Standard.[168] Several other states—including Maryland, Colorado, New Mexico, and Connecticut—are considering adding renewable thermal technologies in their RPS mandates, or have already done so.

Although the thermal sector accounts for approximately one-third of Rhode Island energy consumption, virtually no renewable thermal market exists in the state

RATIONALE

Need

Although the thermal sector accounts for approximately one-third of Rhode Island energy consumption, virtually no renewable thermal market yet exists in the state. Renewable thermal fuels can provide energy security, economic, and environmental benefits. Rhode Island, like other New England states, relies essentially solely on carbon-based heating fuels that are either costly (petroleum-based), constrained (natural gas), or both. Thus, renewable thermal fuels can play a vital role in diversifying the state's thermal portfolio. Expanding the renewable thermal fuel market could help allay the economic burden of high heating costs on Rhode Islanders. In many instances, renewable thermal fuels offer lifecycle cost savings compared to petroleum-based heating fuels, and in some cases, natural gas.[169] Finally, it is becoming

[165] http://www.mass.gov/eea/docs/doer/pub-info/heating-and-cooling-in-aps.pdf
[166] http://www.mass.gov/eea/docs/doer/pub-info/heating-and-cooling-in-aps.pdf
[167] http://www.gencourt.state.nh.us/legislation/2012/SB0218.html
[168] https://malegislature.gov/Bills/188/Senate/S1593
[169] http://www.mass.gov/eea/docs/doer/renewables/renewable-thermal-study.pdf

increasingly clear that renewable thermal must play a role in any strategy for reducing greenhouse gas emissions, without which ambitious reduction targets are not possible.

Alignment with Performance Measure Targets and Modeling

To meet the 45 percent carbon emission reduction performance measure target modeled in Scenario 3, the market share of renewable thermal technologies—such as biofuels, solar thermal, and geothermal—must expand dramatically. The Plan's modeling suggests that an energy supply target of approximately 15 percent from renewable thermal energy by 2035 would assist in achieving the security and sustainability outcomes modeled in both Scenarios 1 and 3 (**Figure 4**). Compared to New Hampshire's renewable thermal fuel target of 2 percent by 2025, a 15 percent carve-out by 2035 is more ambitious; further detailed analysis would be needed to determine actual levels. The thermal sector promises the greatest potential, of all the sectors, for demand reduction—perhaps as much as a 50 percent reduction[170] according to the modeling. However, greenhouse gas reduction targets will be impossible without further contributions from renewable thermal supply in meeting remaining heating loads not served by efficiency measures.

Rhode Island Thermal Demand - 2035

	2013	*BAU*	*Scenario 1*	*Scenario 2*	*Scenario 3*
Natural Gas	60%	60%	53%	74%	53%
Distillate Fuel Oil	34%	31%	25%	16%	25%
Other Petroleum	6%	8%	7%	9%	7%
Renewables/Electricity	0%	2%	15%	1%	15%
TOTAL	100%	100%	100%	100%	100%

Source: Navigant scenario modeling

Figure 4. Projected thermal demand in 2035 in Rhode Island, by scenario.

IMPLEMENTATION

Legal Authority

Rhode Island General Law §39-26 established the Renewable Energy Standard. Authority to provide tax incentives for renewable energy including solar space heating, solar domestic hot water, and geothermal heat pumps exists in §44-57, but is inactive because of changes in 2010 to §44-30-2.6.

Lead and Supporting Actors

LEAD	SUPPORTING
Office of Energy Resources	• General Assembly • Commerce RI • Gas distribution companies • Unregulated fuel distributors

Expected Costs / Potential Funding

Program costs are uncertain, but likely to be in the millions of dollars. The results of the modeling show high levels of thermal sector capital investment in renewables and efficiency, ranging from approximately

[170] 2010 RI thermal demand was approximately 63,269 BBTU; 2035 RI thermal demand after aggressive demand reductions modeled in Scenario 2 was approximately 31,599 BBTU

$30 million to $80 million in average annual expenditures above the business-as-usual condition. In Scenario 1 and Scenario 3, a portion of this investment represents efforts to mature the renewable thermal fuel market. Despite the significant costs, failure to support a renewable thermal fuel market in Rhode Island will ignore a momentous economic opportunity to provide lifecycle cost savings[171] to consumers, while stemming the tide of energy dollars exiting the state used to pay for petroleum and gas heating products.

Design or Implementation Issues

Identifying appropriate sources for the proposed level of renewable thermal fuel funding will be very challenging. Equitable and fair policy design should attempt to minimize cross-subsidization: ideally, any group bearing the cost of a program should be eligible to benefit from the program. Careful analysis should address the costs and benefits of various funding strategies and ways to ameliorate the economic impact of compliance on all possible obligated entities, whether electric and gas distribution companies, fuel distributors, or other groups.

[171] http://www.mass.gov/eea/docs/doer/renewables/renewable-thermal-study.pdf

10. EXPAND USE OF BIOFUELS

Increase the biodiesel content of distillate fuel blends used by Rhode Island's thermal and transportation sectors

ESTIMATED REQUIREMENT: B20 STANDARD BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY	•EXISTING	•NEAR TERM (0-5 YEARS)
•COST-EFFECTIVENESS	•EXPANDED	•LONG TERM (0-20 YEARS)
•SUSTAINABILITY	•NEW	
•ELECTRIC		
•THERMAL		
•TRANSPORTATION		

STRATEGY DESCRIPTION

Background

Biofuels are liquid fuels derived from organic substances, including recycled cooking grease, plant residues, animal fats, and other renewable feedstocks. Biodiesel, an important member of the biofuel family, is most commonly used in thermal and transportation applications and typically blended with conventional petroleum products to create distillate fuel blends. "B5" blends, for instance, contain a mixture of 95 percent conventional oil and 5 percent biodiesel.

To promote the production and use of biofuels in the state, the Rhode Island General Assembly passed the Biodiesel Heating Oil Act of 2013.[172] Now Rhode Island General Law § 23-23.7, the Act sets a compliance schedule ramping up to a 5 percent biofuel blend minimum standard for all heating oil sold in the State by July 1, 2017.

In addition, on June 24, 2014, the Rhode Island Department of Environmental Management (DEM) Office of Air Resources amended Air Pollution Control Regulation No. 8 to further limit the sulfur content of fuels, including distillate and residual fuel oils.[173] Reducing the sulfur content of heating fuels helps improve the efficiency of existing heating systems, and enables the adoption of higher efficiency new boilers and furnaces.

Summary

This strategy recommends increasing the biodiesel content of distillate fuel blends used by Rhode Island's thermal and transportation sectors. Policy makers should evaluate the suitability of

[172] http://webserver.rilin.state.ri.us/Statutes/TITLE23/23-23.7/INDEX.HTM
[173] http://www.dem.ri.gov/pubs/regs/regs/air/air08_14.pdf

increasing the existing 5 percent biofuel blending mandate to a statewide B20 standard by 2035. Policy design should consider ways to expand the requirement beyond heating oil to all distillate fuels entering the State, allowing for penetration of B20 blends into the diesel fuel transportation market as well.

Experience in Other States

Many states across the nation have enacted biodiesel blend mandates, including a number in the Northeast. Massachusetts enacted the Clean Energy Biofuels Act in 2008, which required a minimum of 5 percent advanced biofuel in all diesel fuel and home heating fuel sold in the Commonwealth.[174] The Vermont Energy Act of 2011 requires a B7 blend for all heating oil sold in state by 2016.[175] In 2013, New York adopted a statewide B2 mandate by 2015.[176] As of 2013, Minnesota, Oregon, Washington, Pennsylvania, New Mexico, and Louisiana had instituted biodiesel blend mandates for diesel fuel used in on-road vehicles.[177] Retailers throughout the United States already offer B20 biodiesel blends for transportation.[178]

RATIONALE

Need

Rhode Island, like other Northeastern states, relies heavily on oil for heating and transportation needs. Nearly 40 percent of Rhode Island households and businesses are home heating oil customers.[179] Many live in locations lacking either the population density or the geography (high water tables near the coast) to make installations of natural gas mains feasible. Increasing the biodiesel content of heating oil used by these customers will furnish automatic environmental benefits in the form of reduced carbon and criteria pollutant emissions in all end-use applications.

Alignment with Performance Measure Targets and Modeling

The scenario modeling indicates that under any scenario, distillate fuel oil will remain Rhode Island's most important thermal sector heating fuel second only to natural gas. In 2035, heating oil will likely account for at least 17 percent of thermal-sector fuel consumption and perhaps as much as 32 percent. Because the scenario modeling indicates that Rhode Island will continue to rely on distillate fuel for the foreseeable future, it is necessary to explore ways to reduce the carbon intensity of the fuel source, while generating benefits to Rhode Island's economy in the form of a growing biodiesel industry. Modeling considered increases in the biodiesel content of distillate heating fuels for both Scenario 1 and Scenario 2, targeting B10 and B20 blends, respectively. The analysis indicated that a B20 minimum mandate by 2035 would likely be necessary to achieve the Energy 2035 greenhouse gas emission reduction performance measure target of 45 percent below 1990 levels.

A B20 minimum mandate by 2035 would likely be necessary to achieve the Energy 2035 greenhouse gas emission reduction performance measure target of 45% below 1990 levels

IMPLEMENTATION

[174] https://malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter206
[175] http://www.leg.state.vt.us/docs/2012/Acts/ACT047.pdf
[176] http://www.biodiesel.org/news/biodiesel-news/news-display/2013/06/24/industry-groups-cheer-new-york-bioheat-legislation
[177] https://www.federalregister.gov/articles/2012/09/27/2012-23344/regulation-of-fuels-and-fuel-additives-2013-biomass-based-diesel-renewable-fuel-volume#t-5
[178] http://www.biodiesel.org/using-biodiesel/finding-biodiesel/retail-locations/retail-map
[179] http://www.eia.gov/state/data.cfm?sid=RI#ConsumptionExpenditures

Legal Authority

Rhode Island General Law § 23-23.7 provides the statutory basis for biodiesel blend requirements.

Lead and Supporting Actors

LEAD	SUPPORTING
Office of Energy Resources	• General Assembly • Department of Environmental Management • Distillate fuel wholesalers and retailers

Expected Costs / Potential Funding

It is possible that either wholesale or retail distillate fuel distributors might face additional costs if there is a biofuel blend mandate. Massachusetts found that some wholesale terminals, where product is typically blended, required capital upgrades as high as $3 million to install the necessary equipment for biodiesel storage, blending, and distribution.[180] No such concerns have been raised in Rhode Island to date. However, the situation warrants monitoring as policy makers consider increases in the mandate. As a result of these concerns about compliance cost, including uncertainties surrounding the reinstatement of the federal biodiesel blender tax credit, the Massachusetts Department of Energy Resources (DOER) suspended the Commonwealth's advanced biofuel content mandate in 2010.[181]

Rhode Island should not incur significant additional direct costs due to the mandate, other than perhaps minor administrative costs to enforce compliance. Because biofuel is a "drop-in replacement" fuel, customers are not faced with the same upfront cost barrier associated with fuel-switching to other heating fuels. Additionally, the incremental cost of blended fuel should be minimal, so long as the price of oil remains relatively high.

Design or Implementation Issues

Most manufacturer warranties for engines, heating furnaces, boilers, and other systems guarantee components only for use with B5 biodiesel blends or less. As policy makers consider biofuel blend mandate increases, equipment manufacturers will need to resolve any potential performance issues associated with higher biodiesel content in fuel blends. Even if manufacturers extend warranties on new products to cover B20 blends, older systems might not be designed to accommodate such high levels of biodiesel content.

Other potential concerns involve uncertainty associated with the amount and characteristics of biodiesel content in blends. Because ASTM International technical standards currently allow for B5 biodiesel blends to be treated as conventional fuel oil, the biodiesel content of product imported into a fuel terminal may be unclear.[182] Further blending could result in blends exceeding the minimum standard, posing concerns about warranty and insurance coverage. Rhode Island wholesale distributors, however, currently test product at the fuel terminal for biodiesel content before blending, obviating this potential problem.[183] In a separate but related matter, Rhode Island law does not currently address the complexities surrounding the heterogeneous nature of biofuel products, which often display a wide range in actual carbon footprint. Massachusetts distinguishes between "conventional biodiesel" and "advanced biodiesel," which the Commonwealth defines as a fuel yielding at least a 50 percent reduction in lifecycle GHG emissions compared with fossil fuels.[184] As Rhode Island policy makers consider increases to Rhode Island's biofuel

[180] http://www.mass.gov/eea/docs/doer/renewables/renewable-thermal-study.pdf
[181] http://www.mass.gov/Eoeea/docs/Eoeea/docs/doer/renewables/biofuels-mandate-announcement-jun302010.pdf
[182] http://www.astm.org/SNEWS/ND_2008/D02E0_nd08.html
[183] Personal communication, Julie Gill, Oil Heat Institute, December 10, 2013
[184] https://malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter206

blending mandate, addressing this issue might become key to ensuring that the law fulfills its intended environmental policy objectives.

11. PROMOTE ALTERNATIVE FUEL AND ELECTRIC VEHICLES

Mature the market for alternative fuel and electric vehicles through ongoing efforts to expand fueling infrastructure, ease upfront costs for consumers, and address other barriers to adoption

ESTIMATED NEED: 25 - 40% ALTERNATIVE FUEL USE BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

Nearly 920,000 vehicles are registered in Rhode Island,[185] and almost all of these vehicles use motor gasoline or diesel for fuel.[186] Vehicles using alternative transportation fuels such as biofuels, electricity, hydrogen, natural gas, and propane can often provide lifetime fuel savings, performance improvements, and reduced harmful emissions compared to conventional vehicles. Despite the economic and environmental benefits, several market barriers currently discourage widespread adoption of these vehicles.

Rhode Island policy makers have begun exploring ways to address two of the primary barriers to alternative vehicle adoption: a lack of fueling infrastructure and high upfront purchase costs to consumers. To address a need for electric vehicle public charging, Governor Lincoln Chafee announced in June 2013 that the Rhode Island Office of Energy Resources (OER) would use funds from the American Recovery and Reinvestment Act (ARRA) of 2009 to purchase and install 50 electric vehicle charging stations around the state.[187] Also in 2013, two bills that would have provided a 30 percent tax credit for alternative fuel infrastructure—House Bill 5813[188] and Senate Bill 128[189]—were introduced but held for further study. As of January 2014, the state has a dozen other fueling stations for compressed natural gas, biodiesel, and propane.[190]

185 http://www.fhwa.dot.gov/policyinformation/statistics/2011/pdf/mv1.pdf
186 http://www.eia.gov/state/seds/sep_sum/html/pdf/sum_btu_tra.pdf
187 http://www.ri.gov/press/view/19599
188 http://webserver.rilin.state.ri.us/BillText/BillText13/HouseText13/H5813.pdf
189 http://webserver.rilin.state.ri.us/BillText/BillText13/SenateText13/S0128.pdf
190 http://www.afdc.energy.gov/locator/stations/

Several policy proposals have been put forward to help defray the upfront costs of alternative vehicles, including 2013 Senate Bill 129[191] and 2013 Senate Bill 28.[192] These would have offered an excise tax exemption for electric vehicles and a similar exemption for sales and use taxes, respectively. Policy EN.3.f in the Rhode Island Long Range Transportation Plan "Transportation 2035" (LRTP 2035) proposed legislation establishing a revenue-neutral "Vehicle Efficiency Incentive Program," providing rebates to purchasers of fuel-efficient vehicles, funded by fees levied on purchases of inefficient vehicles.[193]

In October 2013, Governor Chafee announced Rhode Island's participation in a multi-state effort to put 3.3 million zero-emission vehicles (ZEVs) on the road by 2025.[194] Through the initiative, the eight partner states will determine measurable goals for ZEV deployment; promote ZEV readiness through favorable building codes, electric rates, and metering options; increase ZEV purchases for public fleets; offer monetary and non-monetary incentives for ZEVs; and develop uniform standards for signage, payment processes, and interoperability of networks.[195]

Alternative fuels could supply between 25% and 40% of Rhode Island's transportation energy needs in 2035

Summary

This strategy recommends maturing the market for alternative fuel and electric vehicles through ongoing efforts to expand fueling infrastructure, ease upfront costs for consumers, and address other barriers to adoption. The State should cultivate and maintain existing interagency collaborations between the OER, the Rhode Island Department of Transportation (RIDOT), the Department of Motor Vehicles (DMV), and the Department of Environmental Management (DEM). It should also encourage stakeholder partnerships—namely, the Ocean State Clean Cities Coalition (OSCCC). These groups can provide ongoing forums to monitor alternative fuel vehicle market growth; evaluate the potential need for additional infrastructure; identify regulatory reforms to facilitate increased market penetration; and implement strategies to increase the use of alternative fuels for public transportation and state or municipal fleets. Separate but parallel grid modernization efforts should support discussions on how to smoothly integrate electric vehicles into the marketplace. In the near term, policy makers should evaluate the economic case for establishing a revenue-neutral "feebate" incentive program for purchasing higher-efficiency vehicles, including alternative fuel vehicles.

Experience in Other States

States around the country are implementing hybrid and electric vehicle incentives, including high-occupancy vehicle lane exemptions; monetary incentives; vehicle inspection or emissions test exemptions; and parking incentives.[196] As part of its Clean Energy and Climate Plan for 2020, Massachusetts proposed establishing a sliding-scale car sales tax, designed as a revenue-neutral way to encourage consumers to purchase efficient and alternative fuel vehicles.[197] As of January 2014, the United States had more than 12,000 alternative fueling stations.[198]

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191 http://webserver.rilin.state.ri.us/BillText/BillText13/SenateText13/S0129.pdf
192 http://webserver.rilin.state.ri.us/BillText/BillText13/SenateText13/S0028.pdf
193 http://www.planning.ri.gov/documents/trans/LRTP%202035%20-%20Final.pdf
194 http://www.ri.gov/press/view/20551
195 http://www.mass.gov/eea/docs/dep/air/priorities/zev-mou-final.pdf
196 http://www.ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx#states
197 http://www.mass.gov/eea/docs/eea/energy/2020-clean-energy-plan.pdf
198 http://www.afdc.energy.gov/locator/stations/

RATIONALE

Need

Federal policy—namely, the joint fuel economy and motor vehicle emissions standards promulgated by the U.S. Department of Transportation, the National Highway Traffic Safety Administration, and the U.S. Environmental Protection Agency will help nearly double the fuel efficiency of average vehicles by 2025.[199] The standards will spur auto manufacturers to offer not only higher-efficiency vehicles to consumers, but also an expanded selection of alternative vehicle types. As a state, Rhode Island has limited ability to influence the availability of alternative fuel vehicles; however, the state can hasten their adoption by influencing consumer choice through incentives and disincentives, and reducing market barriers.

Alignment with Performance Measure Targets and Modeling

All of the modeled scenarios display an increase in the use of transportation alternative fuels: compressed natural gas, electric vehicles and biofuels.[200] This suggests that the adoption of alternative fuels provides underlying or explicit benefits for each of the security, economic, and sustainability themes. Although the modeling analysis demonstrated significant opportunities for transportation sector demand reduction—at least one-third in every scenario—it is clear that without increases in the market share of alternative fueled vehicles, it is very difficult or impossible to meet the Energy 2035 performance measure targets. The results of the modeling suggested that alternative fuels could supply between 25 percent and 40 percent of Rhode Island's transportation energy needs in 2035 (Figure 5). The expansion of alternative fuel markets will (1) support transportation sector fuel diversification displacing gasoline, the dominant fuel; (2) help contain and decrease transportation fuel costs by offering (in general) lower-cost alternatives to gasoline and other conventional fuels; and (3) assist in meeting the 45 percent greenhouse gas emission reduction performance measure target by further lowering the carbon intensity of the transportation fuel mix after demand reduction measures have been exhausted.

Natural Gas: The scenario modeling results showed major opportunities for expanding the use of natural gas in transportation. Substantial increases in the consumption of compressed natural gas are already built into the business-as-usual (BAU) forecast. In Scenarios 1 and 2, natural gas' market share is approximately double that of the BAU condition, representing a dramatic increase to about 40 percent of the total sector fuel use. According to Navigant's resource targets, achieving this outcome roughly corresponds to the real-world equivalent of converting all public and private buses to natural gas.

Biofuels: Diesel fuel currently accounts for a material portion of Rhode Island transportation fuel consumption. Establishing a mandatory bioblend standard for transportation diesel fuel consumed in the state would assist in decreasing GHG emissions from vehicles using this fuel. Scenario 3 modeled a B20 blend of biodiesel by 2035, equivalent to biofuels' providing about 5 percent of total transportation fuel needs. Refer to **Strategy 10, Expand Use of Biofuels**, for a more detailed description of opportunities to expand the use of bioblends in Rhode Island.

Electric Vehicles: The scenario modeling showed increases in electric vehicles (EVs) in all scenarios. By 2035, the BAU shows 7,000 EVs; Scenarios 1 and Scenario 2 show 17,200 EVs; and Scenario 3 shows 84,900 EVs. Based on 2011 data[201] documenting 527,589 registered passenger vehicles in Rhode Island, Scenario 3 suggests that 20 years from now, 16.1 percent of all passenger cars could be EVs. With this

[199] http://www.nhtsa.gov/About+NHTSA/Press+Releases/2012/Obama+Administration+Finalizes+Historic+54.5+mpg+Fuel+Efficiency+Standards

[200] With the exception of biofuels in Scenario 2 and natural gas in Scenario 3.

[201] http://www.fhwa.dot.gov/policyinformation/statistics/2011/pdf/mv1.pdf

estimate, electricity would account for approximately 4 percent of total transportation fuel consumption. Assuming a 10-year average turn-over of the fleet, achieving this outcome would require an aggressive and concerted effort to replace conventional vehicles with EVs.

Rhode Island Transportation Demand - 2035

	2013	*BAU*	*Scenario 1*	*Scenario 2*	*Scenario 3*
Gasoline	73%	56%	32%	29%	47%
NG	3%	13%	39%	42%	17%
DFO	16%	22%	19%	22%	19%
Jet-A	7%	8%	7%	7%	8%
RFO	0%	0%	0%	0%	0%
Propane	0%	0%	0%	0%	0%
E85	0%	0%	0%	0%	0%
Bio	0%	0%	2%	0%	5%
Electric	0%	0%	1%	1%	4%
TOTAL	100%	100%	100%	100%	100%

Source: Navigant scenario modeling

Figure 5. Island's modeled demand for transportation, by fuel, and by scenario, compared to the business-as-usual condition.

IMPLEMENTATION

Legal Authority

None currently exists.

Lead and Supporting Actors

LEAD	SUPPORTING
Office of Energy Resources	• General Assembly • Department of Transportation • Department of Environmental Management • Department of Motor Vehicles • Electricity and natural gas distribution companies • Public Utilities Commission • Ocean State Clean Cities Coalition

Expected Costs / Potential Funding

Alternative fueling infrastructure is costly. The state expended more than $780,000 in ARRA funds to site and install a network of 50 electric vehicle charging stations in Rhode Island during 2013.[202] A "feebate" incentive program for higher-efficiency and alternative-fuel vehicles, however, could be designed as a revenue-neutral policy. Developing uniform standards, regulations, and policies to facilitate the adoption of alternative fuel vehicles requires administrative funding only. Finally, because RIDOT and the Rhode Island Public Transit Authority (RIPTA) have historically relied on state and federal gasoline taxes for funding

[202] http://www.ri.gov/press/view/20373

transportation operations and infrastructure improvements, decreases in gasoline consumption from increases in alternative fuel and electric vehicles will affect the state's ability to fund transportation activities, absent changes to these funding structures.

Design or Implementation Issues

Experience in Rhode Island with most alternative fuel vehicles is fairly recent. In some cases, entirely new standards and regulatory structures must be developed to support deployment of these vehicles—for example, electric vehicles. Siting and managing alternative fueling stations also present a challenge in terms of identifying suitable locations that balance the considerations of cost-effectiveness, public access, and visibility.

12. ENHANCE ENERGY EMERGENCY PREPAREDNESS

Develop a short- and long-term strategy for mitigating critical infrastructure energy security risks and investing in power resiliency solutions

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

A 2013 report prepared by the Obama administration found that 670 widespread weather-related power outages occurred nationwide over the past decade, with an estimated annual cost to the U.S. economy of between $18 billion and $33 billion.[203] Rhode Island has witnessed many severe weather events over the last four years, including floods, blizzards, extended heat waves, extreme cold snaps, and hurricanes. These events pose significant energy security risks to the state. For example, during Blizzard Nemo in February 2013, all of the fuel terminals in the state lost electrical power for two days and were unable to provide gasoline, diesel, heating oil, and jet fuel to gas stations, homes, and airports. During Superstorm Sandy, approximately 120,000 electricity customers and 1,200 natural gas customers lost service, and five days passed until National Grid was able to restore electric power to 100 percent of the state's utility customers.[204]

Rhode Island has already taken initial steps to gather high-level information on energy emergency considerations through the development of an Energy Assurance Plan (EAP),[205] which was funded through an American Recovery and Reinvestment Act (ARRA) State Energy Program grant in 2012. The State, however, has not yet drawn on the recommendations of the EAP to design and implement a comprehensive, targeted strategy addressing energy security vulnerabilities at the municipal or facility level, specifically at discrete critical infrastructure assets—hospitals, police and fire stations, water and sewage treatment plants, senior centers and nursing homes, shelters, correctional facilities, fueling stations, and grocery stores. Smart energy security investments at these locations and energy resiliency solutions could help alleviate the effects of power outages and fuel supply disruptions in energy emergencies. Examples of such

[203] http://energy.gov/sites/prod/files/2013/08/f2/Grid%20Resiliency%20Report_FINAL.pdf
[204] National Grid 2012 Public Safety Meeting, November 2012.
[205] http://www.recovery.ri.gov/programs/energy/EnergyAssurance.php

solutions are backup generation, fuel reserves, distributed generation, combined heat and power, energy storage, and microgrids. In addition, vulnerability assessments and strategic long-term planning are necessary for improving the resiliency of key critical facilities in the face of future impacts of climate change. Critical energy infrastructure in the state, including the fuel terminals at the Port of Providence, are likely to be at risk for such impacts, especially sea level rise.[206]

Summary

This strategy recommends the formation of a working group charged with the task of developing a short- and long-term strategy for mitigating critical infrastructure energy security risks and investing in power resiliency solutions. The working group should convene the appropriate set of stakeholders to review the state of current critical infrastructure, fully characterize the need for resiliency investments, assess existing information and options, evaluate costs and benefits—and most important, devise a sustained and institutionalized funding mechanism to help ensure that the recommended energy security improvements can be made to critical infrastructure locations throughout the state.

Experience in Other States

Distributed resilient power systems and energy emergency response protocols are critical to protecting energy security at the facility and municipal levels

Presidential directives issued by the Obama administration emphasize the importance of critical infrastructure security and power resiliency.[207] [208] As a result of federal policy and stimulus investment in state-level energy planning, each of the 50 states is moving to implement comprehensive energy assurance and emergency planning initiatives.[209] In the Northeast in particular, states battered by storms like Hurricane Sandy are investing in power resiliency solutions,[210] and are exploring applications of energy resilience technologies like microgrids. The New York State Energy Research and Development Authority (NYSERDA) published its first study on microgrid efficacy, including the use of microgrids in emergency situations in 2010.[211] A microgrid run by a 13.4 MW combined heat and power system kept New York University heated and powered while the rest of lower Manhattan was dark in the wake of Superstorm Sandy.[212] In Connecticut, the 2012 passage of PA 12-148, "An Act Enhancing Emergency Preparedness and Response," established a grant program to fund microgrid pilot projects, drawing on best practices from other states.[213,214,215]

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[206] http://www.planning.ri.gov/geodeminfo/data/slr.php
[207] http://www.whitehouse.gov/the-press-office/2013/02/12/presidential-policy-directive-critical-infrastructure-security-and-resil
[208] http://www.whitehouse.gov/the-press-office/2013/11/01/executive-order-preparing-united-states-impacts-climate-change
[209] http://energy.gov/sites/prod/files/National%20Energy%20Assurance%20Planning%20Conference_After%20Action%20Report_082112_1.pdf
[210] http://www.cleanenergystates.org/projects/power-resiliency-adaptation-and-the-role-of-states/
[211] "Microgrids: An Assessment of the Value, Opportunities and Barriers to Deployment in New York State", http://stuff.mit.edu/afs/athena/dept/cron/project/EESP-Cambridge/microgrid/NYS-Microgrids-Roadmap.pdf
[212] http://www.eenews.net/stories/1059987045
[213] http://www.cga.ct.gov/2012/SUM/2012SUM00148-R02SB-00023-SUM.htm
[214] http://www.cga.ct.gov/2012/rpt/2012-R-0417.htm
[215] http://www.cleanegroup.org/assets/Uploads/2013-Files/Reports/CT-Microgrids-project-summary-Sept2013.pdf

RATIONALE

Need

The increasing frequency of extreme storm events and the ongoing possibility of future natural or manmade disasters pose serious energy security risks to the State of Rhode Island. The likelihood that future events will occur is high, and without preemptive efforts to address critical infrastructure energy resiliency, Rhode Island could face disastrous consequences, including loss of life and significant economic damage.

Alignment with Performance Measure Targets and Modeling

Energy security is one of the three themes of the Energy 2035 Vision. Although diversifying fuel sources can mitigate the overall impact of an energy supply disruption, distributed resilient power systems and energy emergency response protocols are critical to protecting energy security at the facility and municipal levels. The Plan's scenario modeling did not consider the impact of resiliency investments at such a granular scale; however, Scenario 1 modeled the deployment of 200 MW of energy storage, and Scenario 3 modeled the deployment of 150 MW. Adding comparable levels of in-state energy storage would represent a significant investment in power system resiliency, providing substantial energy security benefits but likely at a significant cost.

IMPLEMENTATION

Legal Authority

Title 30 of Rhode Island General Law addresses most aspects of state emergency management.

Lead and Supporting Actors

LEAD	SUPPORTING
Office of Energy Resources	• Emergency Management Agency • Division of Public Utilities and Carriers • Division of Planning • Department of Environmental Management • Department of Health • Department of Transportation • Electric and gas distribution companies • Fuel terminal operators, and wholesale and retail fuel distributors

Expected Costs / Potential Funding

Expected costs vary by need and vulnerability of existing critical infrastructure. The working group could better quantify likely costs from research and experience in other states. Connecticut's Microgrid Grant and Loan Pilot Program Round I funded $18 million[216] in projects, with a $25 million bond authorization.[217] The group should conduct a thorough review of possible other existing funding sources and potential novel methods of financing critical infrastructure energy resiliency investments.[218]

[216] http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/40cb9336a459e06185257bb20052b8ff/$FILE/Microgrids%20Funding%20Chart%20Final.pdf

[217] http://www.cga.ct.gov/2012/SUM/2012SUM00148-R02SB-00023-SUM.htm

[218] e.g. "Using State RPSs to Promote Resilient Power at Critical Infrastructure Facilities" http://www.cleanenergystates.org/assets/2013-Files/RPS/Using-State-RPSs-to-Promote-Resilient-Power-May-2013.pdf

Design or Implementation Issues

Intrastate and interstate energy emergency preparedness, planning, and implementation require collaboration among multiple governmental, private-sector, and institutional actors that do not always interact in their day-to-day business.

13. MODERNIZE THE GRID

Develop recommendations for electric grid, rate, and regulatory modernization

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

The Comprehensive Energy Conservation, Efficiency, and Affordability Act of 2006 set forth Rhode Island's commitment to "System Reliability and Least-Cost Procurement" in Rhode Island.[219] Now Rhode Island General Law § 39-1-27.7,[220] this mandate contains an innovative provision requiring electric distribution companies to develop annual system reliability plans for review by the Rhode Island Energy Efficiency and Resource Management Council (EERMC) and adoption by the Rhode Island Public Utilities Commission (RIPUC). System reliability plans evaluate the potential of "non-wires alternatives"—energy efficiency, demand response, distributed generation, and other methods—to curtail electric load in constrained areas of the distribution network. The latest 2013 System Reliability Procurement report focuses on deploying energy efficiency and WiFi thermostats in the particularly load constrained areas of Tiverton and Little Compton to defer a major investment in distribution system infrastructure.[221]

In 2010, the Rhode Island General Assembly passed a bill that decoupled utility revenues from energy sales. Now Rhode Island General Law § 39-1-27.7.1,[222] revenue decoupling realigned regulatory incentives such that investing in energy efficiency and overall system reliability is in the best interest of electric distribution companies. The statute also requires National Grid, the state's major electric gas distribution company, to submit an annual Electric Infrastructure, Safety, and Reliability Plan (Electric ISR Plan). The purpose of the Electric ISR Plan is to "protect and improve the electric delivery system through repairing failed or damaged equipment, addressing load growth/migration, sustaining system viability through targeted investments driven primarily by condition, continuing a level of feeder hardening and cutout

[219] http://www.ripuc.org/eventsactions/docket/3759-RIAct.pdf
[220] http://webserver.rilin.state.ri.us/Statutes/title39/39-1/39-1-27.7.HTM
[221] http://www.ripuc.org/eventsactions/docket/4367-NGrid-SRP-2013Plan(11-2-12).pdf
[222] http://webserver.rilin.state.ri.us/Statutes/title39/39-1/39-1-27.7.1.HTM

replacement, and operating a cost-effective vegetation management program."[223] Costs are recovered through an annual rate reconciliation mechanism.

Least-Cost Procurement and Revenue Decoupling rules form the existing basis for aligning electric rates and regulation with the goal of cost-effective system reliability in Rhode Island. To truly move towards the "utility of the future," however, further efforts to address grid modernization are needed. In July 2013, Massachusetts released an Electric Grid Modernization Report to the Department of Public Utilities.[224] The report identified both customer-facing and grid-facing options to support the intended outcomes of a modernized electric grid: (1) preventing power outages, (2) reducing the impact of outages, (3) optimizing demand, (4) integrating distributed resources, and (5) workforce and asset management. Establishing a working group to examine the results of the Massachusetts Grid Modernization Report and preparing a similar report taking into account the unique regulatory and rate structures in Rhode Island would help the state begin to chart a path forward on modernizing the electric grid and enhancing system reliability.

As new smart grid and clean energy technologies become increasingly cost-competitive and sophisticated, the traditional model of distribution system management must adapt

Summary

This strategy recommends convening a working group to develop recommendations for electric grid, rate, and regulatory modernization in Rhode Island. The working group should convene the appropriate set of stakeholders to examine key issues: current status of electric grid infrastructure modernization in Rhode Island, modernization objectives and an implementation strategy for customer- and grid-facing elements, evaluating costs and benefits, cost recovery, customer engagement, and security and privacy concerns.

Experience in Other States

Massachusetts released an Electric Grid Modernization Report in July of 2013.[225] New York established a public-private partnership called the Smart Grid Consortium in 2008[226] that addresses grid modernization activities.[227] Other Northeast states—Pennsylvania, Vermont, and Maine—rank in the top 15 of GridWise's grid modernization index.[228] Massachusetts already has a time-of-use pricing rate (R-4) in its rate tariff with National Grid.[229] Time-of-use pricing is also present in Connecticut power rate tariffs.[230]

RATIONALE

Need

The design and operation of the electric distribution grid has changed little over the past century. As new smart grid and clean energy technologies become increasingly cost-competitive and sophisticated, the traditional model of distribution system management must adapt. Over the coming decades, investments in the grid of the future—grid hardening, non-wires alternatives, advanced metering infrastructure (AMI) technologies, distributed generation, and energy storage—offer the potential to yield substantial consumer

[223] http://www.ripuc.org/eventsactions/docket/4382-NGrid-2014-ISR-Electric(12-28-12).pdf
[224] http://magrid.raabassociates.org/
[225] http://www.mass.gov/eea/docs/dpu/electric/grid-mod/ma-grid-mod-working-group-report-07-02-2013.pdf
[226] http://www.nyserda.ny.gov/Statewide-Initiatives/NYS-Smart-Grid-Consortium.aspx
[227] http://nyssmartgrid.com/innovation-highlights/new-york-state-grid-modernization-activities/
[228] http://www.gridwise.org/uploads/reports/GWA_13_GMIReport_FINAL.pdf
[229] http://www.nationalgridus.com/masselectric/home/rates/4_tou.asp
[230] http://www.cl-p.com/downloads/TOU%20BRO.pdf?id=4294986199&dl=t

and system benefits. Implementing concomitant improvements to rate and regulatory regimes will help accelerate the integration of non-conventional resources and support the development of a more resilient, reliable, efficient, and flexible electric grid.

Alignment with Performance Measure Targets and Modeling

All future energy scenarios modeled for this Plan showed increases in energy storage, renewable generation, electric vehicles, and other distributed energy resources. The electric distribution grid of the future must provide a platform to effectively integrate and facilitate the adoption of these technologies. Furthermore, grid modernization will assist efforts to meet the Energy 2035 energy security performance measure target of increased fuel diversification by supporting growth in electric sector renewable energy and increased electrification of the thermal and transportation sectors.

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 39-1-27.7 provides the statutory basis for system reliability procurement. Rhode Island General Law § 39-1-27.7.1 provides the statutory basis for revenue decoupling.

Lead and Supporting Actors

LEAD	SUPPORTING
Energy Efficiency and Resource Management Council	• Public Utilities Commission • Division of Public Utilities • Office of Energy Resources • Electric distribution companies

Expected Costs / Potential Funding

Electric distribution companies will likely need to incur significant costs to make grid modernization investments. For example, National Grid's 2015 Electric ISR Plan proposes to invest $66 million to make safety and reliability improvements to the state's electric distribution infrastructure.[231] However, as system reliability least-cost procurement shows, alternative approaches to traditional "poles and wires" distribution planning can offer more cost-effective options for enhancing electric sector reliability. New technologies, and rate and regulatory structures offer the possibility for additional least-cost approaches to achieving system reliability through grid modernization. Current law allows for cost recovery of such measures through system benefits charges.

Design or Implementation Issues

Current Rhode Island law limits system reliability efforts to those that are shown to be least-cost. Some grid modernization efforts might provide net lifetime savings, but require a large upfront capital expenditure. Furthermore, newer technologies might require further study to determine economic effects and improved methods for valuing costs and benefits. Finally, proposed grid modernization measures must account for and address security, privacy, and interoperability concerns.

[231] http://www.ripuc.org/eventsactions/docket/4473-NGrid-Electric-ISR-2015(12-19-13).pdf

14. ADDRESS NATURAL GAS LEAKS

Review the progress of gas infrastructure repair and replacement in Rhode Island

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

According to a 2013 report prepared for U.S. Senator Edward Markey, over 2.6 trillion cubic feet of natural gas escaped through pipeline leaks in the nation's aging gas distribution infrastructure over the last decade, costing American consumers at least $20 billion.[232] The problem is particularly acute in New England, where some of the oldest and most leak-prone gas pipelines exist. A Conservation Law Foundation (CLF) study in Massachusetts found that the quantity of lost and unaccounted-for gas exceeded the amount of energy savings through the state's gas efficiency programs.[233] In Rhode Island, gas distribution system leaks represent the seventh[234] largest source of greenhouse gas emissions in the state, as of 2012. In fact, a 2009 study suggested that Rhode Island lost 5.72 percent of its natural gas through leaks, about five times the rates of the Massachusetts utilities described in the report.[235]

In Rhode Island, the Revenue Decoupling Act, now Rhode Island General Law §39-1-27.7.1, requires National Grid, the state's only natural gas distribution company, to submit an annual Gas Infrastructure, Safety, and Reliability Plan (Gas ISR Plan).[236] The purpose of the Gas ISR Plan is to "protect and improve the gas delivery system through proactively replacing leak-prone gas mains and services, upgrading the system's pressure regulating systems, responding to emergency leak situations, and addressing conflicts that arise out of public works projects."[237] Costs are recovered through an annual rate reconciliation mechanism.

[232] http://www.markey.senate.gov/documents/markey_lost_gas_report.pdf
[233] http://www.clf.org/static/natural-gas-leaks/WhitePaper_Final_lowres.pdf
[234] http://ghgdata.epa.gov/ghgp/main.do
[235] http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Benefits_Costs_TIRF_Jan2013.pdf
[236] http://webserver.rilin.state.ri.us/Statutes/title39/39-1/39-1-27.7.1.HTM
[237] http://www.ripuc.org/eventsactions/docket/4380-NGrid-2013-ISR-Gas(12-27-12).pdf

Summary

This strategy recommends reviewing the progress of gas infrastructure repair and replacement in Rhode Island and determining whether the programs are adequately meeting their intended safety and reliability objectives. Further evaluation should consider how well the current initiatives are assisting the State in meeting its cost and sustainability goals and whether any changes to the programs are warranted.

Experience in Other States

In the Northeast, at least three states—Maine, New York, and New Hampshire—have promulgated regulations for classifying and repairing natural gas leaks.[238] Several bills have been proposed in Massachusetts to address leaky natural gas pipelines. A bill proposed by Representative Lori Ehrlich (Bill H.2933) would establish a grading system for assessing and classifying leaks and set specific timeline requirements for repair.[239]

RATIONALE

Need

National Grid's natural gas distribution system is large and extensive, delivering natural gas to approximately 253,000 residential, commercial, and industrial customers in 33 cities and towns in Rhode Island, using a network of more than 3,100 miles of mains.[240] According to the U.S. Environmental Protection Agency (EPA) Facility Level Information on Greenhouse Gases Tool (FLIGHT), natural gas lost through leaks in this distribution system ranks as the seventh largest source of greenhouse gas emissions in the state, as of 2012. Because natural gas is composed primarily of methane, a greenhouse gas over 20 times as potent as carbon dioxide, fugitive gas emissions represent a significant contributor to global warming. Addressing natural gas leaks in Rhode Island is therefore a necessary component of achieving the greenhouse gas reduction goals outlined in the Energy 2035.

Natural gas lost through leaks in this distribution system rank as the seventh largest source of greenhouse gas emissions in the state

Alignment with Performance Measure Targets and Modeling

The results of the scenario modeling indicate that under any scenario, natural gas will continue to play an important role in Rhode Island's electric and thermal sectors, and will play a growing part as a transportation sector fuel. As natural gas will remain the most significant economy-wide fuel in the state for the foreseeable future, it is imperative that fugitive gas emissions are accounted for and addressed, so that greenhouse gas emission reduction performance measure targets might be met. Additionally, CLF estimates that lost and unaccounted-for gas results in Massachusetts ratepayers' shouldering additional costs to the tune of nearly $40 million per year. If costs are comparable in Rhode Island, continuing an aggressive schedule of leak repairs will be necessary to minimize costs to energy users.

[238] http://www.clf.org/static/natural-gas-leaks/WhitePaper_Final_lowres.pdf
[239] https://malegislature.gov/Bills/188/House/H2933
[240] http://www.ripuc.org/eventsactions/docket/4380-NGrid-2013-ISR-Gas(12-27-12).pdf

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 39-1-27.7.1 provides the statutory basis for the Gas Infrastructure, Safety, and Reliability Plan.

Lead and Supporting Actors

LEAD	SUPPORTING
Division of Public Utilities and Carriers	• Public Utilities Commission • Department of Environmental Management • Office of Energy Resources • Gas distribution companies

Expected Costs / Potential Funding

The costs of upgrading the gas distribution system are included in the gas company's revenue requirement and are reconciled as part of the annual rate case. For example, National Grid's 2015 Gas ISR Plan proposes an investment of $72 million to make safety and reliability improvements to the state's gas distribution infrastructure, including the repair of fugitive gas leaks.[241] Therefore, ratepayers are ultimately shouldering the cost of the repairs. However, costs associated with any unresolved fugitive gas emissions are paid annually in perpetuity by ratepayers, as noted above. Therefore, paying for leak repair investments helps permanently remove this additional cost imposed on ratepayers.

Design or Implementation Issues

The basis for gas repair investments exists through the Gas Infrastructure, Safety, and Reliability Plan.

[241] http://www.ripuc.org/eventsactions/docket/4474-NGrid-Gas-ISR-2015(12-20-13).pdf

15. EXPAND FINANCING AND INVESTMENT TOOLS

Bring energy efficiency, renewable energy, and alternative transportation programs to scale by deploying new sources of capital

ESTIMATED NEED: AT LEAST $7 BILLION TOTAL BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

Rhode Island currently invests about $140 million annually in clean energy programs and initiatives.[242] Much of this investment occurs through energy efficiency programs mandated by Least-Cost Procurement. The remainder comprises (1) renewable power and / or renewable energy certificates (RECs) purchased to comply with obligations under the Renewable Energy Standard (RES), Long Term Contracting (LTC) Standard for Renewable Energy, and Distributed Generation (DG) Standard Contracts Program obligations; (2) grants and loans issued through the Renewable Energy Fund (REF) administered by Commerce RI; and (3) clean energy investments made with Regional Greenhouse Gas Initiative (RGGI) funds.

Although Rhode Island ranks among the national leaders[243] in clean energy investment, maintaining the status quo presents two primary future challenges for policy makers: (1) The pace and magnitude of investment is not commensurate with levels required to achieve long-term energy goals—for example, achieving the Plan's security, cost, and sustainability performance measure targets could require annual investments in Rhode Island's electric, thermal, and transportation sectors totaling at least $340 million;[244] and (2) current programs rely almost solely on funding collected from assessments on electric and gas ratepayer bills. Supporting a dramatic growth on top of existing programs using only public funds might

[242] Energy Efficiency: 2013 Energy Efficiency Program Plan ($97,036,800 reflects total electricity and natural gas program budgets); Renewable Energy: OER Data Request to National Grid ($42,005,000 reflects anticipated 2015 costs for Long-Term Contracting for Renewable Energy and Distributed Generation Standard Contracts; and 2013 costs for Net Metering, Renewable Energy Fund, and Renewable Energy Standard); RGGI: 2013 Plan for the Allocation and Distribution of RGGI Auction Proceeds ($2,857,538.70).
[243] http://aceee.org/files/pdf/state-sheet/rhode-island.pdf
[244] See "Alignment with Performance Measure Targets and Modeling" below

exceed society's willingness to pay for needed investments, despite proven long-term benefits. An effort to expand financing opportunities, including mobilizing private sector capital, could play an important role in helping Rhode Island's clean energy programs achieve the scale needed to meet ambitious energy goals.

Rhode Island has already taken some steps to shift in this direction. As of 2013, National Grid had committed approximately $13 million to an energy efficiency revolving loan fund for commercial and industrial customers.[245] For residential customers, National Grid supports a 0 percent interest HEAT Loan program through an interest rate buy-down with participating lenders. Also in 2013, the Office of Energy Resources (OER) designated approximately $2 million in American Recovery and Reinvestment Act (ARRA) funds to capitalize a revolving loan fund for energy efficiency and renewable energy to be administered by Commerce RI, in addition to existing loan products available through the REF. The OER also made $1 million available through a revolving loan fund administered by National Grid for municipal and state buildings through the Rhode Island Public Energy Partnership. On the residential side, the OER is spearheading an investigation of the Home Energy Affordability Loan (HEAL) program developed by the Clinton Global Initiative. Also in 2013, the Rhode Island General Assembly passed the Property Assessed Clean Energy (PACE) Residential Program.[246] This program will help mitigate barriers to investment in energy efficiency and renewable energy by giving municipalities the option to allow homeowners to purchase energy upgrades and pay them back over time as part of their property assessment.

Currently, Rhode Island invests approximately $140 million per year in clean energy programs--less than half the estimated necessary amount

There is plenty of room for Rhode Island to build on these first efforts. For example, an emerging model for expanding private financing of clean energy is the "Green Bank." The Green Bank is a public-private partnership mechanism between states and private financial institutions that leverages an initial state capitalization to jumpstart sustainable and efficient clean energy financing services through private lending markets. The goal of the Green Bank is to enhance market confidence in clean energy investments, ultimately maturing private lending markets to the point where financing energy technology is as easy and customer friendly as financing an automobile.

Summary

This strategy recommends evaluating how Rhode Island can most effectively bring energy efficiency, renewable energy, and alternative transportation programs to scale by deploying new sources of capital. Policy makers should examine how financing opportunities can best be used to expand the reach of clean energy initiatives, lower their overall costs, and otherwise support the wider and hastened adoption of efficient and clean technologies.

Experience in Other States

New York Governor Andrew Cuomo announced the $1 billion capitalization of a Green Bank in September 2013[247] after the state hired Booz & Company (now Strategy&) to develop a business plan.[248] In 2011, Connecticut Public Act 11-80 established the Connecticut Clean Energy Finance and Investment Authority

[245] http://www.ripuc.org/eventsactions/docket/4451-NGrid-EEPP2014_11-1-13.pdf (Page 14)
[246] http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-26.5/INDEX.HTM
[247] http://www.bloomberg.com/news/2013-09-10/cuomo-starts-1-billion-new-york-green-bank-for-energy-lending.html
[248] http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B52B09652-1BA1-4B85-845C-B6F05185E692%7D

(CEFIA).[249] The CEFIA helps connect residential energy contractors and businesses with zero-down financing options for energy technologies.

RATIONALE

Need

The purpose of state-supported energy efficiency and renewable energy incentive programs is to speed the diffusion of clean energy technologies among state residents, businesses, and institutions. These initiatives help address key market barriers to adoption—namely, by defraying high upfront costs of investment—and thus encouraging participants to make energy improvements they would not have made, otherwise. In a time of dwindling and limited public sector resources, however, identifying innovative ways to engage new sources of capital is desirable. Because many clean energy investment upgrades pay for themselves over time, the savings could potentially provide a return to private investors, helping to reduce reliance on public subsidies and incentives.

Alignment with Performance Measure Targets and Modeling

The results of the scenario modeling demonstrated that very ambitious levels of investment are required to achieve the Energy 2035 security, cost, and sustainability performance measure targets. Aggregate capital investments in energy efficiency, renewable energy, thermal, and transportation totaled between $6.8 billion and $7.3 billion (net present value) over the life of the Energy 2035 planning horizon. This suggests that Rhode Island might need to make minimum annual investments of $340 million (in 2012 dollars)—and perhaps as high as $400 million—between 2013 and 2035 to achieve the outcomes modeled in the different scenarios. Currently, Rhode Island invests approximately $140 million per year in clean energy programs—less than half the estimated necessary amount. Therefore, because levels of capital investment, in orders of magnitude higher, are required to accelerate the adoption of clean energy solutions in the state, innovate strategies to harness private-sector resources and expand financing tools are likely necessary to meet Energy 2035 performance measure targets.

IMPLEMENTATION

Legal Authority

None currently exists.

Lead and Supporting Actors

LEAD	SUPPORTING
Office of Energy Resources	• Commerce RI • Energy Efficiency and Resource Management Council • Office of the Treasurer • Electric and natural gas distribution companies

Expected Costs / Potential Funding

The estimated size of the clean energy loan marketplace in Rhode Island is currently unknown. However, the Energy 2035 modeling suggests that minimum annual investments of $340 million in the state's energy efficiency, renewable energy, and alternative transportation sectors might be required to achieve the Energy 2035 performance measure targets.

[249] http://www.cga.ct.gov/2011/act/pa/pdf/2011PA-00080-R00SB-01243-PA.pdf

Design or Implementation Issues

Any new financing initiatives in Rhode Island must be seamlessly integrated with existing successful programs, to optimize customer experience and maintain robust participation. Wherever financing offerings are considered for reducing or replacing direct incentives, program administrators should properly account for the substitution ratio of financing with rebates in the eyes of different customer groups.

16. REDUCE THE SOFT COSTS OF RENEWABLE ENERGY

Provide guidance at the state and municipal levels for uniform, standardized clean energy permitting processes to streamline development and mitigate regulatory hurdles to renewable deployment

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

Current laws in New England and Rhode Island regarding renewable energy siting, permitting, zoning, and interconnection are a patchwork of varied state and municipal rules. A number of important public-private partnerships and state initiatives have begun to address this issue in Rhode Island over the past few years, primarily focusing on siting challenges associated with offshore and onshore wind. The Ocean Special Area Management Plan (SAMP), adopted by the Coastal Resources Management Council (CRMC) in 2011, informed the siting of Rhode Island's first offshore wind farm in state waters off Block Island.[250] Following the SAMP, the Renewable Energy Siting Partnership (RESP) produced a land-based resource assessment and siting analysis in 2012 to help guide the siting of terrestrial wind turbines, low-head hydropower facilities, and landfill solar projects.[251] In addition to a comprehensive report, the RESP created a "Wind Energy Siting Tool," an online decision-support tool that stakeholders can use to assess the estimated power production and siting impacts of proposed wind projects.[252]

Also during 2012, the Division of Planning (DOP) released a technical report, "Interim Siting Factors for Terrestrial Wind Energy Systems," which put forth guidelines for siting wind turbines in municipalities.[253] SPP produced this report as part of an overarching statutory charge to develop siting guidance for the location of renewable energy facilities in the state.[254] The law directed the DOP to consider standards and guidelines for the location of eligible renewable energy resources and facilities with consideration for the location of such resources and facilities in commercial, industrial, and agricultural areas, areas occupied by

[250] http://seagrant.gso.uri.edu/oceansamp/index.html#
[251] http://seagrant.gso.uri.edu/resp/
[252] http://www.edc.uri.edu/resp/WindSitingViewer/
[253] http://www.planning.ri.gov/documents/LU/Wind%20Energy%20FacilityGuidelines_June-2012_.pdf
[254] http://webserver.rilin.state.ri.us/Statutes/title42/42-11/42-11-10.HTM

public and private institutions, and property of the State, and in other areas of the state as appropriate. The 2012 report addressing terrestrial wind energy siting is the first part of the DOP's siting guidelines; other forms of renewable energy will be addressed at a later date. OER will coordinate with DOP on these guidelines and issue updated wind siting guidance for municipalities in the future as new data and information on siting impacts emerge.

Through the resources generated by these efforts, decision-makers and stakeholders can now access a comprehensive body of information to assess opportunities, evaluate impacts, and make informed siting decisions for renewable energy technologies, primarily wind. As Rhode Island moves toward a future with a greater amount and variety of distributed generation resources the State must shift to actions designed to streamline and accelerate the diffusion of these technologies into the marketplace. In 2013, the Office of Energy Resources (OER) announced its participation in a regional collaboration funded through the U.S. Department of Energy (DOE) SunShot Initiative Rooftop Solar Challenge II called the *New England Solar Cost-Reduction Partnership.*[255] Over the 2.5 years of the grant, the team will tackle a range of barriers to solar energy deployment, including permitting and interconnection challenges; the need for new financing tools; and planning and zoning rule variations. This and other concerted efforts to drive down the non-hardware "soft" costs of installing distributed renewable energy in Rhode Island will improve business climate by driving down barriers to entry and reducing administrative costs; will expand consumer access to clean energy products; and will bring associated economic development benefits to the state.

Summary

Focus on developing common intra- and inter-state rules and regulations for the installation of clean energy systems in order to radically simplify the business of doing renewable energy

This strategy recommends providing guidance at the state and municipal levels for uniform, standardized clean energy permitting processes to streamline development and mitigate regulatory hurdles to renewable deployment. State agencies should maintain ongoing partnerships with local government, citizens, and industry, and other key stakeholder groups to apply best practices and lessons learned regarding siting of renewable energy. New efforts should address developing common intrastate and interstate rules and regulations for the installation of clean energy systems, to radically simplify the business of doing renewable energy in Rhode Island and the region.

Experience in Other States

Both Connecticut and Massachusetts received grants through the U.S. Department of Energy (DOE) SunShot Initiative Rooftop Solar Challenge I to work with municipal partners to lower the soft costs of rooftop photovoltaic solar systems in their respective states.[256]

RATIONALE

Need

Uniform standards and regulations provide the private sector with a simplified environment for doing business. They also help developers of renewable energy offer products to consumers at a lower cost.

[255] http://www.ri.gov/press/view/20643

[256] http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/solar/sunshot-rooftop-solar-challenge.html; http://energizect.com/communities/programs/Sun%20Rise%20New%20England

Alignment with Performance Measure Targets and Modeling

Each modeled scenario considered substantial renewable energy expansion, with significant capacity additions of in-state solar and wind. Increased distributed generation in Rhode Island is necessary to achieve fuel diversification and emissions reductions, as laid out in the Energy 2035 security and sustainability performance measure targets. Proactively addressing renewable energy soft costs and regulatory burdens will simplify the addition of generating capacity and lower the costs of installing future renewable energy systems.

IMPLEMENTATION

Legal Authority

No statutory authority is needed to launch a state effort to reduce soft costs of renewable energy.

Lead and Supporting Actors

LEAD	SUPPORTING
Office of Energy Resources	• General Assembly • Commerce RI • Department of Labor and Training • Division of Planning • Building Code Commission

Expected Costs / Potential Funding

Primary costs associated with this project are simply the administrative costs of identifying best practices and setting standards. As of 2013, inter-jurisdictional federal grant funding awarded to the state supports this effort.

Design or Implementation Issues

Renewable energy developers face an assortment of permitting rules as they operate throughout the state and region. At the same time, Rhode Island cities and towns, not to mention other New England states, have very different political dispositions and regulatory frameworks. Achieving regulatory consistency across jurisdictions to streamline the permitting and installation of renewable energy systems will likely be challenging.

17. ADDRESS HIGH AND VOLATILE REGIONAL ENERGY COSTS

Continue to partner closely with other New England states to address regional energy supply challenges and identify cost-effective strategies to mitigate the impacts of rising energy costs

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

Over the past decade, the rising use of natural gas has reshaped the face of New England's electric system. Between 2000 and 2012, power generated from natural gas skyrocketed from 15 percent of the total regional supply to over 50 percent. Increased natural gas generation has brought both economic and environmental benefits to New England by displacing higher-cost and higher-greenhouse gas emitting coal- and oil-fired generation. During recent years, however, the region's growing demand for gas has placed mounting pressures on the interstate pipeline system that delivers natural gas into New England. Limited pipeline capacity has led to increasingly severe gas supply constraints, particularly during acute cold weather winter conditions, when power generators compete for fuel access with gas distribution companies providing gas for residential heating and other thermal demand.

These gas constraints are leading to extremely high natural gas prices, and consequently, very high wholesale electric prices. In 2013, the region's wholesale energy market approached $8 billion, reflecting a 54 percent increase from 2012.[257] During the first six weeks of 2013, the value of the energy market was about $1.3 billion higher than the total spent during that same period one year earlier.[258] These wholesale energy price increases ultimately translate into higher retail prices for Rhode Island residents and businesses. For instance, in January 2014 Ocean State residents absorbed a 12 percent electric rate increase—approximately $10 per month for the average household—due to increases in the energy supply portion of the bill.

In December 2013, the New England governors announced a collaborative effort to respond to the region's energy system reliability challenges, and increasingly high and volatile energy prices. The regional energy

[257] http://www.iso-ne.com/nwsiss/pr/2014/2013_price%20release_03182014_final.pdf
[258] http://www.iso-ne.com/aboutiso/fin/annl_reports/2000/2014_reo.pdf

initiative would help guide strategic, cost-effective investments in natural gas infrastructure and electric transmission to access large-scale, low- and no-carbon resources, such as hydropower.[259] To facilitate Rhode Island's participation in such an effort, Governor Lincoln D. Chafee signed the Affordable Clean Energy Security Act (ACES) in July 2014.[260] ACES establishes a framework for the Office of Energy Resources, Division of Public Utilities and Carriers, and the state's electric and gas distribution companies to work with other New England states and use competitive procurement mechanisms to identify strategic investment opportunities in regional energy infrastructure. The state partners continue to advance the governors' long-term effort. Meanwhile, many of the New England states, including Rhode Island, are actively examining the best ways that existing state and local clean energy programs—such as least-cost investments in energy efficiency—can be leveraged in the near and long terms to help the region further mitigate the impacts of the region's gas supply constraints.

Summary

Rhode Island is highly integrated into a regional energy system and economy. It is critical that the state examine not only local strategies to meet its energy goals, but also act regionally wherever possible to ensure that New England can successfully address its energy reliability challenges and high and volatile energy costs. **This strategy recommends that Rhode Island continue to partner closely with other New England states to address regional energy supply challenges and identify cost-effective strategies to mitigate the impacts of rising energy costs.** States should give thorough consideration to the range of available options—from customer-side investments in energy efficiency, combined heat and power, renewable heating, and distributed renewable generation to infrastructure investments in the region's electric and natural gas transmission systems—as they develop coordinated plans.

New England is widely recognized as having among the highest natural gas and electric prices in the nation

Experience in Other States

All New England states rely on the same bulk electric system administered by ISO New England to generate and deliver power to consumers. The effects of natural gas supply constraints and attendant high and volatile wholesale electric prices have therefore reverberated throughout the region. The New England governors are currently partnering on a regional effort to pursue strategic electric and natural gas infrastructure investments that will help mitigate the impacts of gas supply constraints.

RATIONALE

Need

New England is widely recognized as having among the highest natural gas and electric prices in the nation. Reducing long-term energy costs will help spur economic growth and job creation, enhance regional competitiveness and overall business climate, and mitigate the impact of high energy bills on consumers. Because limited availability of gas during the coldest winter periods forces some dual-fuel generating units to burn oil instead of gas, addressing regional supply constraints could produce environmental benefits as well.

[259] http://www.nescoe.com/uploads/NewEngGovEng12-05-13.pdf
[260] http://webserver.rilin.state.ri.us/BillText/BillText14/HouseText14/H7991A.pdf

Alignment with Performance Measure Targets and Modeling

For all the scenarios, Energy 2035 modeled changes incremental to the business-as-usual forecast (BAU). The BAU forecast developed projections for future electricity and natural gas prices in Rhode Island consistent with the best available regional forecasts. If infrastructure constraints continue to drive unprecedented increases in New England's cost of energy supply, Rhode Island might not be able to achieve the degree of net economic benefits indicated by the performance measure targets set in the Plan. Insulating the state from further increases in energy costs is vital to securing a cost-effective energy future for Rhode Island, as well as meeting performance measure targets for energy security and sustainability.

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 39-31 established the Affordable Clean Energy Security Act. Rhode Island General Law § 39-1-27.7 established Least-Cost Procurement, and Rhode Island General Law § 39-26 et seq. established the bulk of renewable energy procurement programs.

Lead and Supporting Actors

LEAD	SUPPORTING
Office of Energy Resources	• Energy Efficiency and Resource Management Council • Public Utilities Commission • Division of Public Utilities and Carriers • Department of Environmental Management • Electric and natural gas distribution companies

Expected Costs / Potential Funding

The cost of addressing New England's natural gas supply constraints will vary according to the portfolio of strategies pursued and adopted in coming years. Customer-side investments in energy efficiency represent New England's least-cost and most immediately available tool to help mitigate regional impacts of high and volatile energy prices. These investments provide proven net economic benefits to New England and could also help reduce the size or scope of electric or natural gas infrastructure investments. In the event that energy infrastructure is needed, Rhode Island's ACES law creates a strong and transparent review process to solicit proposals—in conjunction with other states. It also uses competitive procurement mechanisms to help identify cost-effective infrastructure solutions.

Design or Implementation Issues

Addressing high and volatile regional energy costs is a complex and cross-cutting challenge involving diverse stakeholder groups and interests, different sectors of energy generation and consumption, and multifaceted tools and solutions. Regional collaborations require the complex balancing of multi-state interests and priorities.

18. CONTINUE PARTICIPATING IN RGGI

Continue participating in the Regional Greenhouse Gas Initiative

ESTIMATED IMPACT: ≤23% ELECTRIC GHG REDUCTIONS BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

The Regional Greenhouse Gas Initiative (RGGI) is the first market-based cap and trade program in the United States designed to reduce electric power sector greenhouse gas emissions.[261] Nine states currently participate in the effort: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The program, which began in 2009, establishes a declining regional emissions cap, and requires electric generators greater than 25 MW to purchase emissions allowances through quarterly auctions. Participating states invest the auction proceeds in energy efficiency and clean energy programs that deliver economic benefits to consumers throughout the region.

The states participating in RGGI recently agreed to reduce the regional CO_2 cap by 45 percent, from 165 million to 91 million tons in 2014, with subsequent reductions of 2.5 percent each year from 2015 to 2020.[262] This significant reduction in the cap signals that RGGI will continue to be a dominant force in shaping the carbon profile of the electric power sector market for the coming years.

Summary

This strategy recommends that Rhode Island continue participating in RGGI. Ongoing involvement in RGGI will drive down regional power sector greenhouse gas emissions, generate net economic benefits to Rhode Island and the region, and help position the participating states as leaders in national efforts to limit carbon emissions.

[261] http://www.rggi.org/
[262] http://www.rggi.org/docs/PressReleases/PR130207_ModelRule.pdf

Experience in Other States

Nine northeastern and Mid-Atlantic states currently participate in RGGI. New Jersey withdrew from the program in 2011.[263]

RATIONALE

Need

Scientific consensus indicates that emissions of greenhouse gases, including carbon dioxide, are contributing to global climate change. The effects of climate change pose significant risks to the communities, economies, and environment of Rhode Island, as the 2012 Climate Change Commission Progress Report spells out in detail.[264] Market-based emissions reduction programs like RGGI are a cost-efficient mechanism to cap and reduce emissions in the electric power sector, a major source of greenhouse gas emissions in the Northeast and Mid-Atlantic. Furthermore, the regional nature of the RGGI collaboration benefits Rhode Island by not placing the state at a comparative economic disadvantage, and by leveraging a much larger carbon reduction impact than this small state could otherwise achieve with unilateral action.

Alignment with Performance Measure Targets and Modeling

The scenario modeling projects Rhode Island reductions of 23 percent of BAU electric sector carbon dioxide emissions below 2013 levels by 2035.The BAU model draws on information from the ENE Business-As-Usual Forecast, which assumed ongoing participation in the RGGI program. This suggests that simply achieving ambitious BAU emissions reductions, not to mention further reductions, depends at least in part on Rhode Island's continued involvement in RGGI. The BAU reductions alone are very significant, especially considering that Energy 2035 calls for 45 percent economy-wide GHG reductions (below 1990 levels) by 2035.

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 23-82 provides the statutory basis for Rhode Island's participation in RGGI[265].

Lead and Supporting Actors

LEAD	SUPPORTING
Department of Environmental Management	• Office of Energy Resources • Energy Efficiency and Resource Management Council • Public Utilities Commission • Non-regulated power producers

[263] http://www.environmentalleader.com/2011/05/27/new-jersey-pulls-out-of-rggi-bans-coal-plants/
[264] http://www.rilin.state.ri.us/Reports/Climate%20Change%20Commission%20Prog%20Report%20Final%2011%2015%2012%20final%202.pdf
[265] http://webserver.rilin.state.ri.us/Statutes/TITLE23/23-82/INDEX.HTM

Expected Costs / Potential Funding

RGGI generates enormous economic and environmental benefits at a comparatively small cost. An independent report by the Analysis Group found that in its first three years, RGGI increased near-term consumer electricity costs by a modest 0.7 percent, but generated net savings of almost $1.1 billion over time, as a result of investment in energy efficiency.[266] Additional macroeconomic benefits to the regional economy during this period include the creation of over 16,000 jobs and $1.6 billion in total economic growth.[267]

Each year, Rhode Island receives proceeds from quarterly auctions held under RGGI. The Office of Energy Resources (OER) is responsible for the allocation and distribution of these funds, which are invested in the most cost-effective available projects to reduce longer-term consumer energy demands and costs. Approximately 60 percent of auction revenues in Rhode Island support the implementation of energy efficiency programs by National Grid, and 40 percent are directed toward innovative projects to integrate efficiency with renewable energy and promote efforts to modernize Rhode Island's electric distribution grid.[268] As of the end of 2012, Rhode Island had invested nearly $18 million in RGGI auction proceeds[269] in clean energy programs, with the most recent round of auctions in 2012 generating a total of $2,857,539.[270]

> Simply achieving ambitious BAU emissions reductions depends at least in part on Rhode Island's continued involvement in RGGI

Design or Implementation Issues

Under RGGI, Rhode Island generation-based carbon emissions have actually increased. Counterintuitively, this trend attests to the success of RGGI, reflecting how the program is driving broader shifts in the regional generation mix. The in-state growth in emissions can be ascribed to Rhode Island's natural gas-fired power plants, which have begun to operate with greater frequency as higher-emitting coal and oil units elsewhere in New England cut back generation. Therefore, from a state emissions perspective, policy makers should strongly consider the merits of planning any separate carbon reduction efforts around consumption-based emissions, at least in the short term.

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[266] http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Economic_Impact_RGGI_Report.pdf
[267] http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Economic_Impact_RGGI_Fact_Sheet.pdf
[268] http://www.energy.ri.gov/documents/rggi/2013%20Plan%20Items/Strategic%20Use%20of%20RGGI%20Funds%2012.5.2013.pdf
[269] http://www.energy.ri.gov/documents/rggi/2012%20Annual%20Report.pdf
[270] http://www.energy.ri.gov/documents/rggi/2013%20Plan%20Items/Annual%20RGGI%20Allocation%20Plan%202013%20-%20Draft%20November%202013.pdf

19. DEVELOP A CARBON REDUCTION STRATEGY

Evaluate a cost-effective portfolio of policies
to meet statutory near- and long-term greenhouse gas emissions reduction targets

ESTIMATED NEED: 45% TOTAL GHG REDUCTIONS BY 2035

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

The New England Governors and Eastern Canadian Premiers (NEG/ECP) 2001 Climate Change Action Plan called for a reduction in greenhouse gas (GHG) emissions to 1990 levels by 2010, at least 10 percent below 1990 levels by 2020, and a 75 to 85 percent reduction below 2001 levels as a long-term goal.[271] The following year, Rhode Island completed a Greenhouse Gas Action Plan.[272] The 2002 Action Plan proposed 52 potential policy initiatives at the state, regional, and national levels to move toward meeting the 2020 carbon reduction goal.[273] In 2007, Rhode Island joined the Regional Greenhouse Gas Initiative (RGGI), which started in 2008 to hold the nation's first cap and trade auctions for fossil fuel power producers over 25MW.[274]

More than ten years since the NEG/ECP issued the Action Plan, the New England states have demonstrated progress toward achieving regional greenhouse gas emissions reduction targets. In aggregate, regional emissions fell approximately 12 percent between 2000 and 2010, mainly due to fuel-switching to natural gas, but also due to growing investment in energy efficiency and renewable energy.[275] In 2013, the NEG/ECP announced it had surpassed its 2010 regional greenhouse gas emissions reduction target and is already nearly 25 percent of the way toward its 2020 target.[276]

[271] http://www.negc.org/uploads/file/Reports/ClimateChangeAP[1].pdf
[272] http://righg.raabassociates.org/
[273] http://righg.raabassociates.org/Articles/GHGPlanBody7-19-02FINAL.pdf
[274] http://www.rggi.org/
[275] http://www.eneclimatevision.org/sites/default/files/ENE_ClimateVision2020_v1.1_0.pdf
[276] http://www.scics.gc.ca/english/Conferences.asp?a=viewdocument&id=2023

Recent federal and state policy developments have now positioned both Rhode Island and other New England states to make further headway toward achieving long-term greenhouse gas reductions goals. On June 2, 2014, the U.S. Environmental Protection Agency (EPA) announced the proposed Clean Power Plan, which would aim to cut domestic greenhouse gas emissions from existing electric power plants 30 percent nationwide below 2005 levels by 2030.[277] The Clean Power Plan provides for a flexible state-by-state approach, allowing states to work individually or in regional groups to develop emissions reductions plans, according to their specific mix of generation sources and clean energy investment opportunities. Also in 2014, the Rhode Island General Assembly enacted and Governor Lincoln D. Chafee signed the "Resilient Rhode Island Act," which established the Executive Climate Change Coordinating Council (EC4).[278] The EC4 is charged with developing and tracking the implementation of a plan to achieve greenhouse gas emissions reductions below 1990 levels of 10 percent by 2020; 45 percent by 2035; and 80 percent by 2050. By codifying these targets in Rhode Island statute, the Resilient Rhode Island Act sets the state on pace to meet the ambitious greenhouse gas emissions reduction performance measure target established in Energy 2035.

Summary

Net economic benefits are expected to accrue to Rhode Island as a result of pursuing a low-carbon future

The Resilient Rhode Island Act helps bring a long-needed comprehensive view to the state's policies on energy efficiency, renewable energy, thermal, and transportation, and firmly establishes climate adaptation and mitigation as a mandatory guide for policy and regulatory decision-making. With clear greenhouse gas emissions reductions goals now institutionalized in state law, the next step for Rhode Island is to develop an implementation strategy to achieve the ambitious reduction targets. **This strategy recommends evaluating a cost-effective portfolio of policies to meet statutory near- and long-term greenhouse gas emissions reduction targets in Rhode Island.** Many strategies proposed in Energy 2035 will work towards meeting these targets. To support the development and implementation of refined plans for meeting the greenhouse gas emissions reduction targets set in statute, state policy makers should draw on strong data analysis, coordinated input from key stakeholders and state decision makers, and strategic harmonization with ongoing and new implementation efforts.

Experience in Other States

Every northeastern state has adopted a legislative or executive goal of approximately 80 percent carbon emission reductions by 2050 (**Table 2**). The 2008 Global Warming Solutions Act in Massachusetts sets an 80 percent greenhouse gas emissions reduction target by 2050 and requires interim goals for 2020, 2030, and 2040, with regularly updated plans to determine all technically feasible reduction mechanisms necessary to achieve the goals.[279] The first of these plans, the Massachusetts Clean Energy and Climate Plan for 2020, provides an excellent example of a data-driven, comprehensive strategy to meet an ambitious carbon reduction goal.[280]

[277] https://www.federalregister.gov/articles/2014/06/18/2014-13726/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating
[278] http://webserver.rilin.state.ri.us/BillText14/HouseText14/H7904A.pdf
[279] https://malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter298
[280] http://www.mass.gov/eea/docs/eea/energy/2020-clean-energy-plan.pdf

Table 2. Northeast state carbon reduction goals

State	Target	Source
Connecticut[281]	80% below 2001 by 2050	2008 Global Warming Solutions Act
Maine[282]	75-80% below 2003 long-term	Act to Provide Leadership in Addressing the Threat of Climate Change (2003)
Massachusetts[283]	80% below 1990 by 2050	2008 Global Warming Solutions Act
New Hampshire[284]	80% below 1990 by 2050	New Hampshire Climate Action Plan (2009)
New York[285286]	80% below 1990 by 2050	Exec. Order No. 2 (2011); Exec. Order No. 24 (2009)
Rhode Island[287]	80% below 1990 by 2050	2014 Resilient Rhode Island Act
Vermont[288]	75% below 1990 by 2050	10 V.S.A. § 578

Source: See footnotes

RATIONALE

Need

Scientific consensus indicates that emissions of greenhouse gases, including carbon dioxide, are contributing to global climate change. The effects of climate change pose significant risks to the communities, economies, and environment of Rhode Island, as the 2012 Climate Change Commission Progress Report spells out in detail.[289] Curbing greenhouse gas emissions is the most effective way to slow the anticipated future damage from climate change.

Alignment with Performance Measure Targets and Modeling

The scenario modeling demonstrated that significant greenhouse gas reductions are feasible under three distinct scenarios. The average emissions reductions among the scenarios was 34 percent, and the results indicate that it is feasible to reduce Rhode Island consumption-based greenhouse gas emissions by approximately 45 percent below 2013 levels by 2035 (**Figure 6**). The Energy 2035 GHG emissions reduction performance measure target is 45% below 1990 levels by 2035[290]. All three modeled scenarios showed substantial carbon reductions, but all three scenarios also modeled dramatically transformed energy systems. To ensure that greenhouse gas emission targets are met, a coordinated strategy with firm interim benchmarks will be required.

[281] http://www.cga.ct.gov/2008/ACT/PA/2008PA-00098-R00HB-05600-PA.htm
[282] http://www.mainelegislature.org/ros/LOM/lom121st/5pub201-250/pub201-250-44.htm
[283] https://malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter298
[284] http://des.nh.gov/organization/divisions/air/tsb/tps/climate/action_plan/documents/nhcap_final.pdf
[285] http://www.dec.ny.gov/energy/71394.html
[286] http://www.governor.ny.gov/executiveorder/2
[287] http://webserver.rilin.state.ri.us/BillText14/HouseText14/H7904A.pdf
[288] http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=10&Chapter=023&Section=00578
[289] http://www.rilin.state.ri.us/Reports/Climate%20Change%20Commission%20Prog%20Report%20Final%2011%2015%2012%20final%202.pdf
[290] GHG reduction targets are often given relative to a 1990 baseline. Rhode Island's economy-wide GHG emissions today are very similar to levels in 1990. In 2010, emissions totaled 11,330,473 tons; 1990 emissions were 11,378,895 tons. See **Part 2: Goals & Performance Measure Targets** for more information.

GHG Reductions - RI Load Served (% Below 2013 levels)

	ALL SECTORS		INDIVIDUAL SECTORS - 2035		
	2023	*2035*	*Electric*	*Thermal*	*Transportation*
BAU	12%	18%	23%	20%	12%
Scenario 1	21%	36%	35%	40%	34%
Scenario 2	21%	32%	23%	34%	36%
Scenario 3	22%	46%	56%	44%	40%
Scenario Avg	**21%**	**38%**	**38%**	**39%**	**37%**

Source: Navigant scenario modeling

Figure 6. RI GHG emissions 2035 by energy sector, and by scenario.

An illustrative greenhouse gas reduction schedule shows that 45 percent reductions by 2035 corresponds to an ambitious 2 to 2.5 percent reduction per year (**Table 3**). The schedule would set Rhode Island on pace to achieve 80 percent reductions (below 1990 levels) by 2050, a generally accepted target to avoid the worst consequences of climate change.

Table 3. Provisional schedule for reducing RI GHG emissions, through 2050

YEAR	REDUCTION	YEAR	REDUCTION	YEAR	REDUCTION	YEAR	REDUCTION	YEAR	REDUCTION
2013	0.0 percent	*2021*	17.3%	*2029*	34.6%	*2037*	51.9%	*2045*	69.2%
2014	2.2%	*2022*	19.5%	*2030*	36.8%	*2038*	54.1%	*2046*	71.4%
2015	4.3%	*2023*	21.6%	*2031*	38.9%	*2039*	56.2%	*2047*	73.5%
2016	6.5%	*2024*	23.8%	*2032*	41.1%	*2040*	58.4%	*2048*	75.7%
2017	8.6%	*2025*	25.9%	*2033*	43.2%	*2041*	60.5%	*2049*	77.8%
2018	10.8%	*2026*	28.1%	*2034*	45.4%	*2042*	62.7%	***2050***	**80%**
2019	13.0%	*2027*	30.3%	***2035***	**47.6%**	*2043*	64.9%		
2020	15.1%	*2028*	32.4%	*2036*	49.7%	*2044*	67.0%		

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 42-6.2 establishes the Executive Climate Change Coordinating Council.

Lead and Supporting Actors

LEAD	SUPPORTING
Executive Climate Change Coordinating Council	• General Assembly • Office of Energy Resources • Department of Environmental Management • Department of Transportation • Division of Planning

Expected Costs / Potential Funding

No additional costs are involved in setting greenhouse gas reduction goals in statute. Funding will be needed to commission studies for estimating economic effects and identifying all technically feasible greenhouse gas reduction measures to achieve interim and final targets. Implementing a carbon dioxide

emissions reduction plan has associated program costs and potential economic effects on businesses and ratepayers, but as demonstrated in the Energy 2035 scenario modeling, net economic benefits are expected to accrue to Rhode Island as a result of pursuing a low-carbon future. Scenario 3, which targeted a 45 percent reduction in greenhouse gases, costs less to ratepayers / energy consumers than either today's energy economy or a business-as-usual future.

Design or Implementation Issues

Rhode Island has approximately six years left to meet the 2020 target of reducing carbon emissions by 10 percent below 1990 levels, as reflected in the NEG/ECP commitment, the 2002 Greenhouse Gas Action Plan, and the 2014 Resilient Rhode Island Act. As of 2013, Rhode Island is at 1990 levels only, according to the Energy 2035 modeling. This means that a reduction of nearly 2 percent per year is required to meet the 2020 goal. The state's strong existing clean energy programs—primarily electric sector energy efficiency and renewable energy, and thermal sector natural gas efficiency—will assist Rhode Island in meeting the near-term target. To meet future emissions reduction targets, on the other hand, Rhode Island will need to address other sectors of large and not-yet-tapped greenhouse gas emissions reduction potential—namely, the thermal sector's delivered-fuel market and the petroleum-dominated transportation sector. Implementing energy- and GHG-saving programs in these sectors, however, represents a potentially politically challenging lift.

20. LEAD BY EXAMPLE

Implement a tailored and comprehensive public sector "Lead by Example" initiative

THEMES/SECTORS	TYPE	TIMEFRAME
•SECURITY •COST-EFFECTIVENESS •SUSTAINABILITY •ELECTRIC •THERMAL •TRANSPORTATION	•EXISTING •EXPANDED •NEW	•NEAR TERM (0-5 YEARS) •LONG TERM (0-20 YEARS)

STRATEGY DESCRIPTION

Background

State and local governments each have a key role to play in helping Rhode Island achieve its energy goals. Government can lead by example through strategic investments in energy efficiency, renewable energy, and alternative transportation. Such measures can present cost-effective opportunities to reduce public sector energy consumption and generate cost savings that provide relief for constrained budgets and the taxpayers who support them.

In addition to direct public investments, governments can also enable private investment in Rhode Island's clean energy economy by establishing favorable regulatory environments for businesses to offer energy efficiency and renewable energy products and services to consumers. Such efforts might involve streamlining or simplifying licensing, permitting, zoning, and taxation requirements, and otherwise mitigating regulatory barriers to implementing clean energy solutions (see **Strategy 16, Reduce the Soft Costs of Renewable Energy**).

Rhode Island has already taken important steps to implement "Lead by Example" energy programs. In 2012, the Rhode Island Office of Energy Resources (OER) launched the Rhode Island Public Energy Partnership (RIPEP), a precedent-setting collaboration to achieve deep energy savings in state and municipal facilities. RIPEP main goals include: (1) establishing the country's first comprehensive public sector energy data inventory using EPA's Portfolio Manager; (2) achieving 20% energy reductions in at least 100 public facilities by 2016; (3) building a targeted, streamlined infrastructure, making it easier for the entire public sector to take advantage of energy efficiency programs; and (4) developing and implementing solutions to overcome longstanding barriers to energy savings in the public sector.

Summary

This strategy recommends implementing a tailored and comprehensive public sector "Lead by Example" initiative. The Lead by Example initiative should include programs for both municipal and state governments.

"Lead by Example" programs are a responsible way to generate taxpayer benefits while addressing a key market sector of energy consumption

Lead by Example – Municipalities: Rhode Island law requires that every municipality must adopt a comprehensive community plan that is consistent with the State Guide Plan, including goals established in Energy 2035. To meet the Plan's energy goals and performance measure targets, Rhode Island cities and towns could consider a mix of implementation actions across municipal energy sectors that are tailored to local needs and are best suited for their community. Such opportunities and potential implementation actions could include:

- Conducting a municipal energy use baseline and developing a plan to reduce public sector energy consumption
- Seeking Property Assessed Clean Energy (PACE) designation for the community
- Adopting zoning and siting standards for renewable energy projects
- Using an expedited application and permit process for renewable energy facilities
- Replacing end-of-life municipal-owned vehicles with high fuel efficiency and/or electric vehicles
- Adopting zoning and land use policies that preserve open space and promote compact growth

Lead by Example – State: Rhode Island should implement a state-level Lead by Example initiative. The program would develop long-term targets and a plan for energy reductions in state facilities, thereby generating security, cost, and sustainability benefits that accrue to all Rhode Island taxpayers. An existing obligation set in Rhode Island General Law § 37-8-17.1, stating that 16 percent of energy used by state buildings must come from renewable sources, could be expanded to require eventual net zero energy use.[291] The initiative could also emphasize transportation energy impacts by expanding on an existing requirement spelled out in Rhode Island General Law § 36-6-21.1 to reduce vehicle miles traveled per state employee by 35 percent by 2016.[292]

Experience in Other States

Massachusetts currently operates a Green Communities Division that guides municipalities toward the goal of achieving zero net energy status.[293] Massachusetts also has a "Leading By Example" Program to reduce greenhouse gas emissions, conserve energy and water, and generate renewable energy in publicly-owned facilities.[294]

RATIONALE

Need

Public sector Lead by Example programs are a responsible way to generate taxpayer benefits while addressing a key market sector of energy consumption. According to OER estimates, state and municipal

[291] http://webserver.rilin.state.ri.us/Statutes/TITLE37/37-8/37-8-17.1.HTM
[292] http://webserver.rilin.state.ri.us/Statutes/TITLE36/36-6/36-6-21.1.HTM
[293] http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/
[294] http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/leading-by-example/

electricity, thermal, and transportation expenditures account for roughly 2 to 3 percent of total Rhode Island energy expenditures.

Alignment with Performance Measure Targets and Modeling

Each scenario modeled in the Plan included sweeping changes to Rhode Island's energy infrastructure and demand and supply portfolios. Achieving such ambitious outcomes depends in part on hastening the adoption of clean energy technologies in Rhode Island's marketplace. State and local government can assist this transition and also contribute to meeting the Energy 2035 performance measure targets, by leading the way with clean energy investments in publicly owned facilities and fleets.

IMPLEMENTATION

Legal Authority

Rhode Island General Law § 42-140 establishes the Rhode Island Office of Energy Resources. Rhode Island General Law § 42-11-10 establishes the Statewide Planning Program.

Lead and Supporting Actors

LEAD	SUPPORTING
Office of Energy Resources	• General Assembly • Division of Planning

Expected Costs / Potential Funding

Expected costs vary on the administrative needs required to perform the new functions and the size of the programs. Sources of funding could include a combination of existing System Benefits Charge and Renewable Energy Fund funding. Massachusetts uses Regional Greenhouse Gas Initiative (RGGI) auction proceeds to fund its Green Communities program,[295] and has awarded approximately $20 million to 103 communities, to date.[296] A similar structure in Rhode Island could strategically maximize the impact of public funding by leveraging action at the local level through a structure that provides incentives for communities to proactively reduce energy use and facilitate the adoption of renewables and alternative fuels before becoming eligible for funding. A state Lead by Example initiative would generate long-term savings for all taxpayers.

Design or Implementation Issues

The OER's experience in administering technical and financial assistance through the American Recovery and Reinvestment Act (ARRA) of 2009—as well as lessons learned from the Renewable Energy Siting Partnership (RESP),[297] EPA Climate Showcase Communities project,[298] and Rhode Island Public Energy Partnership (RIPEP)[299]—revealed that local governments face unique challenges in implementing energy efficiency and renewable energy projects. This is largely due to the nature of their governance structures, budgeting, and financing mechanisms. The Lead by Example program would help municipalities overcome these barriers and streamline and coordinate technical and financial assistance opportunities.

[295] http://www.mass.gov/eea/docs/eea/energy/2020-clean-energy-plan.pdf
[296] http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/gc-grant-program/
[297] http://seagrant.gso.uri.edu/resp/
[298] http://www.epa.gov/statelocalclimate/local/showcase/building-local-capacity.html
[299] http://www.energy.ri.gov/pep/index.php