

Rhode Island EERMC Member Handbook

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STATE OF RHODE ISLAND
**ENERGY EFFICIENCY &
RESOURCE MANAGEMENT COUNCIL**



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SECTION 1: WHAT IS ENERGY?

1.1) What is Energy?

Fundamentally, energy is the ability to do work. Our modern society is dependent on energy for many daily operations, such as lighting, heating, cooling, manufacturing, and transportation. Most of the energy used in the United States comes from non-renewable sources, which cannot easily be replenished. Renewable sources of energy, those that can be replenished, are less prolific but have growing markets (Table 1.1) ([EIA, 2018](#)).

Table 1.1: Energy Sources Used in the United States

Non-Renewable Sources	Renewable Sources
<ul style="list-style-type: none">• Coal• Hydrocarbon gas liquids• Natural gas• Nuclear energy• Petroleum products	<ul style="list-style-type: none">• Biomass (energy from plants)• Geothermal energy (heat inside the Earth)• Hydropower (flowing water)• Solar energy• Wind energy

1.2) How is Energy Measured?

All forms of energy can be measured. Common types of energy and their units of measure include:

- Electricity: kilowatt hours (kWh), megawatt hours (MWh)
- Natural gas: 100 cubic feet (Ccf), therms, decatherms
- Liquid petroleum or biofuels: barrels (bbl) or gallons (one barrel = 42 gallons)
- Coal: tons, metric tons

In order to compare different types of energy, their measurements must be converted to the same units. Typically, that will be the British thermal unit (Btu), a measure of heat energy. Some examples of Btu conversions include:

- 1 gallon of gasoline = 120,476 Btu
- 1 cubic foot of natural gas = 1,037 Btu
- 1 gallon of propane = 91,333 Btu
- 1 kilowatt hour of electricity = 3,412 Btu

([EIA, 2018](#))

1.3) How is Energy Produced?

Since energy can neither be created nor destroyed, all human engineered energy has been converted from one form to another. Energy is transformed differently depending on the energy source and the technology being used. For example, natural gas, oil and coal can be burned to produce heat directly or to spin turbines with magnets that generate electricity. Wind turbines and solar photovoltaics (PV) harness energy from the wind and sun to produce electricity. Heat from solar thermal technology can be used directly to heat water or ventilation air.

More information: <https://www.energy.gov/science-innovation/energy-sources>

1.4) How Is Energy Delivered?

1.4.1) Electricity Transmission and Distribution

In the United States, electricity is primarily generated from fossil fuel power plants and transmitted across a vast grid of substations, transformers, and power lines. *Transmission* lines carry high-voltage electricity long distances to the area where it will be used. Once it reaches a local substation, a transformer lowers the voltage, so it is safer for use in homes and businesses, and sends it through *distribution* lines to the end-user (Figure 1.1). Transmission systems are managed by Regional Transmission Organizations (RTOs), which also have the responsibility of working with power generators to ensure that enough electricity is available to meet demand at all times (EIA, 2018). Distribution systems are managed more locally by electric distribution companies, also known as utility companies.

New England's power grid is managed by ISO New England. Within Rhode Island, the majority of the electric distribution system is managed by National Grid, the state's primary utility company (RI OER, 2019).

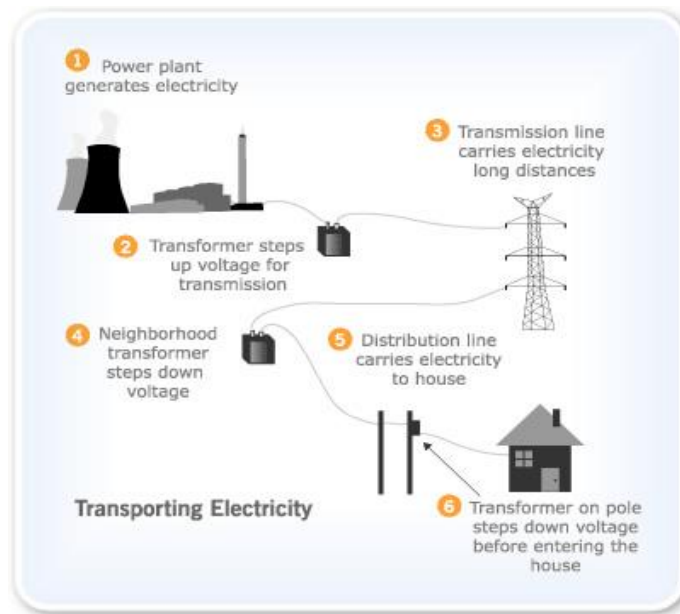


Figure 1.1. Transporting Electric Energy

Source: www.solarschools.net

More information:

- ISO/RTO Council (<https://isorto.org/>)
- ISO New England (<https://www.iso-ne.com/>)
- RI Office of Energy Resources (<http://www.energy.ri.gov/electric-gas/electricity/learn-about-electricity.php>)

1.4.2) Natural Gas and Delivered Fuels

After natural gas is extracted and processed, it must be transported to end users like power plants for electric generation or homes and businesses for heating. Like the delivery of electricity, the delivery of natural gas involves first piping the fuel through wide-diameter *transmission* pipelines across long

distances. When the natural gas arrives in the area where it will be used, it is received by smaller diameter *distribution* pipes, also known as mains and service lines, that connect directly to the end-use facility ([EIA, 2019](#)). Because natural gas is not native to New England, it is piped in from production areas in the Appalachian region, the Gulf Coast, and Canada. National Grid, Rhode Island’s only natural gas distribution company, manages the retail delivery of gas to end users in the state ([OER, 2019](#)).

Petroleum-based fuels have a similar story. After the crude oil has been collected from wells in a production field, pipelines, barges, trains, or trucks transport it to refineries or ports for shipment on oil tankers to other countries ([EIA, 2018](#)). Almost all of the transportation and heating fuel consumed in Rhode Island, eastern Connecticut, and parts of Massachusetts are supplied via marine shipments through the Port of Providence and other marine import terminals in East Providence and Tiverton ([EIA, 2018](#)). Most of the product arriving at the terminals is subsequently trucked to end users. Because Rhode Island does not regulate retail sales of heating oil and propane, sales are managed primarily by local delivered fuel dealers. ([OER, 2019](#)).

1.5) Forms of Energy in Rhode Island

1.5.1) Electricity

Electricity used in Rhode Island is an integrated mix from a variety of power plants and distributed renewable energy sources located throughout the region (Figure 1.2) ([National Grid, 2018](#)).

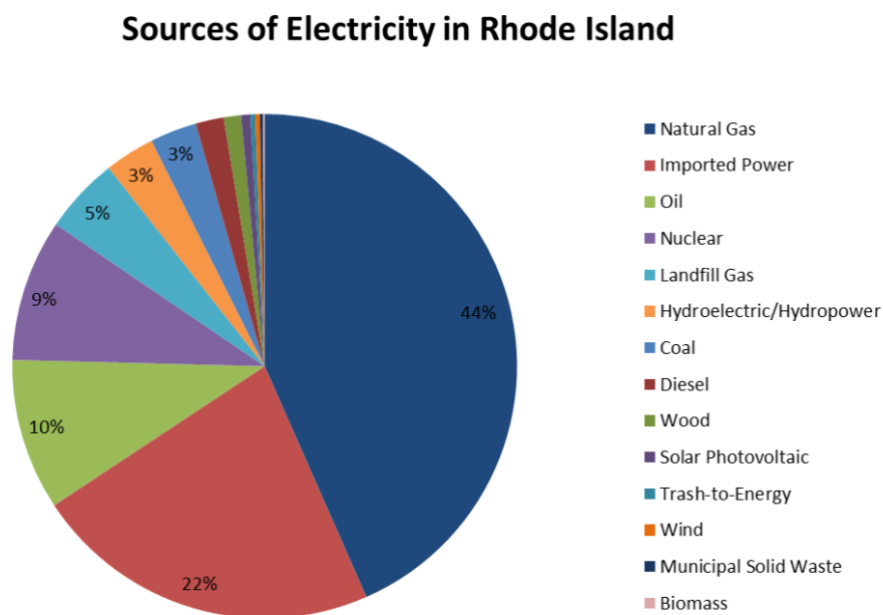


Figure 1.2. Sources of Electricity in Rhode Island
Source: www.nationalgridus.com

There are six power plants located in Rhode Island, which have a collective generating capacity of 2 gigawatts (GW). Almost all of these plants use natural gas as the primary fuel ([EIA, 2018](#)). As of December 2016, Rhode Island also had approximately 2,150 distributed renewable energy systems representing approximately 100 MW of wind, solar, and hydropower capacity ([OER, 2019](#)). All of this in-state generation gets fed into the regional electric grid and combined with many other generation sources.

1.5.2) Heating

In addition to being used for electricity, natural gas is also used directly as a source of heat for roughly half of Rhode Island’s households. Another third of Rhode Islanders use fuel oil as the primary energy source for heating their homes (EIA, 2018). In recent years, heat pumps have started becoming more widely used in Rhode Island. Air source heat pump technology transfers heat in and out of a building to provide efficient space heating as well as cooling (OER, 2019).

1.5.3) Transportation

Much of the transportation sector in Rhode Island is fueled by petroleum products such as motor gasoline, which is required to be mixed with ethanol to limit ozone formation (EIA, 2018). As alternative fuel vehicles (AFVs) gain traction, supporting infrastructure like electric charging stations and biodiesel fueling stations are available throughout the state (DOE, 2018). Overall, Rhode Island hosts 318 motor gas fueling stations, 7 liquefied petroleum gas stations, 80 electric charging stations, and 4 compressed natural gas/alternative fuel stations (EIA, 2018).

1.6) How Do Rhode Islanders Use Energy?

Rhode Island relies on energy for three major purposes: end use electric consumption, thermal energy demand, and transportation applications (Figure 1.3). 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 supply thermal energy needs (OER, 2015).

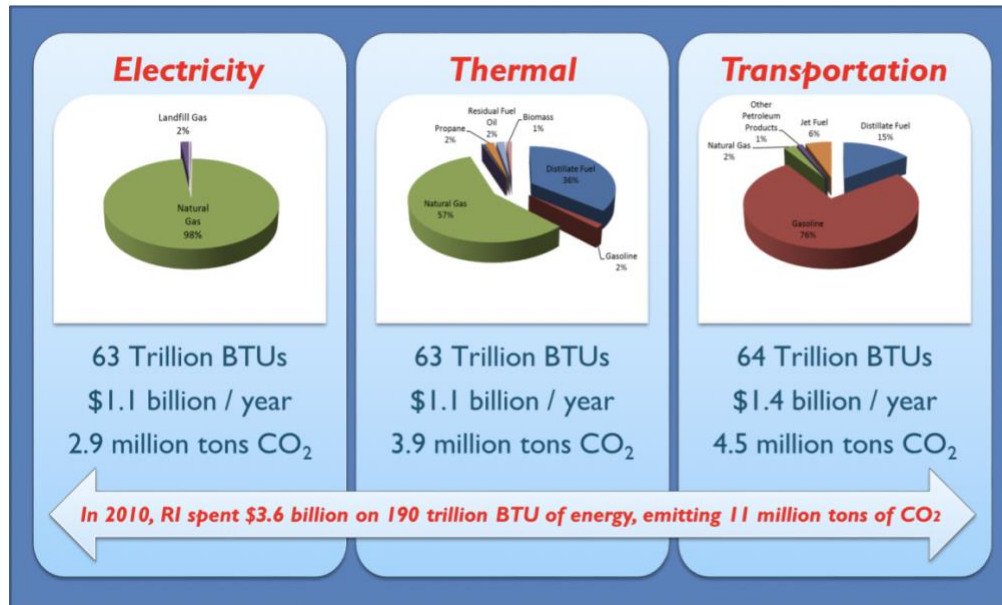


Figure 1.3. Rhode Island’s Total Energy Profile 2010

Source: Energy 2035: Rhode Island State Energy Plan

Rhode Island has among the lowest energy consumption per capita in the country, in part because there is not much manufacturing and industry. The residential and transportation sectors are the largest consumers, with the commercial sector following close behind ([EIA, 2016](#)).

Rhode Island Energy Consumption by Sector

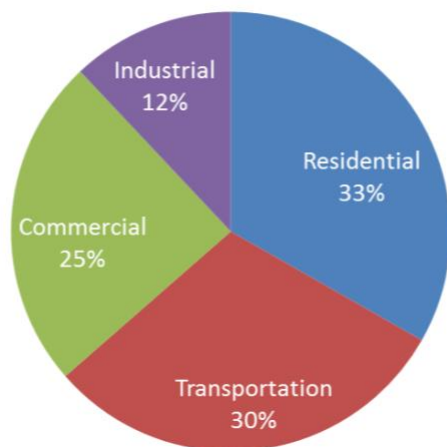


Figure 1.3. Rhode Island Energy Consumption by Sector in 2016
Source: www.eia.gov

1.7) Energy Efficiency and Conservation

Energy efficiency and energy conservation are strategies to reduce the demand of energy. Both strategies reduce demand which reduces costs for utility ratepayers.

- **Energy conservation** occurs when less energy is used as a result of a *behavior*, such as turning off the lights or setting back your thermostat.
- **Energy efficiency** is when *technology* is employed that uses less energy to produce the same result. For example, an LED light bulb can produce the same amount of light as an incandescent bulb, but it is significantly more efficient because it requires less energy ([EIA, 2019](#)).

Maximum energy savings can be achieved when both energy efficiency and energy conservation provide are used together. There countless examples of efficiency and conservation measures. Some of the most impactful, and therefore common, measures for the residential and commercial sectors are: lighting, insulation, air sealing, heating and cooling systems, thermostats, appliances, water heating, windows, electronics, and transportation ([DOE, 2014](#)). Energy efficiency programs can help ratepayers identify and implement efficiency and conservation measures to lower their energy bills. Section 7 covers Rhode Island’s energy efficiency programs in more detail.

1.8) Additional Resources

- https://www.eia.gov/energyexplained/index.php?page=about_home
- <https://www.energy.gov/science-innovation/energy-sources>
- https://www.eia.gov/energyexplained/index.php?page=electricity_delivery

- <https://www.eia.gov/state/analysis.php?sid=RI#26>
- https://www.nationalgridus.com/media/pdfs/billing-payments/bill-inserts/ri/cm4391_ri-edisclosure.pdf
- <https://afdc.energy.gov/states/ri>

SECTION 2: HISTORY OF ENERGY EFFICIENCY IN THE UNITED STATES

2.1) Energy Efficiency as a Resource

In general, two options exist to meet the energy needs of consumers, businesses, and institutions:

1. Using sources of energy supply (from natural gas, petroleum, renewable energy, etc.), or
2. Reducing energy demand (from energy conservation or investments in energy efficiency) ([OER, 2015](#)).

In other words, energy efficiency is capable of displacing energy supply. Because efficiency programs are generally significantly cheaper to implement than acquiring conventional supply (e.g. buying electricity), efficiency is now widely considered not only a resource, but often the “first fuel” of choice. Efficiency programs can also defer expensive upgrades to utility infrastructure, improve system reliability, reduce peak demand, and increase energy security ([Yang, 2015](#)).

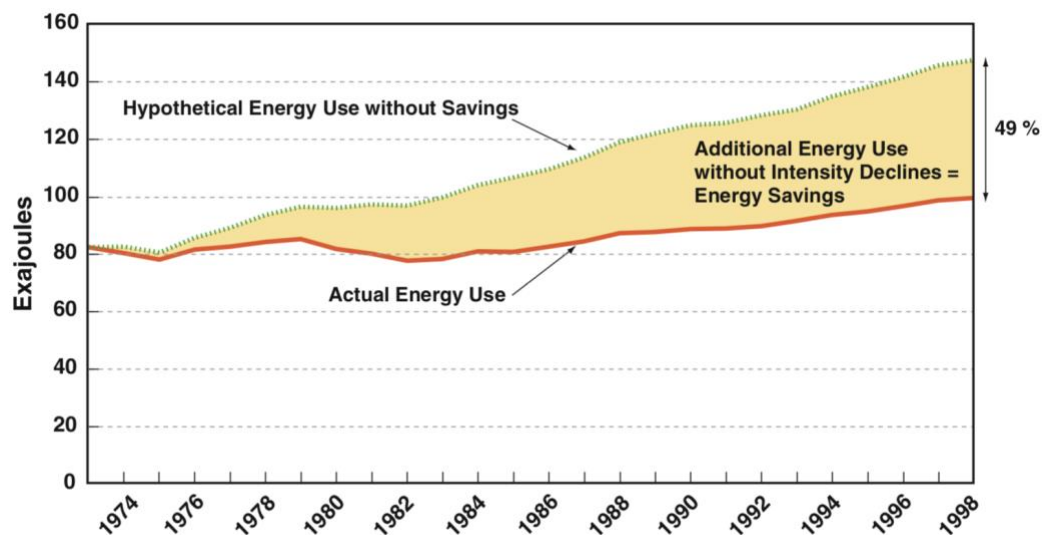


Figure 2.1. Impact of energy efficiency on total energy use in IEA countries
Source: Yang, 2015

2.2) Energy Efficiency as a Strategy for Demand Side Management

On a fundamental level, a utility company is concerned with two main aspects of energy:

1. The supply side – the procurement of energy resources, and
2. The demand side – the use of energy resources.

Managing the demand side means encouraging ratepayers to modify their energy use by either using less energy overall or by moving the time of energy use to off-peak times (when energy consumption is lowest) such as nighttime and weekends. The main goal of Demand Side Management (DSM) is to mitigate the need for costly investments in utility infrastructure that might be needed to accommodate rising peak demand.

Energy efficiency programs (including energy conservation) represent one type of DSM, as they offer consumers financial and behavioral incentives to implement energy saving measures in their homes,

businesses, and facilities. The result is avoided infrastructure investments, which keeps costs low while still ensuring a steady supply of energy ([EIA, 2002](#)).

2.3) Where Demand Side Management Began

In the 1970's, growing concerns over the United States' reliance on foreign oil and the environmental impacts of electric generation led to the development of Demand Side Management (DSM). During the 1980's, public utilities commissions began using least-cost planning principles and offered utilities incentives to establish DSM programs, resulting in rapid growth into the early 1990's ([Eto, 1996](#)).

Focus on electric industry restructuring (see Section 4.1.1) in the mid 1990's caused a decline in DSM investments. Growth resumed in the late 1990's as states began creating DSM funding mechanisms, like "public benefits" funds ([DOE, 2009](#)). Since then, investments in demand-side resources have steadily increased. In 2016, spending on electric energy efficiency programs (both utility and nonutility programs) totaled \$6.8 billion compared to \$1.6 billion in 2006 ([CEE, 2017](#)).

2.4) Additional Resources

- Energy Efficiency as a Resource:
https://www.springer.com/cda/content/document/cda_downloaddocument/9781447166658-c2.pdf?SGWID=0-0-45-1494788-p177249982
- History of Demand Side Management:
https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/adequacy_report_01-09-09.pdf
- Recent Demand Side Management Trends:
https://library.cee1.org/system/files/library/13561/CEE_2017_AnnualIndustryReport.pdf

SECTION 3: UTILITIES REGULATION

3.1) History of Utility Regulation and Energy Efficiency

Utilities historically had two main functions: power generation and power distribution. While power generation can be a competitive, non-monopoly industry (detailed further below), power distribution is a natural monopoly. The monopoly arises because the costs of creating multiple, competing power distribution grids in the same region would be too great compared to possible gains or cost reductions from competition. Public Utilities Commissions, or equivalent bodies, regulate monopolies like utilities to prevent the abuse of monopoly power.

3.1.1) Utility Restructuring and Deregulation

Traditionally, utilities offered both power generation and distribution services, and the costs of power generation and distribution were both included in calculations for cost-based regulation. However, in the 1990s, due to rising costs and the subsequent increasing regulatory burden, some states began a process of restructuring the utility business model by separating the functions of power generation from distribution. Utilities were required to sell off their power generation assets but continued to be responsible for delivering energy to consumers and maintaining the distribution infrastructure (e.g. poles, wires, transformers, substations, etc.)

Relatedly, many states also deregulated the power supply market, allowing for independent, non-utility power producers to sell their power directly to the end-use customer at unregulated rates in an open marketplace. In deregulated states, like Rhode Island, utilities no longer generate power and focus solely on maintaining the power delivery system.

3.1.2) Rate of Return Regulation

Rate of Return (RoR) regulation is a method of compensating private companies, often called legal monopolies, who supply a marketplace with a natural monopoly structure, such as electricity distribution. Because the market is best suited to having a single distribution utility in a given region, it is important for regulators to ensure that consumers are treated fairly while still allowing a reasonable rate of return on investment for the utility.

3.1.3) Cost Based Regulation

A common regulatory model is cost-based regulation, in which a regulator determines how much money a utility must make to recover its costs (plus earn a reasonable return on infrastructure investments) and allows the utility to base its rates on that.¹ On its own, cost-based regulation can incentivize utilities to sell more power because the more energy they sell, the more money they earn. Any amount earned over the set rate of return can be kept as profit. Additionally, they earn more if they invest

¹ In cost-based regulation, regulators identify the costs needed to provide adequate, reliable power on well-maintained infrastructure, allow a return on utility infrastructure investments, and divide the sum of the costs, allowed return, and a depreciation allowance by the projected total sale of energy units. For utilities that provide both power generation and distribution, the calculated costs include power generation costs. Regulators determine a set amount for utilities to recover annually on their capital investments (typically 9-10%). This is lower than the average return on equity across all industry, in part because utility investments are seen as less risky than the industry average.

more in capital upgrades, as the returns are calculated as a percent of capital investments. This provides a strong disincentive for the utility to provide efficiency programs.

3.1.4) Revenue Decoupling

Revenue decoupling is an increasingly common way to regulate how a utility gets paid. It breaks the link between the utility's revenue and the amount of energy it sells, removing the disincentive for the utility to be a full partner in energy efficiency and clean resource investments. Decoupling changes only the way the utility is compensated for its distribution costs. Under decoupling, delivery charges are not based on sales, but rather on how much it costs to run the system and maintain the grid.

Some states, like Rhode Island, have policies which decouple the amount of power sold from the amount of revenue earned by the utility. For example, National Grid undergoes an annual review to "true up" the profits earned from selling power and match them to the allowed rate of return. If National Grid sells less power than expected, they are allowed to collect additional funds in the future to match the revenue requirement. If they sell more power than expected (as has been the case in recent years), they return money to the ratepayers.

3.1.5) Utility Business Model and Energy Efficiency

A traditional utility business model, when subjected to rate of return (RoR) regulation, incentivizes investment in physical infrastructure and energy sales, because these investments yield increased income (since $\text{income} = \text{investment} * \text{RoR}$). As a result, utilities have historically felt tension between the goals of energy efficiency policies and their fiduciary duty to shareholders. Fortunately, policy solutions to these poorly aligned incentives have proven effective. For example, in Rhode Island, utility companies receive financial incentives for achieving energy efficiency savings targets. This model has largely been able to overcome the tension between rate of return regulation and energy efficiency, in part because the state's efficiency programs are well-run and utility regulators set and enforce appropriate incentives.

3.1.6) Performance Based Regulation

Performance-based regulation (PBR) is an alternative to cost-based regulation. While there are different types, typically PBR attaches utility earnings to the achievement of specific goals or metrics. Rather than utility profit increasing as utility investment increases, utility profit increases as performance improves. For example, a utility is allowed to earn a higher return if it achieves certain performance goals (also known as Performance Incentive Mechanisms or PIMS) like energy efficiency, peak reductions, Distributed Energy Resources integration, or data sharing.

3.2) Utility Structures

Utility companies can have a range of structures, and it is important to understand what the key differences among these are. This section will define and highlight key distinctions among three of the most common structures, Investor-Owned Utilities (IOUs), Publicly Owned Utilities (POUs), and Cooperative Utilities (Coops).

- **Investor-Owned Utility** – Privately owned companies, these utilities are typically subject to state regulation, often have portfolios that span multiple fuels (most commonly electricity and natural gas) and are financed through a combination of shareholder investments and debt. *A key feature of IOUs is their fiduciary duty to shareholders.*
- **Publicly-Owned Utility** – These utilities, sometimes referred to as municipal utilities, are owned by a governmental or municipal entity. As a result of this, in contrast to with IOUs, there is a

presumption that these utilities are managed with the customers' interests in mind, because they are part of the public sector and thus vested with the public interest rather than shareholder interests. *A key feature is that these utilities are sometimes exempt from state regulations due to this presumption.*

- **Cooperative Utilities** – Cooperative utilities are owned by their customers. As with other customer-owned businesses, they are typically governed by a board of directors, while day-to-day management falls to employees. Coops are common in rural areas, and *due to their customer-owned structure, the board of directors often provides primary regulatory oversight.*

Rhode Island's primary utility company, National Grid, is a private investor-owned distribution utility company. Pascoag Utility District and Block Island Power Company are both publicly-owned by their respective municipalities.

3.3) Additional Resources

- Utility Regulation and Policy:
<https://aceee.org/topics/utility-regulation-and-policy>
- Utility Structures:
<https://marketrealist.com/2014/09/must-know-structure-electric-utility-industry>
- Rate of Return Regulation / Utility Business Model and Energy Efficiency:
<https://www.investopedia.com/terms/r/rate-of-return-regulation.asp>
- Strategic Energy Management:
<https://aceee.org/files/proceedings/2014/data/papers/4-1119.pdf>
<https://www.energy.gov/eere/slsc/data-driven-strategic-energy-management>

SECTION 4: ENERGY EFFICIENCY IN RHODE ISLAND

Rhode Island is widely recognized as a leader in the nation for energy efficiency policy, programs, and outcomes. While many factors, including dedicated staff at all levels of energy efficiency policy, programs, and implementation, the regulatory structure in Rhode Island is a key enabler of the state's consistent performance. This section describes the landmark legislation that propelled Rhode Island to the top, provides an overview of the key groups that contribute to energy efficiency efforts, and highlights Rhode Island's recent energy efficiency accomplishments and opportunities for improvement.

4.1) Landmark Legislation

Rhode Island is a deregulated, decoupled state that uses performance-based utility regulation (see Section 3). The utility's profit does not change based on how much energy it delivers to homes and businesses. In fact, if the utility sells more energy than expected, ratepayers receive a credit on their bills at the end of the year. If it sells less, ratepayers receive a surcharge.

Not only does the utility *not* have an incentive to sell more energy, its investment in energy efficiency is actually cheaper than buying energy. Selling less energy also reduces strain on infrastructure, lowers greenhouse gas emissions and air pollution, and fosters economic growth and job creation.

Rhode Island has nearly two decades of concerted energy efficiency efforts under its belt. The following subsections describe the landmark legislation that removed barriers and enabled Rhode Island to effectively invest in energy efficiency.

4.1.1) Rhode Island Utility Restructuring Act (1996)

Prior to 1996, Rhode Island utilities owned both power generation facilities and all the transmission and distribution infrastructure (poles and wires) to get that power to your home or business. When consumers wanted more electricity, the utility profited from both supplying that power *and* delivering it. This business model did not allow for a competitive energy supply market and prevented ratepayers from choosing lower-cost supply alternatives.

In 1996, Rhode Island joined four other New England states in restructuring the utility by effectively unbundling the energy supply and distribution functions of the utility. The utility was required to sell off its power generation assets (e.g. all power plants it had previously owned) but maintain nondiscriminatory access to distribution infrastructure for all retail customers and nonregulated power producers.

Importantly, this legislation also deregulated the power supply market, allowing for power plants to sell their power competitively in an open marketplace. Ratepayers can now choose to purchase power from any of these "third party suppliers". For customers who prefer a default supply of power, the utility purchases power from a mix of suppliers and passes that supply cost directly through to ratepayers. If the cost of default supply (also called "Standard Offer Service") increases, then the cost on the ratepayer's bill will increase, but the utility does not profit from it.

The other key aspect of the Utility Restructuring Act was the creation of the nation's first public benefits fund, known as the Systems for demand-side management and renewable energy resources, which funded utility investment in energy efficiency (i.e. programs that incentivize energy-saving measures like insulation, air sealing, and higher-efficiency lighting, HVAC systems, and appliances).

More information:

- Utility Restructuring Act:
<http://www.energy.ri.gov/policies-programs/ri-energy-laws/rhode-island-utility-restructuring-act-1996.php>
- Third Party Suppliers:
<http://www.ripuc.org/utilityinfo/electric/compfaq.html>

4.1.2) Least Cost Procurement (2006)

This groundbreaking statute established a new economic model for efficiency investment in Rhode Island. Officially called the “Comprehensive Energy Conservation, Efficiency and Affordability Act”, it requires electric and natural gas distribution companies to procure energy supply (including energy efficiency) that is the least costly. When considering which supply to purchase, utilities must invest in *all cost-effective efficiency* that is *less than the cost of supply* as well as prudent and reliable.² In this way, Rhode Island treats energy efficiency as equivalent to a power generation resource and its first fuel of choice.

Benefits of Least Cost Procurement:

- avoided costs of energy supply
- avoided costs of energy capacity
- avoided transmission & distribution costs
- wholesale market price (electricity rates) suppression
- avoided cost of environmental compliance
- utility non-energy benefits
- participant non-energy benefits
- environmental benefits
- macro-economic benefits

Costs of Least Cost Procurement:

- costs of running the energy efficiency program
- cost of any financial incentives paid to program participants
- costs the participants pay out-of-pocket

The sum of all benefits must be larger than the sum of all costs for energy efficiency to be considered cost-effective. Not only does the energy efficiency have to be cost-effective, it must also cost less than it would to buy the equivalent amount of actual energy from traditional sources.³ The statute also required the utility to begin submitting Annual and Three-Year Energy Efficiency Procurement Plans and established the Energy Efficiency and Resource Management Council to oversee the efficiency programs. As a result of Least Cost Procurement, Rhode Island now leads the country in efficiency investments per capita and realizes hundreds of millions of dollars in benefits to ratepayers every year.

More information:

- Comprehensive Energy Conservation, Efficiency and Affordability Act of 2006 (R.I.G.L. § 39-1-27.7.1): <http://webserver.rilin.state.ri.us/Statutes/title39/39-1/39-1-27.7.HTM>

² Cost-effective means that the benefits of energy efficiency are greater than the costs of energy efficiency. All benefits and costs are specified in the Rhode Island Test (formerly the Total Resource Cost Test). The cost of power supply is typically around 10 cents per kilowatt-hour (kWh) for homeowners. The cost of energy efficiency is typically around 4 cents per kWh saved. In other words, the cost of saving energy is generally cheaper than the cost to supply that energy. Equivalently, the ratio of benefits to costs (a.k.a. the benefit-cost ratio) must be greater than 1.000.

³ On the electric side, for example, the cost of kWh saved over the lifetime of the investment is averaged across the entire efficiency program portfolio. The cost of supply used for this critical comparison is the price-per-kWh of electricity charged to residential consumers who choose the default Standard Offer Service supply of electricity.

- Least Cost Procurement:
<http://www.energy.ri.gov/policies-programs/ri-energy-laws/least-cost-procurement-2006.php>
<https://aceee.org/files/proceedings/2012/data/papers/0193-000255.pdf>
- Least Cost Procurement Standards:
<https://rieermc.ri.gov/least-cost-procurement-standards-2017/>

4.1.3) Revenue Decoupling (2010)

After the Utility Restructuring Act and Least Cost Procurement removed critical barriers for utility investment in energy efficiency, the Revenue Decoupling Act of 2010 ([R.I.G.L. § 39-1-27.7.1](#)) severed the final link between utility profits and sales volume. Before 2010, the utility profited on how much power it delivered to homes and businesses. Delivering more power meant higher profits, even though the utility did not profit on supplying that power (since Restructuring in 1996).

Least Cost Procurement mandated that utilities invest in energy efficiency, which inherently decreased sales volume and, therefore, profits. Decoupling resolved this tension 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.⁴

Furthermore, the utility has an opportunity to earn a performance-based incentive based on meeting energy savings targets each year (see Section 3.2.3 *Performance Based Regulation*). The result is that Rhode Island utilities have no disincentive to invest in energy efficiency and do have an incentive to meet energy savings targets.⁵

More information:

- Revenue Decoupling Law (R.I.G.L. § 39-1-27.7.1):
<http://webserver.rilin.state.ri.us/Statutes/TITLE39/39-1/39-1-27.7.1.HTM>

4.2) Utility Performance Incentive Structure

National Grid is given the opportunity to earn 5% of the total energy efficiency spending budget for achieving 100% of the energy savings goals approved by the Public Utilities Commission. It is worth noting that Rhode Island offers one of the lowest performance incentives for energy efficiency in the country, while achieving highest-in-the-nation energy savings goals. The median award among states with similarly-designed performance incentives is 8%, with a low of 4.2% and a high of 15% (ACEEE, 2015). The performance incentive signals that utility executives must take energy efficiency seriously in Rhode Island and devote the necessary resources to achieving the energy savings goals set by the Public Utilities Commission. The benefits to Rhode Island consumers far outweigh the cost of both the energy efficiency investment and the performance incentive reward ([EERMC, 2015](#)).

⁴ Utilities 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.

⁵ This legislation can affect energy distribution rates and ratepayer bills by either affecting the amount of energy sold or the revenue requirement (how much the utility is allowed to make each year). Rates are determined by dividing the revenue requirement by the forecasted sale of energy. If ratepayers reduce energy use, then the amount of energy sales will decrease and lead to an increase in rates. Even though there is upward pressure on rates, ratepayer bills will decrease because they use less energy. If energy efficiency investments are sufficient to reduce strain on the energy system or defer/prevent the need for additional energy infrastructure, costs to build and maintain the energy system will decrease. Since the approved revenue requirement is directly linked to costs of maintaining the distribution system, the revenue requirement would decrease, causing rates to decrease.

Rhode Island has had a shareholder incentive for electric and gas since 2005 and 2007, respectively. The Narragansett Electric Company, d/b/a National Grid (NG), can earn incentives for both electric (kWh) and gas (MMBtu) savings. There is a target base incentive rate of 5% for both electric and gas in 2010 applied to the eligible spending budget for 2010. The threshold performance level for energy savings by sector is set at 75% of the annual energy and demand savings goal for the sector (Docket 4366). Further, in 2015, the Commission approved 30% of the target electric program incentive to be based on demand savings, while the remaining 70% will be based on energy savings (Docket 4527).

4.3) The Role of the System Benefits Charge

The 2006 Comprehensive Energy Conservation, Efficiency, and Reliability Act established Rhode Island's System Benefits Charge (SBC), which is a small fee assessed on electricity and gas customers' bills. Across all ratepayers in the state, this small charge per kilowatt-hour or per therm accumulates to a significant amount and is the primary source of funding for the state's energy efficiency programs like free home energy audits and incentives for energy-saving measures. Funding for energy efficiency programs also comes from the Forward Capacity Market (see Section 4.3 *The Role of the Forward Capacity Market*).

Funding from the SBC is carefully spent and evaluated to ensure the funds support only cost-effective energy efficiency that is less than the cost of supply, as required by the Least Cost Procurement law.

Diverting SBC funds to fill gaps in the state budget or imposing an artificial cap on the charge will always be detrimental to Rhode Island's efficiency programs. National Grid would be forced to scale back programs and funds would be exhausted, so many Rhode Island homes, businesses, and institutions would not be able to participate in programs that lower their energy bills. Additionally, the state would not receive the full benefits like reduced spending on electricity generation, transmission, and distribution capacity; reduced spending on emissions controls; avoided carbon emissions; and economic development resulting from local spending on energy resources.

Why is it called the *System Benefits Charge*?

Energy efficiency reduces the amount of energy that the utility has to distribute. Less distribution decreases strain on the energy infrastructure system. This reduction in strain is considered a benefit to the system. The charge for energy efficiency investment, therefore, is simultaneously a charge to fund system benefits.

More Information:

<http://rieermc.ri.gov/wp-content/uploads/2017/09/eermc-faq-final-6-22-15.pdf>

4.4) The Role of the Forward Capacity Market

The Forward Capacity Market (FCM) ensures that the New England power system will have sufficient resources to meet the future demand for electricity. Forward Capacity Auctions (FCAs) are held annually, three years in advance of when the power will be needed. Resources (mostly power plants) compete in the auctions to supply capacity in exchange for a market-priced capacity payment. Energy efficiency is one such resource for which the utility can receive payment.⁶ When National Grid receives a payment, it invests those funds in more energy efficiency (and therefore in future FCM revenues).

More information: <https://www.iso-ne.com/markets-operations/markets/forward-capacity-market>

⁶ Because the FCM is subject to market forces its revenues vary from year to year depending on demand for increased capacity.

4.5) Key Groups

Several entities are instrumental in ensuring that Rhode Island’s energy efficiency programs perform at their best and adhere to the law of Least Cost Procurement.

4.5.1) Utilities

National Grid is the primary utility in Rhode Island, as it serves 99% of electric and gas customers. National Grid also operates in Massachusetts and New York. The Pascoag Utility District serves a portion of Burrillville and Block Island Power Company serves New Shoreham. Because National Grid is the primary utility in the state, it is often referred to as “the utility” or “the Company”. National Grid is also the primary energy efficiency program administrator in Rhode Island, maintaining a wide portfolio of successful programs.

4.5.2) Energy Efficiency and Resource Management Council (EERMC)

The Energy Efficiency and Resource Management Council (EERMC or Council) provides oversight of Rhode Island’s rate-payer funded energy efficiency programs and structured stakeholder participation. The Council includes fifteen members that represent small and large business, non-profit organizations, market rate and low-income home-owners and renters, municipalities, governments and environmental science and policy. The Council’s goal is to ensure Rhode Islanders are getting the least expensive and most environmentally healthy energy supply through energy efficiency, conservation, and resource management.

More information: See [Section 5](#) and <http://www.rieermc.ri.gov/>

4.5.3) Public Utilities Commission (PUC)

The Rhode Island Public Utilities Commission (PUC) is a quasi-judicial body that regulates Rhode Island utilities. In addition to regulating electric distribution and pipeline public utilities, the PUC also has jurisdiction over gas, water, railroad, ferry boats, telephone, and telegraph. The PUC has three Commissioners appointed by the Governor to six-year terms with the advice and consent of the Senate. The Commissioners hold public hearings on rates, tariffs, and charges by the utility, among other items. Its role in energy efficiency involves approving utilities’ Annual Energy Efficiency (EE) and System Reliability Procurement (SRP) Plans (including the System Benefits Charge), Three-Year Energy Savings Targets, and Least Cost Procurement Standards.

More information: <http://www.ripuc.org/generalinfo/commission.html>

4.5.4) Division of Public Utilities & Carriers (DPUC)

The Division of Public Utilities and Carriers (DPUC or “Division”) is the regulatory arm that represents the ratepayer in rate cases and filings with the Public Utilities Commission. The Division is a settling party to EE and SRP Plans and participates in the Energy Efficiency Technical Working Group.

More information: <http://www.ripuc.org/generalinfo/division.html>

4.5.5) Office of Energy Resources (OER)

The Office of Energy Resources (OER) is Rhode Island’s lead state agency on energy policy and programs. OER works closely with private and public stakeholders to increase the reliability and security of the state’s energy supply, reduce energy costs and mitigate price volatility, and improve environmental quality. OER operates at the nexus of the many ongoing efforts to transform the Ocean State energy

system. Its role in energy efficiency includes working closely with the Council and its consultant team to review EE and SRP Plans.

More information: <http://www.energy.ri.gov>

4.5.6) Energy Efficiency Technical Working Group

National Grid’s Rhode Island Energy Efficiency Technical Working Group (formerly known as the Demand Collaborative) is a group of energy efficiency stakeholders that meets monthly to inform the development, implementation, and evaluation of National Grid’s EE and SRP Plans. National Grid has facilitated the Collaborative since 1991 as a means to create transparency around the development of annual EE and SRP Plans and to work towards building consensus with organizations before the plans are filed with the PUC each year.

More information: <https://rieermc.ri.gov/thecollaborative/>

4.6) Accomplishments

Rhode Island remains a nationally recognized leader in implementing high-quality energy efficiency programs. In the *2018 State Energy Efficiency Scorecard*, published by the American Council for an Energy Efficient Economy (ACEEE), Rhode Island received the #1 ranking in the category of “utility-sector energy efficiency programs and policies” after once again being the only state to earn a perfect score in that category. Rhode Island also ranked #3 overall for the second year in a row by achieving some of the highest energy savings in the country and pushing the envelope in several other categories. Since 2009, Rhode Island has consistently been in the top 10 states ([ACEEE, 2018](#)).

Energy efficiency has made a significant contribution to Rhode Island’s overall energy supply portfolio. As of 2018, 10 years of demand reduction investments made through the ratepayer-funded electric efficiency program supply approximately 17 percent of the state’s electric needs (Figure 4.1)([OER, 2015](#)).

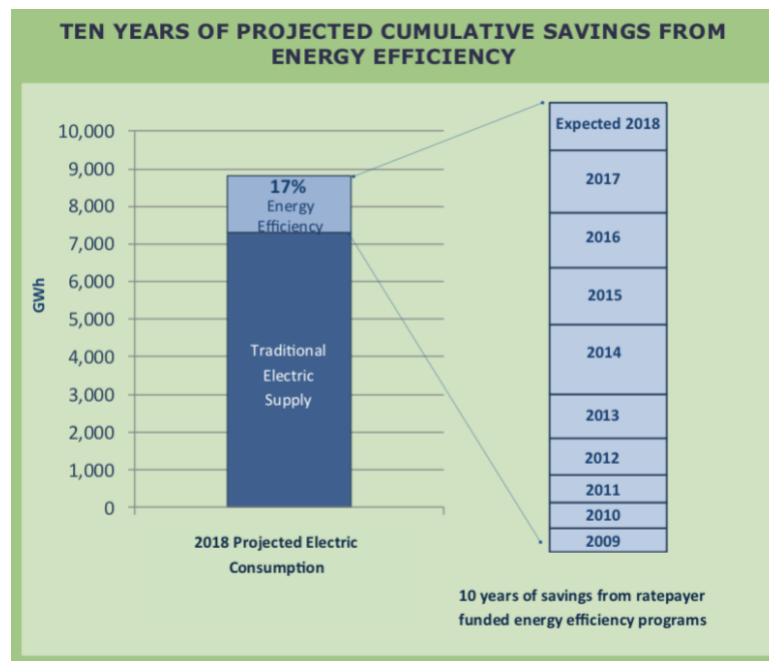


Figure 4.1. The role of energy efficiency since 2009, and its cumulative effects on energy use in Rhode Island. Source: EERMC 2018 Annual Report

In addition to enabling nation-leading levels of energy savings, Rhode Island's investments in cost-effective, low cost energy efficiency are creating jobs and boosting economic activity. Energy efficiency reduces the cost of doing business in Rhode Island and lowers residents' energy bills, leaving them with more disposable income to spend on other goods and services. These two effects lead to job creation and economic growth. Every \$1 million invested in energy efficiency leads to the creation of 45 job-years of employment, and every \$1 invested boosts Gross State Product by \$4.20 (National Grid, 2014).

More information:

- Full Report: <http://aceee.org/sites/default/files/publications/researchreports/u1710.pdf>
- RI Summary: <http://aceee.org/sites/default/files/pdf/state-sheet/2017/rhode-island.pdf>
- RI Full Details: <http://database.aceee.org/state/rhode-island>

SECTION 5: RHODE ISLAND ENERGY EFFICIENCY AND RESOURCE MANAGEMENT COUNCIL

5.1) What is the EERMC?

The Energy Efficiency and Resource Management Council (EERMC) was established in 2006 under amendments to the Rhode Island Energy Resources Act ([R.I.G.L. § 42-140.1](#)) to provide structured stakeholder participation and oversight of energy efficiency procurement. The Council includes members that represent small and large business, non-profit organizations, market rate and low-income homeowners and renters, municipalities, governments and environmental science and policy. The EERMC is responsible for ensuring maximum benefits to all Rhode Island ratepayers through energy efficiency.

Rhode Island is among the leading energy efficiency jurisdictions in North America. The presence of a council consisting of stakeholders focused on energy efficiency policy planning is a key driver of Rhode Island's success. The strength of the Council comes from the fact that diverse, key stakeholders representing all types of Rhode Island interests work together to make decisions from a common set of facts to implement the legislative mandate to acquire all cost-effective efficiency resources.

5.2) Purposes

Per its enabling legislation, the Council has four main purposes:

- "Evaluate and make recommendations, including, but not limited to, plans and programs, with regard to the optimization of energy efficiency, energy conservation, energy resource development; and the development of a plan for least-cost procurement for Rhode Island;
- Provide consistent, comprehensive, informed and publicly accountable stakeholder involvement in energy efficiency, energy conservation, and energy resource management;
- Monitor and evaluate the effectiveness of programs to achieve energy efficiency, energy conservation, and diversification of energy resources; and
- Promote public understanding of energy issues and of ways in which energy efficiency, energy conservation, and energy resource diversification and management can be effectuated."



Figure 5.1: Purposes of the RI EERMC

5.3) Key Stakeholders

To fulfill its mandates, the EERMC maintains important working relationships with key entities, including National Grid, the Office of Energy Resources, the Division of Public Utilities and Carriers, and the Public Utilities Commission. Council meetings also serve as a forum for public and private stakeholders, such as non-profit organizations, industrial users, institutions, businesses, and municipalities, to engage in the energy efficiency process by sharing their unique perspectives, challenges, and suggestions. A diverse array of voices at the table ensures that energy efficiency policy and programs continue to serve all Rhode Islanders and address evolving needs. Stakeholders are encouraged to attend meetings and/or submit public comment to the Council at <https://rieermc.ri.gov/submit-public-comment/>.

5.4) Meetings

As a quasi-governmental entity, the EERMC must adhere to the stipulations of the Rhode Island Open Meetings Act and the Access to Public Records Act. The Council must provide written notice of regularly scheduled meetings at the beginning of each calendar year. In addition, the date, time, location, and agenda for each Council meetings must be posted to the Rhode Island Secretary of State website at least 48 hours prior to each meeting. Written meeting minutes must be maintained and made public at the next regularly scheduled meeting or within 35 days. These procedures ensure that decision-making is transparent and that all stakeholders have the opportunity to participate in their government.

More Information:

<http://www.riag.ri.gov/documents/opengov/guidetoopeingovernmentbookletfullpagetext.pdf>

5.5) EERMC Membership

5.5.1) Membership Appointment

New members of the EERMC are nominated by the Governor, with the Senate's advice and consent. Each member represents the perspectives and interests of their sector, functioning as a liaison between stakeholders and the efficiency policy and planning process ([R.I.G.L. § 42-140.1-4](#)).

- Energy regulation and law
- Large commercial/industrial
- Small commercial/industrial
- Residential
- Low-income
- Environmental issues pertaining to energy
- Energy design and codes
- Energy efficiency education and employment tracking
- Municipal
- Large nonprofit institutional
- Small nonprofit

These 11 seats make up the voting members. The remaining 4 seats are ex-officio, non-voting members, including:

- A representative from an electric distribution entity
- A representative from a gas distribution entity
- A representative from a fuel oil or heating fuel industry
- The commissioner of the Rhode Island Office of Energy Resources

Once a new member has been selected by the Governor and approved by the Senate, they are officially appointed to the EERMC by the General Assembly.



Figure 5.2. Member photograph taken May 17, 2018 (several members not pictured)

5.5.2) Member Responsibilities

Once appointed, an EERMC member commits to:

- Serve a 5-year term
- Attend at least 8 out of the 12 meetings each year
- Actively participate in meetings
- Relay the work of the Council to their constituents

5.5.3) Current Members

Information about the current EERMC members, including their biographies and the sectors they represent, can be found at <https://rieermc.ri.gov/about/>.

5.6) Officers

5.6.1) Chairperson

The Chairperson of the EERMC, which must be a voting member, is appointed by the Governor and presides at all meetings when they are present. In addition to reporting on what was discussed at Executive Committee meetings, the Chairperson leads discussion, calls for votes, and ensures that the agenda is followed. When needed, the Chairperson can create ad-hoc sub-committees and appoint EERMC members to them.

5.6.2) Vice-Chairperson

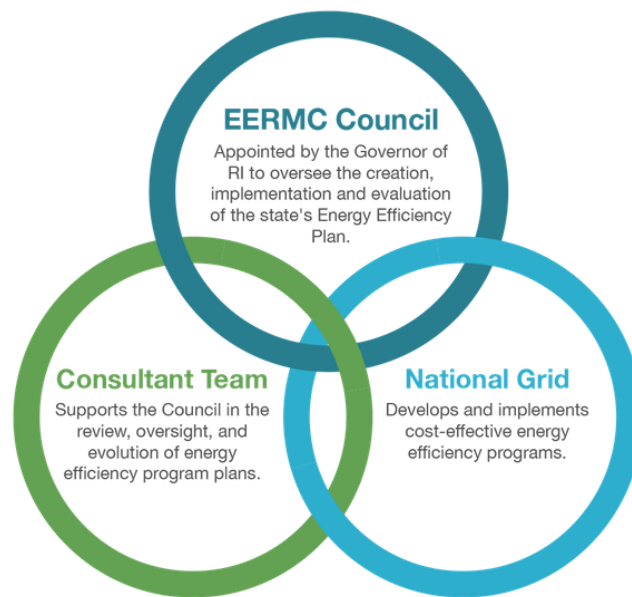
Also appointed by the Governor, the Vice-Chairperson of the EERMC performs the Chairperson's duties whenever they are not present and can also be given additional duties and powers from the Chairperson when necessary.

5.6.3) Executive Director

The Commissioner of the Rhode Island Office of Energy Resources serves as the Executive Director of the EERMC. The Executive Director and his/her staff keep the EERMC up to date on local and national energy-related information and fields, including energy efficiency and renewable energy. The Executive Director and staff are also responsible for EERMC administrative duties such as ensuring meetings meet open meeting regulations, maintaining official meeting minutes, drafting annual reports, and making all public EERMC documents available online.

5.7) Consultant Team

As part of the Legislation, the EERMC enlists the help of technical consultants to assist with its responsibilities. The Consultant Team serves the EERMC as a project manager -- ensuring that the Council meets its objectives and required duties each year and providing technical support wherever issues may arise. A Consultant Team work-plan is completed and submitted to the Council for review and approval on an annual basis. Consultant Team members include expertise with energy efficiency policy, data and analysis, project management, residential and commercial sector program development, regulation, financing, and evaluation, measurement, & verification. The Consultant Team's contract is rebid on a triennial basis.



5.8) Legal Counsel

As directed by the enabling legislation, the EERMC retains legal counsel, which:

- Advises the EERMC on all legal matters;
- Provides legal interpretations of legislative mandates pertaining to the EERMC; and
- Represents the EERMC at regulatory proceedings conducted by the Public Utilities Commission.

5.9) EERMC Committees

By vote of the Council, the EERMC may create sub-committees to address specific issues or tasks within the Council's powers and duties. Like EERMC meetings, these sub-committee meetings must be open to the public, and the majority of the sub-committee membership constitutes a quorum.

5.9.1) Executive Committee

The EERMC Executive Committee (also casually referred as: "Ex-Com") meets monthly and consists of the Chairperson, Vice-Chairperson, Executive Director, and any other members designated by the Council. While non-EERMC members may attend these open meetings, only voting EERMC members are permitted to vote in Executive Committee decisions. The Executive Committee's general duties include:

- Reviewing the performance of EERMC members;
- Identifying educational opportunities for new and current EERMC members;
- New member recruitment; and
- Developing EERMC meeting agendas and budget recommendations.

5.10) Annual Report to the General Assembly

Each spring, the EERMC is required to submit an Annual Report to the Rhode Island General Assembly "regarding the activities of the council, its assessment of energy issues, the status of system reliability, energy efficiency and conservation procurement, and its recommendations regarding any improvements which might be necessary or desirable" (R.I.G.L. § 42-140.1-5). The report also serves as a showcase of the previous year's energy efficiency program achievements including case studies of successful initiatives.

More information: <https://rieermc.ri.gov/plans-reports/>

5.11) By-Laws

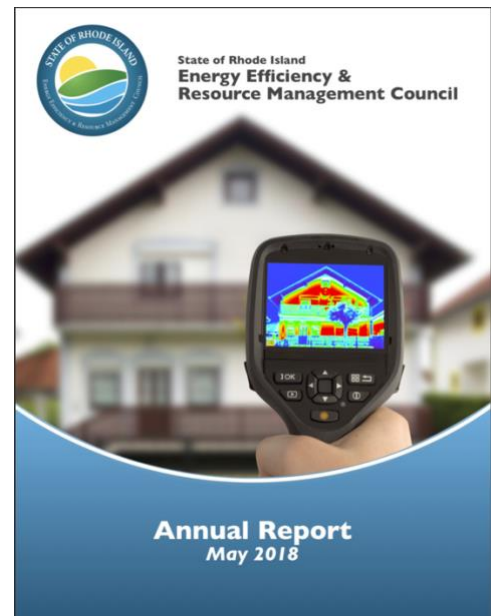
While the creation of the EERMC is defined in the legislation, the specific rules that the Council must adhere to are outlined in the by-laws. The by-laws, originally adopted in February of 2015, explain the council's purposes, powers, and duties, its membership composition, the roles of officers and committees, and meeting procedures.

More information:

<http://rieermc.ri.gov/wp-content/uploads/2017/11/eermc-by-laws-final-10-19-17.pdf>

5.12) Additional Resources

- EERMC Website:
<https://rieermc.ri.gov/>
- EERMC Enabling Legislation:
<http://webserver.rilin.state.ri.us/Statutes/TITLE42/42-140.1/INDEX.HTM>
- Attorney General's Guide to Open Government in Rhode Island:
<http://www.riag.ri.gov/documents/opengov/guidetoopengovernmentbookletfullpagetext.pdf>

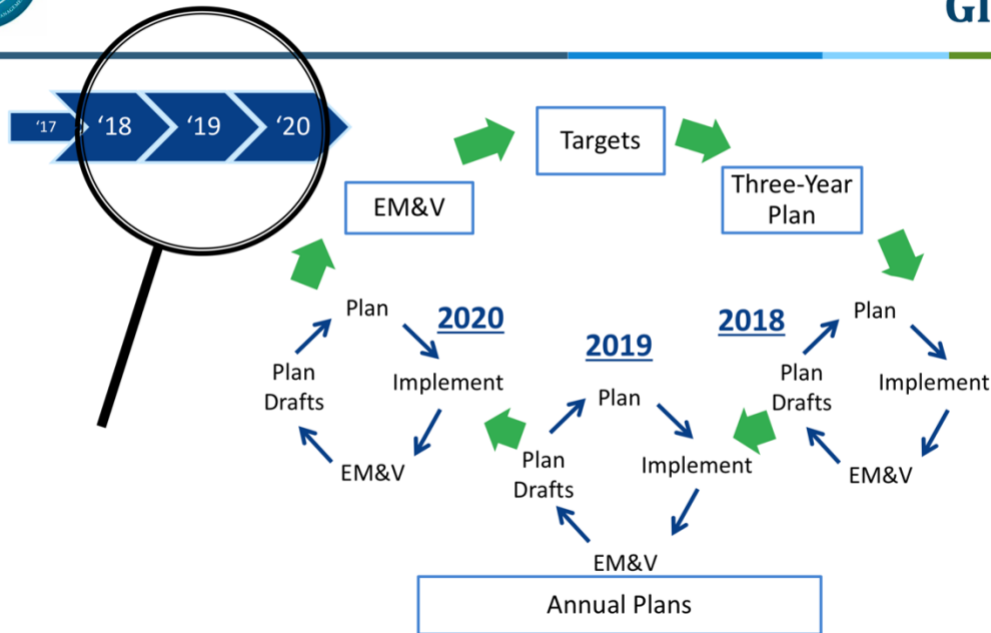


SECTION 6: ENERGY EFFICIENCY PLANNING

Rhode Island's energy efficiency activities work in three-year cycles that include setting energy savings targets; developing three-year plans; developing, implementing, and evaluating annual plans for three years; evaluating again; and then using the evaluation results to inform the next cycle (Figure 6.1).



The Three-Year Planning Process At a Glance



6.1) Least Cost Procurement Standards

The foundation of the energy efficiency planning process is the Least Cost Procurement Standards, which lay out a clear structure and process for achieving the goals of least cost procurement and define the roles and responsibilities for the different program administration and oversight entities. The Standards:

- Set deadlines for annual and triennial efficiency plans
- Require that the plans include certain components, including strategies for procuring all cost-effective efficiency and providing the utility with the opportunity to earn a performance incentive
- Require that the plans include information on program costs and benefits, energy savings goals, funding sources, and monitoring and evaluation plans
- Define an active role for the EERMC in providing assistance to develop the energy efficiency plans and ensure that the state's ratepayers "get excellent value from the EE Procurement Plan being implemented on their behalf"

More information:

http://riermc.ri.gov/wp-content/uploads/2018/05/4684-lcp-standards_7-27-17.pdf

6.2) Total Resource Cost Test

An important component of the Standards is cost-effectiveness testing. Because Least Cost Procurement requires the benefits of all utility investments in energy efficiency to be greater than the costs to implement them, a benefit-cost analysis is required. In the past, Rhode Island used the Total Resource Cost Test. In 2017, the state developed own state-specific test that provides a more holistic view of energy efficiency by accounting for additional benefits and costs. Rhode Island's test accounts for avoided costs of compliance with emissions regulations, participant health benefits and environmental benefits from reduced emissions. It also accounts for non-energy costs and benefits associated with economic well-being, comfort, health and safety, other fuels, water savings, the social cost of carbon not embedded in energy market prices, economic development, and energy security from reduced use of fuel oil ([ACEEE, 2019](#)).

More information:

[http://www.ripuc.org/eventsactions/docket/4684-NGrid-RI-Test-Tech%20Session\(9-13-17\).pdf](http://www.ripuc.org/eventsactions/docket/4684-NGrid-RI-Test-Tech%20Session(9-13-17).pdf)

6.3) Energy Efficiency Savings Targets

Every three years, the EERMC is required to develop targets for annual electric and natural gas reductions as a result of energy efficiency programs administered by National Grid. The targets support the development of National Grid's triennial and annual energy efficiency program plans by to give the utility guidance on potentially available cost-effective efficiency resources in the state. The EERMC and its consultant team conduct in-depth analysis, research, and stakeholder engagement to establish achievable, cost-effective levels of energy efficiency to inform proposed energy savings targets. Then the targets are submitted to the PUC for final approval. the targets developed by the EERMC under R.I.G.L § 39-1-27.7.1(e)(4) and (f) are not subject to the cost-effectiveness standard, because as high-level estimates, the purpose of the targets is simply to guide the development of those plans.

More information: http://rieermc.wpengine.com/wp-content/uploads/2017/08/4684-eermc-targetsstandards_12-22-16.pdf

6.4) Energy Efficiency and System Reliability Plans

The Standards require National Grid to develop triennial and annual program plans that offer program details as well as spending and savings goals for energy efficiency and system reliability procurement. The EERMC's role is to verify that the programs are cost-effective and will deliver the expected energy and economic savings. This model is proving successful because all of the customer sectors paying for the energy efficiency investments have a role in oversight, planning, and evaluation. This level of stakeholder participation results in high quality programs that are responsive to customers' needs and broad support for energy efficiency.

6.4.1) Three-Year Plans

The Three-Year Plan illustrates how lifetime and annual energy savings set out in the Targets will be achieved through energy efficiency program delivery. It also describes economic and environmental benefits including the development and maintenance of jobs. Sections of the Three-Year Plan include:

- Strategies and Approaches to Planning
- Cost-Effectiveness
- Prudence and Reliability
- Funding Plan and Savings Targets

- Performance Incentive Plan

The Three-Year Plan is subsequently filed with the PUC on September 1st, though the PUC does not have to rule on it.

6.4.2) Annual Plans

The Annual Plans are settlements among the parties in the Technical Working Group (Collaborative) and must be approved by both the EERMC and the PUC. The Commission is to consider the EERMC's evaluation and approval of the distribution utility's plan in issuing its order of approval of the Plan. Primary sections of the Annual Plan include:

- Final Funding Plan and Budget Amounts, Cost-Effectiveness, and Goals
- Program Descriptions
- Monitoring and Evaluation Plan
- Reporting Requirements
- Performance Incentive Plan

Key factors that inform the Annual Plan include:

- Energy Savings Targets
- Rhode Island Benefit Cost Test
- Program evaluations and pilots
- Evolving markets
- New and/or improved technologies
- State policy objectives

Portfolios are *required* to be cost-effective and programs *should* be cost-effective. Annual Plans are due each year on October 15th (or November 1st if a Three-Year Plan is also being submitted) and PUC hearings to review them are held once a year.

6.4.3) System Reliability Plans

National Grid is also responsible for drafting and filing System Reliability Procurement (SRP) Plans annually and triennially along with Energy Efficiency Plans. National Grid works closely with the EERMC, the consultant team, OER, and the Technical Working Group to develop robust SRP Plans. Guidelines for SRP Plans are described in Chapter 2 of the Least-Cost Procurement Standards. The SRP Standards set forth guidelines for the incorporation of energy efficiency, distributed generation, demand response, and other energy technologies (collectively referred to as “non-wires alternatives” or NWA) into utility planning.

6.5) Program Implementation

Program implementation runs on a calendar year, January through December. Throughout the year, National Grid, the EERMC's consultant team, and the Office of Energy Resources meet monthly to review program progress, identify any program issues, assure programs are moving along in a timely fashion, and discuss strategies to continually improve programs.

6.6) Program Reporting

Per the Least Cost Procurement Standards, National Grid, in consultation with the EERMC, is required to report quarterly and annually on the benefits of the energy efficiency efforts implemented, with particular focus on energy cost savings and program participation levels across all sectors.

6.7) Additional Resources

- http://rieermc.ri.gov/wp-content/uploads/2018/05/4684-lcp-standards_7-27-17.pdf
- [http://www.ripuc.org/eventsactions/docket/4684-NGrid-RI-Test-Tech%20Session\(9-13-17\).pdf](http://www.ripuc.org/eventsactions/docket/4684-NGrid-RI-Test-Tech%20Session(9-13-17).pdf)
- http://rieermc.wengine.com/wp-content/uploads/2017/08/4684-eermc-targetsstandards_12-22-16.pdf
- [http://www.ripuc.org/eventsactions/docket/4684-NGrid-3YP-2018-2020-Presentation\(10-25-17\).pdf](http://www.ripuc.org/eventsactions/docket/4684-NGrid-3YP-2018-2020-Presentation(10-25-17).pdf)

SECTION 7: ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND

In Rhode Island, energy efficiency programs are offered by the state's regulated distribution utilities. The major investor-owned utility operating in the state, National Grid, offers a comprehensive slate of programs that work together to produce significant energy savings. Hearings are held once a year before the Rhode Island Public Utilities Commission to review program plans. A collaborative of stakeholders reviews these plans and makes recommendations to the RI PUC on the programs. Program costs are trued up annually each May.

7.1) Key Terms

- **Measure** – Any intervention implemented to reduce the energy consumption of a facility (e.g. installing more efficient lighting)
- **Project** – The set of measures implemented at a given facility
- **Program** – Closely related delivery activities (e.g. providing rebates, offering financing, educating customers) targeted to a specific energy use sector (e.g. residential, commercial, industrial) to promote the implementation of energy efficiency measures
- **Portfolio** – The complete collection of energy efficiency programs managed by a program administrator
- **Program Administrator** – An entity, often but not always a utility, that manages energy efficiency programs

7.2) How Do Rhode Island's Energy Efficiency Programs Work?

RI's comprehensive energy efficiency programs are designed to overcome most of these impediments through three primary tools:

Technical assistance and information: Guidance from energy efficiency professionals can make energy efficiency improvements more understandable, accessible, and easily implemented by homeowners and business people. Experts help consumers work through the available information about upfront costs, how to choose a contractor, quotes and pricing, available incentives, and resulting energy savings. Experts also provide back-end assistance through commissioning and training on the use of new equipment to make sure the customer knows how to operate it as intended.

Financial incentives and rebates: Incentives help by reducing the risk (or perceived risk) of not recouping an energy efficiency investment and by guiding customers to the best options. Energy efficiency incentives reduce the length of the payback period and make the project feasible, even for business customers that must conform to strict payback periods. Financial incentives come in several forms.

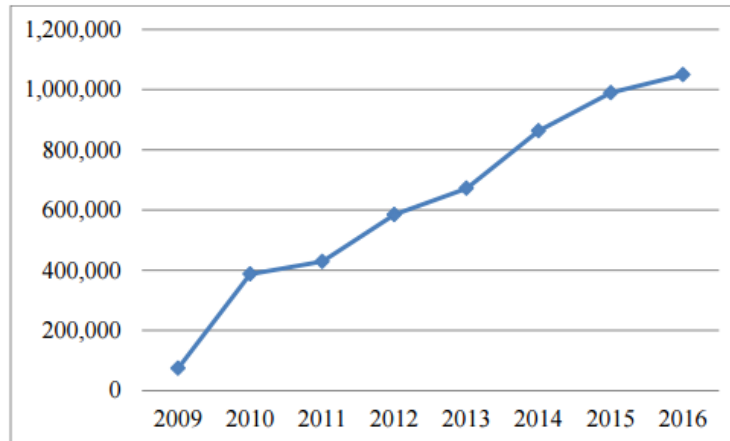
For example, a residential customer is eligible to receive a free home energy assessment during which the auditor will install energy efficient lighting and other measures at no cost. The customer may also be eligible to have their home weatherized and pay only 50% of the total project cost.

Sometimes, the rebate is already built into the price of the energy efficient product. For example, National Grid buys down the price of LED lightbulbs at retailers like Home Depot, Lowes, and local hardware stores so that the sticker price is significantly lower than it otherwise would be. The objective is to design the incentive to the market and fuel type, while simultaneously minimize the costs of saving energy.

Efficiency financing: Access to capital is a barrier to implementing efficiency for some customers, and various forms of financing have been used to cost-effectively address this in many markets. Loans can help homeowners or business owners with efficiency upgrades when access to capital is a problem ([EERMC, 2015](#)).

7.3) Performance of Rhode Island Energy Efficiency Programs

Figure 1 Total Energy Savings (MWh) by Year

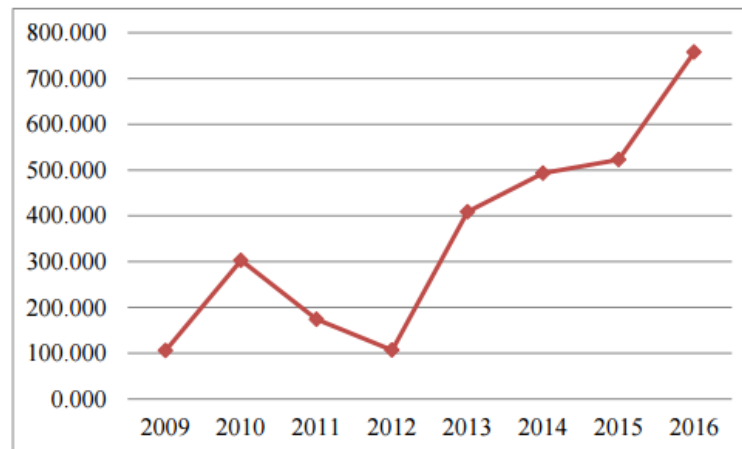


Data compiled by Northeast Energy Efficiency Partnerships (NEEP)
<http://www.neep.org/blog/policy-tracker-may-2017>

The Chart above depicts total Megawatt hour savings throughout the Northeast from the year 2009 through 2016. The levels of achievement in Megawatt hour savings are attributed to initiatives set by National Grid, through the Northeast Energy Efficiency Partnership.

*Note: 1 Megawatt hour (MWh) is equivalent to 1,000 Kilowatt hours (KWh) (Equivalent to the energy produced by 10 automobile engines, or 1,000 Kilowatts of energy used consistently for one hour.) (Cleanenergyauthority.com, 2018).

Figure 2 Total Demand Savings (MW) by Year



Source: Northeast Energy Efficiency Partnerships (NEEP)
<http://www.neep.org/blog/policy-tracker-may-2017>

The Chart above depicts total Megawatt savings throughout the Northeast from the year 2009 through 2016. The levels of achievement in Megawatt savings are attributed to initiative set by National Grid, through the Northeast Energy Efficiency Partnership.

*Note: 1 Megawatt= is equivalent to 1 Million Watts of energy (Cleanenergyauthority.com, 2018).

7.4) Residential Programs

7.4.1) EnergyWise Program

EnergyWise offers single-family customers home energy assessments and information regarding their actual energy usage. Participants in this program receive recommendations and technical assistance as well as financial incentives to replace inefficient lighting fixtures, appliances, thermostats, and insulation levels with models that are more energy efficient. The program addresses base load electric use and heating and cooling energy loads in all residential buildings. The program recommends efficient products that are delivered through National Grid's various programs as well as solar opportunities provided through statewide solar initiatives. The program offers finance opportunities to customers such as the Heat Loan and the Rhode Island Infrastructure Bank's residential financing opportunities, when available. Starting in 2019, EnergyWise will implement an online home energy assessment to educate customers on where household opportunities for greater comfort and energy savings exist. In addition, a 100% landlord incentive will be offered to address the split incentive barrier.

7.4.2) Multifamily Programs

Comprehensive energy services for multifamily customers include energy assessments, incentives for heating and domestic hot water systems, cooling equipment, lighting, and appliances. Coordinated services will be offered for all types of multifamily properties. An approach tailored for multifamily properties designates a primary point-of-contact to manage and coordinate services offered through the

Company's existing portfolio, including EnergyWise, C&I Retrofit, Residential New Construction, Income Eligible, and the ENERGY STAR® HVAC programs. Beginning in 2019, the Company's lead vendor for the multifamily retrofit program will begin serving individual condo unit owners and utilize the time on-site as an opportunity for face-to-face recruitment of the other units at the facility. Additionally, increased coordination with Rhode Island's Community Development Corporations (CDC) and alignment with 15-year refinance cycles will be a focus for the program in 2019.

7.4.3) Income Eligible Single Family

Income Eligible Single (IES) Family Services are delivered by local Community Action Program (CAP) agencies with oversight provided by a Lead Industry Partner. Three levels of home energy assessments are offered: (1) lighting and appliance, (2) heating and weatherization, and (3) comprehensive. Customers who qualify for LIHEAP are eligible to receive all services and equipment upgrades at no cost. In 2019, National Grid will begin to offer cold-climate mini-split heat pumps through the IES Program. This new offering will provide clarity on up-front "installed cost" as well as customer satisfaction and ease of use.

7.4.4) Residential New Construction

The Residential New Construction (RNC) program promotes the construction of high-performing energy efficient single family, multifamily, and low-income homes, as well as the education of builders, tradesmen, designers, and code officials. In 2019, the RNC program will launch a new energy efficiency incentive called the "Path to Zero Energy Ready", which will include additional incentives for areas including: project certification, RI Residential Stretch Code, PV and EV ready, and fossil fuel free.

7.4.5) Residential Home Energy Report Program

The Home Energy Reports (HER) program is the Company's key program to achieve energy savings through changes in customer behavior by presenting personalized energy usage data and encouraging desired behaviors to reduce energy consumption. The Company will continue to deliver Home Energy Reports that offer enhanced feedback tools to inspire customers to take actions that reduce their energy consumption and also increase their participation in other energy efficiency programs. In 2019, emails the Company will send to customers will begin to include annual or bill-level disaggregation pie charts of customers' individual energy usage, which will help customers identify drivers of high bills. The Company will also continue sending High Bill Alerts to customers who are trending to exceed the prior month's usage by a predetermined amount.

7.4.6) ENERGY STAR® Lighting

This initiative is implemented jointly with other regional utilities. It provides discounts to customers for the purchase of ENERGY STAR® lighting through instant rebates, special promotions at retail stores, pop-up retailer, and social marketing campaigns. In 2019, the EnergyStar Lighting program will continue to drive market transformation and reach new retailers that have not yet participated in the program.

7.4.7) Residential Consumer Products

This program is run in collaboration with other regional utilities to promote the purchase of high efficiency household appliances, including kitchen appliances and electronics. These appliances carry an ENERGY STAR® label. The program also offers refrigerator recycling, which promotes more efficient refrigerators while removing non-efficient units from the market. In 2019, the Residential Consumer Products program will add an additional customer offering of low-e storm windows to provide an additional 50% energy savings over traditional windows.

7.4.8) ENERGY STAR® HVAC Program

This program promotes the installation of high efficiency central air conditioners for electric customers and new energy efficient natural gas related equipment including boilers, furnaces, water heating equipment, thermostats, boiler reset controls, and furnaces equipped with high efficiency fans. The program provides training of contractors to increase accurate installation practices, testing of the high efficiency systems, tiered rebates for new ENERGY STAR® systems, and incentives for checking new and existing systems. The program also includes oil and propane heating equipment rebates. In 2019, the HVAC program will include several new offerings including: cold climate mini-split heat pumps, replacement of central air conditioners, and the reintroduction of indirect hot water heaters.

7.4.9) Community Based Initiatives

The initiative is designed to leverage trusted community partnerships and develop targeted marketing strategies in order to promote all energy efficiency programs, residential and commercial, in specific targeted communities or businesses. In 2019 the Company will focus on promoting expanded technology offerings within communities such as mini-split heat pumps, WiFi Thermostats, and demand response offerings.

7.4.10) Residential ConnectedSolutions (Demand Response)

Residential ConnectedSolutions will move from a pilot in 2017 and 2018 to a program in 2019. The focus of the program will continue to be reducing peak load through the use of wi-fi thermostats and other eligible technologies which may include batteries, lighting, water heaters, pool pumps, electric vehicles, and other devices.

7.4.11) Residential Pilots

In 2019, the Company will continue the Zero Energy Home pilot to help accelerate the zero energy home market in Rhode Island. In 2019 the pilot will focus on four main areas: Education and Awareness, Workforce Development, Project Incentives, and Marketing.

7.4.12) Education Programs

The Company promotes energy education to private and public schools and youth groups through the National Energy Education Development (N.E.E.D) Program. This program provides curriculum materials and training to students and teachers in grades K-12.

7.5) Commercial & Industrial (C&I) Programs

7.5.1) Large Commercial New Construction and Building Energy Code and Appliance Standards

This program promotes energy efficient design and construction practices in new and renovated commercial, industrial, and institutional buildings. The program promotes and incentivizes the installation of high efficiency equipment in existing facilities during building remodeling and at the time of equipment failure and replacement. Large Commercial New Construction aims to prevent or mitigate lost opportunities because a customer who does not install energy efficient equipment at the time of new construction or equipment replacement will likely never make the investment for that equipment or will make the investment at a much greater cost at a later time. The program also promotes energy efficient building design for new construction projects and for major renovations. The program provides both

technical and design assistance to help customers identify efficiency opportunities in their new building designs and to help them refine their designs to pursue these opportunities. Incentives are also offered to owner's design teams for their time and effort to meet program requirements. Operations Verification or quality assurance is also offered to ensure that the equipment and systems operate as intended. The program also promotes compliance with the building energy code and increased use of the Stretch Code to support the State's goals and objectives. In addition, it provides technical assistance in advancing the development and adoption of minimum efficiency standards for appliances and equipment. Finally, the program supports the States Zero Energy Building (ZEB) goals through engagement and development of ZEB programs in the future.

7.5.2) Large Commercial Retrofit

Large Commercial Retrofit is a comprehensive retrofit program designed to promote the installation of energy efficient equipment such as lighting, motors, and heating, ventilation and air conditioning (HVAC) systems, thermal envelope measures, and custom measures in existing buildings. All commercial, industrial, and institutional customers are eligible to participate. The Company offers technical assistance to customers to help them identify cost-effective efficiency opportunities and pays incentives to assist in defraying part of the material and labor costs associated with the energy efficient measures. The Company also offers education and training, such as the building operator certification (BOC) training, to support the implementation and adoption of energy efficiency.

7.5.3) Small Business Direct Install

The Small Business Direct Install Program provides direct installation of energy efficient lighting, non-lighting retrofit measures, and gas efficiency measures. Electric customers who consume less than 1,000,000 kWh per year are eligible to participate. There is no eligibility criterion for gas consumption. The program's lighting and non-refrigeration measures are delivered through one labor and one product vendor selected through a competitive bidding process. The Customer share of the total project cost of a retrofit is discounted 15% for a lump sum payment or the customer has the option of spreading the payments over a two-year period, interest free.

7.5.4) Commercial Pilots

In 2019, the Company will continue the Commercial and Industrial Demand Response gas pilot to address grid constraints and help provide reliable service to our customers. In addition, the Company will continue the Pathway to Zero Energy Buildings pilot in 2019 and focus on such areas as: training and education for the building industry, benchmarking and building energy labeling effort. The Company will also look to partner with building owners and developers on potential Zero Energy Building projects in 2019.

7.5.5) C&I Connected Solutions (Demand Response)

C&I Connected Solutions will move from a pilot in 2017 and 2018 to a program in 2019. The program is technology agnostic and provides an incentive to C&I customers for verifiable shedding of load in response to a signal or communication from the Company. In 2019 the program has a goal of enrolling 34 MW.

7.6) Energy Efficiency Financing

7.6.1) Residential Financing Tools

- **Residential Heat Loan** - As part of the EnergyWise program, customers in 1-4 family homes are eligible to apply for a 0% interest HEAT Loan to finance qualifying energy savings upgrades. Loans are available for \$500 - \$25,000 over terms of 24-84 months from participating lenders. An evaluation completed in 2018 supports the continued success of zero-percent financing through the HEAT loan in facilitating program adoption. The financing reduces the upfront customer cost associated with upgrades to home's insulation levels, heating system, or water heating systems.
- **Ascentium** - For the multifamily sector, National Grid works with Ascentium Capital, a specialty financing firm who is a leader in equipment and technology financing solutions, to offer financing to cover the customer co-payment portion of larger multifamily market-rate projects. A simple, rapid approval loan process allows customers to use their incentive to buy down interest on loans (typically to zero percent depending on the term) for up to \$250,000.

7.6.2) Commercial and Municipal Financing Tools

- **Large C&I Revolving Loan Fund** - This program offers financing to help pay for customer costs through On Bill Payment (OBR) from revolving loan funds. National Grid finances the customer portion of electric or gas efficiency projects for up to five years at 0% interest. OBR offers easy access to capital and reduces transactional friction by offering repayment of the loan through the customer's electric bill. This method of financing is often considered an operating expense because it allows the expense to be handled within existing operating budgets and often allows decisions to be made at a lower level than a capital expense. All customers are eligible for OBR.
- **Small Business Revolving Loan Fund** - For small business customers, National Grid offers on bill repayment for the customer portion of the project over 12 or 24 months.
- **Commercial Property Assessed Clean Energy (C-PACE)** - C-PACE is a financing program that allows commercial property owners to repay the costs of energy efficiency or renewable energy projects in conjunction with their property tax payments. C-PACE is an ideal tool for some commercial real estate owners and developers. It allows them to finance energy and related improvements in a way that is widely considered "off book" and can be passed through to renters in many types of leases. The Rhode Island Infrastructure Bank (RIIB) manages the states C-PACE program with assistance from Sustainable Real Estate Solutions (SRS).
- **Efficient Buildings Fund (EBF)** - The Efficient Buildings Fund (EBF) is a long-term, low cost financing program for local governmental units, including cities, towns and quasi-state entities, to invest in clean energy projects. EBF is administered in partnership between the Rhode Island Office of Energy Resources (OER) and the Rhode Island Infrastructure Bank (RIIB). The EBF was created in 2015 with input from National Grid and a variety of stakeholders, many of which belong to the Rhode Island Energy Efficiency Collaborative. OER is responsible for determining project eligibility, reviewing project applications and producing a project priority list (PPL). The Infrastructure Bank only finances projects that are listed on the PPL. OER, RIIB and the National Grid municipal sales representative work together to originate efficiency projects that meet the requirements of least cost procurement. EBF also provides financing for renewable energy projects and uses other sources of capital to finance those transactions. The Infrastructure Bank does not receive an annual allocation of capital from the State of Rhode Island to support the EBF program.

- **Ascentium** - National Grid works with Ascentium Capital, a specialty financing firm who is a leader in equipment and technology financing solutions, to offer customers another way to finance their projects. A simple, rapid approval loan process allows customers to use their incentive to buy down interest on loans (typically to zero percent depending on the term) for up to \$250,000.

7.7) Additional Resources

- Rhode Island Office of Energy Resources (OER) programs and incentives:
<http://www.energy.ri.gov/policies-programs/programs-incentives/>
- National Grid energy savings programs and incentives:
<https://www.nationalgridus.com/RI-Home/Energy-Saving-Programs/>
- 2019 Annual Energy Efficiency Plan
[http://www.ripuc.org/eventsactions/docket/4888-NGrid-EEPP2019\(10-15-18\).pdf](http://www.ripuc.org/eventsactions/docket/4888-NGrid-EEPP2019(10-15-18).pdf)

SECTION 8: EVALUATION, MEASUREMENT, AND VERIFICATION

8.1) What is EM&V?

Because all of the energy efficiency programs are funded with ratepayer dollars, it is important to ensure that expected energy savings are actually being achieved. To address this question, energy efficiency program administrators across the country employ a now standardized set of analytical methods and processes, known as Evaluation, Measurement and Verification (EM&V), that assess the actual performance of energy efficiency programs.

- **Measurement** includes data collection, monitoring and analysis on existing and new equipment to assess expected costs and energy savings for a particular efficiency project as accurately as possible. For example, a retrofit of lighting fixtures would require recording the number of hours the fixtures are used as well as the measured change in wattage in order to calculate savings.
- **Verification** compares initial measurement data to data collected typically a year after implementation to validate expected savings and ensure that equipment is installed and operating properly.
- **Evaluation** reviews the performance of the entire efficiency program to assess cost-effectiveness and whether it met its objectives and savings goals ([DOE, 2019](#)).

8.1.1) Value of EM&V

In addition to ensuring that public spending on efficiency is prudent and cost-effective, EM&V also informs program design improvements, guides future investment decisions, and determines whether utilities receive performance-related incentives or penalties. Forward Capacity Markets use EM&V data to understand the impacts of efficiency programs on peak demand, determine capacity payment amounts to efficiency providers, and establish consistent, minimum requirements for quantifying savings across efficiency activities and jurisdictions. EM&V data also helps states confirm emissions reductions to meet National Ambient Air Quality Standards (NAAQS). At the customer level, EM&V can support a company's energy management and financial savings goals ([EPA, 2017](#)).

8.1.2) Types of EM&V

- **Impact Evaluation** – Assesses outcomes of the changes attributable to an energy efficiency program. These evaluations answer questions for the first and second objectives described above about the accountability of the benefits and risk management.
- **Process Evaluation** – Assesses program operations to identify and recommend areas of improvement. These evaluations answer questions for the third objective above about program improvement.
- **Market Evaluation** – Assesses broad aspects of the marketplace with respect to energy efficiency. For example, a market effects evaluation characterizes changes in the structure or functioning of the market or the behavior of market participants that resulted from one or more program efforts. These evaluations help to answer questions for all three objectives ([ACEEE, 2016](#)).

8.2) Key Terms

- **Baseline Case** – A model used to represent a system’s energy usage before efficiency measures are implemented
- **Effective Useful Life (EUL)** – How long an efficiency project or measure is expected be operable and saving energy ([EPA, 2017](#))
- **Deemed Savings** – The amount of energy saved per unit for a particular efficiency measure, typically determined in advance of installation, based on prior field data collected from a sample of customers ([NRDC, 2017](#))

8.3) EM&V in Rhode Island

8.3.2) Accuracy and Accountability

In Rhode Island, utilities are required to file EM&V Plans and Reports, which are reviewed and approved by the Public Utilities Commission (PUC) and the Rhode Island Energy Efficiency Resource Management Council (EERMC). Rhode Island’s Least Cost Procurement Standards require EM&V Plans to address the following points:

- Savings verification, including where appropriate analysis of customer usage
- Verification should also facilitate participation in ISO-NE’s forward capacity market
- Issues of ongoing program design and effectiveness
- Efforts related to market assessment and methodologies to claim savings from market effects, among others
- Regional and other cooperative M&E efforts the distribution company is participating in, or plans to participate in
- Longer-term studies, as appropriate, to assess programs over time

8.3.1) The Process

National Grid hires independent consulting firms to regularly conduct evaluation studies as part of its measurement and verification process. These evaluations incorporate industry standard methods such as engineering analysis, metering analysis, billing analysis, site visits, surveys, and market studies to document the actual energy savings that particular measures are having. To achieve maximum benefits, it is also important to tailor EM&V protocols to the specific energy efficiency programs being assessed. Every year, the results of the surveys are used to update the benefit-cost calculations during planning.

8.3.2) Technical Reference Manual (TRM)

Rhode Island’s Technical Reference Manual (TRM) documents the methodologies and assumptions used by National Grid to estimate the energy savings, demand reduction, and other resource and non-energy impacts attributable to its electric and gas energy efficiency programs. This reference manual provides methods, formulas and default assumptions for estimating energy, peak demand and other resource and non-energy impacts from efficiency measures. The TRM is reviewed and updated annually to reflect changes in technology, baselines and evaluation results.

8.4) Additional Resources

- EM&V Overview:
https://www.energy.gov/sites/prod/files/2014/05/f16/what_is_emv.pdf
<https://aceee.org/sector/state-policy/toolkit/emv>
- EM&V for Energy Efficiency Policies and Initiatives:
https://www.epa.gov/sites/production/files/2017-06/documents/emvframeworkpaper_2017-01-19.pdf
- National Grid's 2019 EM&V Plan:
<http://riermc.ri.gov/wp-content/uploads/2018/09/2019-eepp-attachment-3-emv-final-draft.pdf>
- Rhode Island Technical Reference Manual:
<http://www.ripuc.org/eventsactions/docket/4755-NGrid-2018-TRM-RI.pdf>
- National Grid Evaluation Studies:
<https://riermc.ri.gov/plans-reports/evaluation-studies/>

SECTION 9: ENERGY EFFICIENCY BEYOND THE LEGISLATION

9.1) Systems Integration Rhode Island (SIRI)

The Systems Integration Rhode Island (SIRI) working group was convened in 2014 by the Office of Energy Resources, the Energy Efficiency and Resource Management Council, the Distributed Generation Board and National Grid to better understand the challenges and capitalize on the opportunities RI faces as the electric system evolves. The purpose of the SIRI group was to map out key issues relating to Rhode Island's changing electric grid and develop recommendations for addressing opportunities, filling gaps, and gaining efficiencies in existing state processes. The effort culminated in vision report, published in early 2016, which provides a framework of understanding and a roadmap to guide near term efforts and develop future proposals. The roadmap included six overarching recommendations:

1. Identify ways to promote more cost-effective, comprehensive non-wires alternative distribution planning
2. Assess market potential, costs, and benefits of strategic electrification and active load management
3. Pave the way for accelerated use of electric vehicles
4. Map Rhode Island's current renewable energy promotion processes and assess adequacy and gaps
5. Assess market potential, costs, and benefits of advanced metering infrastructure and time-varying rates
6. Consider whether methods of performance regulation can be implemented to further the public good

9.2) Docket 4600

Docket 4600, was a proceeding that was opened as part of the Renewable Energy Growth program, in response to SIRI recommendations, and in response to a stalled ratemaking docket, to help decide if the state needed rate reforms to accommodate DERs. The full title is "Docket 4600: Investigation into the Changing Electric Distribution System and the Modernization of Rates in Light of the Changing Distribution System." The driving question for Docket 4600 was "What attributes are possible to measure on the electric system and why should they be measured?" More specifically, the facilitators led the group of 12 stakeholders in discussions on:

- What are the costs and benefits that can be applied across any and/or all programs, identifying each and whether each is aligned with state policy?
- At what level should these costs and benefits be quantified — where physically on the system and where in cost-allocation and rates?
- How can we best measure these costs and benefits at these levels — what level of visibility is required on the system and how is that visibility accomplished?

The stakeholder group included representatives from National Grid, the EERMC, low income advocates, environmental advocates, third part power providers, developers of distributed energy resources, large commercial and industrial users of electricity, and two state agencies.

The main outcomes, detailed in the stakeholder report, were:

- A framework for a broader cost-benefit analysis, the “Rhode Island Test”, with which to evaluate energy initiatives; and
- A set of principles and suggestions for rate design.

This is important for energy efficiency because it will both determine a nominal value for efficiency on the grid relative to other DERs and traditional resources, and identify the attributes that will make EE higher value in the energy system of the future (flexibility, locational value, etc.) The report was submitted with consensus from the stakeholders on all issues except for dissenting opinions on how to phase in time-varying rates. The PUC adopted several recommendations from the Stakeholder Report into a draft guidance document in anticipation of future rate cases. The guidance document does not carry the force of law but can be a statement of general applicability that sets forth a policy on a given statutory, regulatory, or technical issue.

9.3) Power Sector Transformation

In March of 2017, Governor Gina M. Raimondo charged the Public Utilities Commission (PUC), the Office of Energy Resources (OER), and the Division of Public Utilities and Carriers (DPUC) with developing recommendations to advance power sector transformation (PST) in Rhode Island. The goal of the PST Initiative is to transition to a more dynamic utility regulatory framework in order to achieve a cleaner, more affordable, and reliable energy system for the 21st century and beyond. The three agencies partnered to solicit input from Rhode Island stakeholders and national experts, submitting a final Phase One Power Sector Transformation report with recommendations to the Governor in November 2017. The final report drew upon previous work to date by the EERMC, the Distributed Generation Board, the Systems Integration Rhode Island Working Group, and the PUC’s Docket 4600 Investigation of the Changing Distribution System. Policymakers, regulators, and stakeholders are working actively to implement the PST recommendations, including through the open docketed proceedings of National Grid’s distribution rate case and Power Sector Transformation filings (Dockets 4770 and 4780).

More Information:

- <http://webserver.rilin.state.ri.us/PublicLaws/law18/law18079.htm>
- [http://www.ripuc.org/eventsactions/docket/4888-NGrid-EEPP2019\(10-15-18\).pdf](http://www.ripuc.org/eventsactions/docket/4888-NGrid-EEPP2019(10-15-18).pdf)
- http://www.ripuc.org/utilityinfo/electric/PST_home.html

9.4) Code Compliance Enhancement Initiative

National Grid is one of a few utilities that have been allowed to claim energy savings for supporting progress related to the building energy code. The Company launched its Code Compliance Enhancement Initiative in 2013 and has been claiming savings for building energy code compliance support activities since 2014. The Company has also provided technical assistance for proposing new and improved appliance and equipment standards regulations for the State. The Codes and Standards initiative is an innovative efficiency offering that saves energy on behalf of customers by: 1) intervening strategically in the construction industry to improve compliance with the state building energy codes, and 2) strengthening energy efficient energy codes and product standards ([GRID, 2019](#)).

9.5) Related Organizations

9.5.1) Energy Boards & Councils

BOARDS & COUNCILS	RESPONSIBILITIES
Energy Facility Siting Board	Licenses and permits the siting, construction, or alteration of major energy facilities in Rhode Island (http://www.ripuc.org/efsb/index.html)
Energy Efficiency and Resource Management Council	Oversees the development and implementation of Rhode Island’s system reliability and energy efficiency investments according to Least-Cost Procurement (http://www.rieermc.ri.gov/)
Distributed Generation Board	Oversees the development and implementation of Rhode Island’s Renewable Energy Growth Program (http://www.energy.ri.gov/about/distributed-generation-board/)
Executive Climate Change Coordinating Council	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 (http://www.planning.ri.gov/planning-areas/climate-change/riec4/)

9.5.2) State Agency Partners

AGENCY	RESPONSIBILITIES
Building Code Commission	Establishes minimum requirements for protecting public health, safety, and welfare in the built environment, and administers implementation of the Rhode Island Green Building Act (http://www.ribcc.ri.gov/)
Coastal Resources Management Council	Oversees marine spatial planning through the implementation of the Ocean Special Area Management Plan (SAMP) and permits offshore wind energy systems (http://www.crmc.ri.gov/)
Commerce RI	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 (http://www.commerceri.com/)
Department of Environmental Management	Preserves the quality of Rhode Island’s environment by implementing laws related to clean air, clean water, and other areas of environmental protection (http://www.dem.ri.gov/)

Department of Human Services	Oversees low-income heating assistance and energy efficiency programs, including the Weatherization Assistance Program and LIHEAP, which are available through local Community Action Programs (http://www.dhs.ri.gov/)
Department of Transportation	Designs, constructs, and maintains the state's surface transportation system, including roadways, bridges, rail stations, and bike and pedestrian paths (http://www.dot.ri.gov/)
Division of Planning	Creates long-range policy plans for land use, energy, transportation, and natural resources in Rhode Island (http://www.planning.ri.gov/)
Division of Public Utilities and Carriers	Operates in concert with the PUC and supervises all laws relating to providers electric and natural gas service (http://www.ripuc.org/)
Office of Energy Resources	Develops and administers energy policy and programs designed to promote energy efficiency, renewable energy, alternative fuels, and energy assurance in Rhode Island (http://www.energy.ri.gov/)
Public Utilities Commission	Regulates electric and gas distribution companies in Rhode Island and reviews and approves implementation of major energy efficiency and renewable energy policies (http://www.ripuc.org/)
RI Infrastructure Bank	Administers the Efficient Buildings Fund (EBF) and residential and commercial Property Assessed Clean Energy (PACE) programs (http://www.riinfrastructurebank.com/)
RI Public Transit Authority	Operates public transit services throughout Rhode Island (http://www.ripta.com/)

SECTION 10: THE FUTURE OF ENERGY EFFICIENCY

One of the responsibilities of the Energy Efficiency and Resource Management Council (EERMC) is to ensure that Rhode Island’s energy efficiency programs are forward-thinking and positioned for long-term success. Therefore, the EERMC (with support from the Consultant Team) must stay abreast of industry trends and emerging technologies that are likely to impact the energy efficiency programs. These trends include:

- Rapid market transformation
- Connected devices
- Behavioral and operational efficiency
- Distributed energy resources
- Electric vehicles

10.1) Market Transformation

The efficiency levels of products and equipment are rapidly improving due to Federal and state codes and standards and technological advancements. Most notably, the lighting market is quickly shifting to light-emitting diodes (LEDs), a high-efficiency lighting option. Incandescent light bulbs are no longer available in the market, and efficiency programs have shifted from promoting compact fluorescent light (CFL) bulbs to promoting LEDs.

Because of these improvements in product and equipment efficiency, efficiency programs can count or “claim” less energy savings as being attributable to the programs’ influence. While the rise of higher efficiency products and equipment in the market is a success story, it creates challenges for efficiency programs, which must innovate to identify new sources of energy savings. In addition, efficiency programs can support adoption of and compliance with more advanced Federal and state energy codes and appliance standards and can take credit for some of the energy savings that result.

10.2) Connected Devices

As market transformation means that there are fewer saving available to efficiency programs from installation of high-efficiency products and equipment, also known as “widgets,” energy savings will increasingly come from more efficient *operation* of devices, equipment, and buildings, enabled by connected devices. The American Council for an Energy-Efficient Economy (ACEEE) uses the term “intelligent efficiency” to describe “the gains in energy efficiency enabled by the new responsive, adaptive, and predictive capabilities of information and communications technologies.”⁷ These technologies include:

- **Smart devices.** Smart meters, smart thermostats, and other smart devices are collecting energy usage data less expensively than ever before. Rather than checking energy use once a month, these hardware tools provide a constant stream of real-time data and have enormously increased the amount of energy data available.⁸

⁷ Rogers, Ethan, Edward Carley, Sagar Deo, and Frederick Grossberg. How Information and Communications Technologies Will Change the Evaluation, Measurement, and Verification of Energy Efficiency Programs, ACEEE, December 2015.

⁸ Northeast Energy Efficiency Partnerships (NEEP), The Changing EM&V Paradigm: A Review of Key Trends and New Industry Developments, and Their Implications on Current and Future EM&V Practices, December 2015.

- **Ubiquitous networks.** Rhode Island does not yet have Advanced Metering Infrastructure (AMI) installed. AMI would enable two-way communication, allowing the utility to send and receive real-time signals to customer smart meters. These signals can communicate dynamic rates, demand response event information, and other price signals to customers in real time. AMI also opens up the potential for customers to get a real-time data feed from the smart meter to a central in-home display or home energy management system (HEMS) via ZigBee or another wireless signal, so that the data can be used to operate controls automatically or encourage behavior changes.
- **Automated analytics.** A growing range of cloud-based software vendors and platforms are able to process large volumes of data quickly using publicly available or proprietary algorithms.⁹ These software tools and platforms are able to provide real-time insights that help utilities, EE program administrators, and EE service providers better understand the amount and persistence of energy savings from installed EE measures, as well as changes in building operations and occupant behavior that have previously been difficult to quantify. Open-source, automated methods are also emerging to normalize metered energy savings for changes in weather and other factors.

10.3) Behavioral and Operational Efficiency

Programs are also exploring new ways to encourage behavior changes that save energy. Behavior programs are defined by two key components, in comparison to conventional efficiency programs: 1) they use primarily information, rather than incentives, to change behavior, and 2) they measure the energy savings directly, rather than relying on deemed savings estimates.

Behavior programs use information in a range of ways, from sending monthly home energy reports to providing usage alerts using a building energy management system. In the case of large C&I customers, Strategic Energy Management programs offer in-depth technical assistance to help businesses create and implement an energy management system to change employee behavior and facility operation. Behavior programs usually use insights drawn from social science to “nudge” behavior changes, for example by comparing energy usage to a peer group or providing immediate feedback.

Behavior programs also measure the energy savings directly, at the meter. With the rise of intelligent technologies like smart thermostats and smart meters, it is now technically feasible to measure energy savings in close to real-time and provide a much more rapid feedback loop to inform program implementation and service delivery. Additionally, intelligent technologies offer new insights about the load shape and the shape of the energy savings from various measures (and thus the time and locational value to the grid) that efficiency provides, supporting the expansion of integrated demand side management (IDSM) that aims to match energy efficiency and demand response to patterns of distributed renewable energy generation.

Connected devices also offer new opportunities to automatically reduce energy or demand, in ways that can lead to measurable savings. For example, “learning” thermostats can make tiny, undetectable adjustments to temperature levels to increase energy savings. Connected lighting can make automatic adjustments based on occupancy and outdoor light levels. If enrolled in demand response programs, connected lights, appliances, and thermostats may also automatically turned down or turned off during peak demand events (typically the hottest hours of summer or the coldest hours of winter). Connected devices also provide a platform for programs to engage customers and nudge them to change behavior by sending prompts and messages via smartphone apps and in-home displays.

⁹ Northeast Energy Efficiency Partnerships (NEEP), *The Changing EM&V Paradigm: A Review of Key Trends and New Industry Developments, and Their Implications on Current and Future EM&V Practices*, December 2015.

10.4) Distributed Energy Resources

Distributed energy resources (DERs) include energy efficiency, solar, battery storage, and demand response (both direct load control and behavioral load shaping). DERs are “physical and virtual assets that are deployed across the distribution grid, typically close to load, and usually behind the meter, which can be used individually or in aggregate to provide value to the grid, individual customers, or both.”¹⁰ Behind the meter means that the DERs are typically located “behind” the electric meter, on-site in a home or business. DERs can also be aggregated to provide services to the electric grid.

DERs can provide a range of benefits to customers, including reduced energy costs and, for businesses, demand charges. They can also provide resilience benefits; for example, on-site storage to provide backup power in the case of an outage. DERs – if thoughtfully integrated – can also provide benefits to the electric grid, including avoided energy usage, avoided investments in electricity generation plants, avoided transmission and distribution infrastructure, and enhanced flexibility.

In Rhode Island, National Grid is partnering with EnergySage to provide an online solar marketplace for its customers. Within the efficiency program, National Grid is currently conducting several DER pilots focused on demand response and storage. The efficiency programs also coordinate with the Rhode Island Infrastructure Bank (RIIB) to promote financing options, including C-PACE, which enables business customers to pursue projects that combine efficiency and solar. Going forward, it will be important to coordinate initiatives promoting other DERs with efficiency programs, to maximize benefits for both customers and the electric grid.

10.5) Electric Vehicles

The electrification of the transportation sector represents a singular opportunity for utilities to help customers reduce their total household utility bills, put downward pressure on rates, and facilitate the integration of variable renewable generation. The US EV electric vehicle (EV) market tripled in size from 2011 to 2012, grew another 70% in 2013, and another 23% in 2014.¹¹ Over the next few years, the number of models will nearly double and next-generation models promise improved range and performance. Battery costs have been cut in half over the last five years and are on track to be halved again over the next five years. However, without a robust network of charging stations, the EV market could stall before it reaches a tipping point.

Researchers at the Pacific Northwest National Laboratory find that there is sufficient spare capacity in the nation’s electric grid to power virtually the entire passenger vehicle fleet without necessitating the construction of a single new power plant, if vehicle charging is properly managed.¹² Utility EV programs should be designed to take advantage of the fact that EVs can be charged whenever they are not being driven, which is 96 percent of the average day.¹³ However, without a nudge from utilities, drivers will generally plug in and charge immediately upon arriving home after work, potentially exacerbating evening peak demand. This pattern is repeated across the US, but stands in marked contrast to the charging

¹⁰ Distributed Energy Resources 101: Required Reading for a Modern Grid, Website retrieved 11/10/17. <https://blog.aee.net/distributed-energy-resources-101-required-reading-for-a-modern-grid>

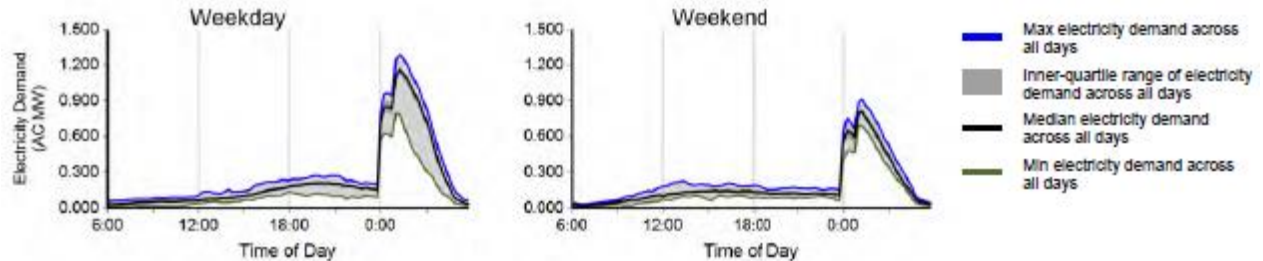
¹¹ Electric Drive Transportation Association. 2015. Vehicle Sales Dashboard, Website retrieved 09/01/2015. <http://electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952>

¹² Michael Kintner-Meyer Kevin Schneider Robert Pratt, 2007. *Impacts Assessment of Plug-in Hybrid Vehicles on Electric Utilities and Regional U.S. Power Grids*

¹³ Chart adapted from Adam Langton and Noel Crisotomo, 2013. *Vehicle-Grid Integration*. California Public Utilities Commission.

pattern of EV drivers in San Diego, who meet 80 percent of their refueling needs during the “super-off-peak” period from midnight to 5:00 AM due to San Diego Gas and Electric’s time-of-use rate.

Residential EV Charging in San Diego by Time of Day



Source: *The EV Project, 2013. Quarterly Report Q2, 2013.*

<http://www.theevproject.com/cms-assets/documents/127233-901153.q2-2013-rpt.pdf>

Utilities like National Grid are well-positioned to facilitate the build-out of charging networks because they can capture system-wide benefits of EV charging by taking advantage of available grid capacity. In turn, the growing customer investment in EVs with large, advanced batteries can also be leveraged to support a more dynamic electric grid and enable greater integration of DERs. Utility programs and rate structures can be designed to manage EV load to avoid peak hours and encourage EV drivers to charge when electricity is cheap, maximizing cost savings relative to gasoline. There are also key opportunities to coordinate EV initiatives with efficiency programs, for example by ensuring that new homes enrolled in efficiency programs are encouraged to be “EV-ready” with fast chargers installed, helping businesses invest in charging infrastructure, or promoting EV adoption during home energy audits.

GLOSSARY OF COMMON ENERGY EFFICIENCY ACRONYMS

AB – Advanced Buildings
ACEEE – American Council for an Energy-Efficient Economy
ADMS – Advanced Distribution Management System
AE – Account Executive
AESC – Avoided-Energy Supply Costs
AFR – Automated Feeder Reconfiguration
AFUE – Annual Fuel Utilization Efficiency
AGA – American Gas Association
AIA – American Institute of Architect
AMI – Advanced Metering Infrastructure
AMF – Advanced Metering Functionality
AMR – Advanced Meter Reading
AMSC – American Superconductor Corporation
AO – Application Owners
ARRA – American Recovery and Reinvestment Act
BBRS – Board of Building Regulations and Standards
B/C or BCR – Benefit to Cost Ratio
BCA – Benefit Cost Analysis
BES – Bulk Electric System
BIA – Business Impact Analysis
BPI – Building Performance Institute
BTU – British Thermal Unit (a measure of energy)
BWR – Boiling water reactor
C&F – Chain & Franchise
C&I – Commercial and Industrial
C&IMC – Commercial and Industrial Management Committee
CAIDI – Customer Average Interruption Duration Index
CAP – Community Action Program
CDA – Comprehensive Design Approach
CEC – California Energy Commission
CECP – Clean Energy and Climate Plan
CEP – Customer Engagement Platform
CFL – Compact Fluorescent Lightbulb
CFR – Code of Federal Regulations
CHP – Combined Heat & Power
CIP – Critical Infrastructure Protection
CIS – Customer Information System
CISO – Chief Information Security Officer
CLF – Conservation Law Foundation
CMI – Customer Minutes Interrupted (can also mean Community Mobilization Initiatives)
CMS – Customer Minutes Saved
CO₂ – Carbon Dioxide
COH – Customer Outage Hours
CPP – Critical Peak Pricing
CSF – Cybersecurity Framework
CSR – Customer Service Representative

CVR – Conservation Voltage Reduction
CWIP – Construction Work In Progress
DA – Distribution Automation
DC – Direct Current
DCF – Discounted Cash Flow
DER – Distributed Energy Resources (can also mean Deep Energy Retrofit)
DERM – Distributed Energy Resource Management
DG – Distributed Generation
DMS – Distribution Management System
DOE – Department of Energy
DOER – Department of Energy Resources
DOT – U.S. Department of Transportation
DR – Demand response
DRIPE – Demand Reduction Induced Price Effects
DSCADA – Distribution Feeder Supervisory Control and Data Acquisition
DSM – Demand side management
EA – Environmental assessment
ECM – Electronically Commutated Motor
ECS – Energy Control System
EDC – Energy Distribution Company
EDR – Economic demand response
EE – Energy Efficiency
EEAC – Energy Efficiency Advisory Council
EEPCA – Energy Efficiency Program Cost Adjustment
EERF – Energy Efficiency Reconciliation Factor
EES – Energy Efficiency Surcharge
EIA – Energy Information Administration
EIS – Environmental impact statement
EISA – Energy Independence and Security Act
EM&C – Energy Measurement & Control
EMC – Evaluation Management Committee
EMS – Energy Management System
EM&V – Evaluation, measurement and verification
EPA – U.S. Environmental Protection Agency
EPRI – Electric Power Research Institute
ERP – Emergency Response Plan
ES-C2M2 – Electricity Subsector Cybersecurity Capability Maturity Model
ES-ISAC – Electricity Subsector Information Sharing and Analysis Center
ETR – Estimated Time to Restore
EV – Electric Vehicle
FAN – Field Area Network
FCM – Forward Capacity Market
FLISR – Fault Location, Isolation, and Service Restoration
FR – Free Rider (or Free Ridership)
FRERP – Federal Radiological Emergency Response Plan
FTE – Full Time Equivalent
FTR – Financial transmission rights
GHG – Greenhouse Gas

GE-VBWR – General Electric – Vallicetos Boiling Water Reactor
GIS – Geographic Information System
GMP – Grid Modernization Plan
GPO – Government Printing Office
GRI – Gas Research Institute (now the Gas Technology Institute)
GSEAF – Gas System Enhancement Adjustment Factor
GSEP – Gas System Enhancement Plan
GTI – Gas Technology Institute
GWP – Global Warming Potential
GWSA – Global Warming Solutions Act
HEHE – High Efficiency Heating and Water Heating
HERS – Home Energy Rating System
HES – Home Energy Services
HLW – High level radioactive waste
HPCs – Home Performance Contractors
HVAC – Heating, Ventilation, and Air Conditioning
ICAP – Installed Capacity
ICRP – International Commission on Radiation Protection
ICS-CERT – Industrial Control Systems Cyber Emergency Response Team
IECC – International Energy Conservation Code
IEEE – Institute for Electrical and Electronics Engineers
IIC – Independent Installation Contractors
IOUs – Investor-owned utilities
IPS – Intruder Prevention System
ISFSI – independent spent-fuel storage installation
ISO – Independent System Operators
ISO-NE – ISO New England
IVR – Interactive Voice Response
JMC – Joint Management Committee
kW – Kilowatt
kWh – Kilowatt-hour
LAUF – Lost and Unaccounted for Gas
LBR – Lost Base Revenue
LCIEC – Large Commercial & Industrial Evaluation Contractor
LDAC – Local Distribution Adjustment Clause
LDAF – Local Distribution Adjustment Factor
LDC – Local Distribution Company
LED – Light Emitting Diode
LLW – Low-level radioactive waste
LMP – Locational Marginal Price
LNG – Liquefied Natural Gas
LP – Liquefied Propane
LSE – Load-serving entities
LTC – Load Tap changer
M&R – Metering and Regulation
Mbps – Megabits per second
Mcf – Thousand cubic feet
MDM – Meter Data Management

MFNC – Multi-Family New Construction
MMcf – Million cubic feet
MMI – Multi-Family Market Integrator
MOU – Memorandum of Understanding
MPLS – Multiprotocol label switching
MT – Metric ton
MTAC – Technical Assessment Committee
MVA – Mega Volt Amps
MW – Megawatts
NARUC – National Association of Regulatory Utility Commissioners
NBI – New Building Institute
NCP – Negotiated Cooperative Promotions
NCRP – National Council on Radiation Protection and Measurements
NECEC – New England Clean Energy Council
NEED – National Energy Education Development
NEI – Non-energy impact
NISTIR – National Institute of Standards and Technology Interagency Report
NMR – Network Meter Reading
NPDES – National Pollutant Discharge Elimination System
NPS – Non-Participant Spillover
NPV – Net Present Value
NRC – U.S. Nuclear Regulatory Commission
NREL – National Renewable Energy Laboratory
NTG – Net-to-Gross
NTGR – Net-to-Gross Ratio
NWA – Non-Wires Alternative
ODCM – Offsite Dose Calculation Manual
O&M – Operations and Management
OMS – Outage Management System
ONG-C2M2 – Oil and Natural Gas Subsector Cybersecurity Capability Maturity Model
OT – Operation Technology
PA – Program Administrator
PAF – Pension Adjustment Factor
PBOP – Post-Retirement Benefits Other than Pensions
PCI – Payment Card Industry
PEX – Program Expediter
PHMSA – Pipeline and Hazardous Materials Safety Administration
PI – Performance Incentive
PIA – Privacy Impact Analysis
PII – Personally Identifiable Information
PLC – Power Line Carrier
PP&A – Program Planning and Administration
PPA – Power purchase agreement
PP&A – Program Planning & Administration
PRV – Pressure Relief Valve
PSDAR – Post-Shutdown Decommissioning Activities Report
PSIG – Pounds per square inch gage
PTR – Peak-Time Rebate
PV – Photovoltaic

PWR – Pressurized water reactor
QA/QC – Quality Assurance/Quality Control
RCNLD – Reproduction Cost New Less Depreciation
RCS – Residential Conservation Service
RD&D – Research, development & deployment
REG – Resilient Electric Grid
RFCI – Remote Faulted Circuit Indication
RFP – Request for Proposal
RGGI – Regional Greenhouse Gas Initiative
RMC – Residential Management Committee
RNC – Residential New Construction
RPS – Renewable Portfolio Standard
RTO – Regional transmission organization
RTU – Remote Terminal Unit
SBC – System Benefit Charge
SAIDI – System Average Interruption Duration Index
SAIFI – System Average Interruption Frequency Index
SCADA – Supervisory Control and Data Acquisition
SCF – Standard cubic feet
SFP – Spent fuel pool
SIT – State inventory tool
SO – Participant Spillover
SPN – Strategic Partner Network
SREC Solar Renewable Energy Credit
SRP – Storm Resiliency Program
STAT – Sales, Technical Assistance & Training
STIC – Short Term Investment Clause
STIAF – Short Term Investment Adjustment Factor
STIF – Short Term Investment Factors
STIP – Short term Investment Plan
STIRF – Short Term Investment Reconciliation Factor
T&D – Transmission & Distribution
TIRF – Targeted infrastructure recovery factor
TMS – Translation Management System
TOU – Time-of-use
TSRG – Technical Standards Review Group
TRC – Total resource cost
TRL – Technical Resource Library
TRM – Technical Review Manual
TVR – Time Varying Rates
UDC – Utility Distribution Company
VAR – Volt-ampere reactive
VBA – Visual Basic for Applications
VVO – Volt/VAR Optimization
WACC – Weighted Average Cost of Capital
WAN – Wide Area Network
WAP – Weatherization Assistance Program
WISP – Written Information Security Plan



REFERENCES