SC 1-1

Request:

Referring to Chapter 5, pages 113 and 104, Table 5-2:

a. Please confirm whether the term "disadvantaged communities" (page 113) references the same set of communities as "Income Eligible" communities (page 104, Table 5-2). If not, please explain the difference.

b. Please provide the definition of an "Income Eligible" community as the Company is using that term with respect to its Electric Transportation proposal. (If the Company's definition of "disadvantaged communities" differs from "Income Eligible communities," please define "disadvantaged communities".)

c. Beyond the four Income Eligible community sites to be targeted for Level 2 charging installations as part of the Charging Station Demonstration Program, please identify any other components of the Company's Electric Transportation proposal that specifically seek to provide the benefits of vehicle electrification to Income Eligible and/or disadvantaged communities.

Response:

a. Yes, the term "disadvantaged communities" (Bates Page 113 of PST Book 1) references the same set of communities as "Income Eligible" communities (Bates Page 104, Table 5-2 of PST Book 1). However, "Income Eligible" communities, as used in this context, is different than referring to an "income eligible" customer. An income eligible customer, as indicated in the Company's response to NERI 4-1 in RIPUC Docket No. 4770, is a customer receiving service on one of the Company's low income rate classes.

b. The Company intends for its Electric Transportation programs to use the same definition of "Income Eligible" that is used by its energy efficiency programs in effect at the time of program implementation. The Company will identify Income Eligible communities as those census blocks with annual median household incomes equal to or less than the applicable income eligibility levels established for its energy efficiency programs.

c. The Company has not identified any other components specifically targeted to benefit members of Income Eligible communities. However, in promoting electrification of public transit buses, municipal school buses, and other fleet vehicles (corporate and government), the Company expects its efforts to help reduce exposure to pollutants by transit and bus passengers, and to support cleaner air in those communities most impacted by local air pollution.

Prepared by or under the supervision of: Carlos Nouel

SC 1-2

Request:

Referring to Chapter 5, Section 2.4 (Transportation Education and Outreach), please identify any steps that the Company will take to specific target education and outreach at Income Eligible or disadvantaged communities, as the Company defines those terms.

Response:

The Electric Transportation Initiative is designed to increase near-term consumer adoption of electric vehicles (EVs) by the Company's customers who are most likely to consider buying or leasing these vehicles. The Company also intends to make information on EVs accessible to its general customer base, including Income Eligible customers, who are customers receiving service on the Company's low income rate classes. As part of its Transportation Education and Outreach program, the Company will inform its Income Eligible customers about EVs and available vehicle incentives. This could include adding information on EVs to some of its existing communications promoting the Company's Income Eligible programs, and providing information on pre-owned EVs that offer fuel-cost savings opportunities at more affordable price points than new EV models. For the charging sites developed in disadvantaged communities through the Charging Station Demonstration Program, the Company will provide materials to participating site hosts to promote EVs to their residents, tenants, customers, or other community members.

Prepared by or under the supervision of: Carlos Nouel

SC 1-3

Request:

Referring to Chapter 5, Table 5-2, please identify the basis (including any studies, analyses or workpapers) for the number of targeted sites for:

a. Workplaces.
b. Apartment buildings.
c. Income Eligible community sites.
d. Public transit stations.
e. Public fast-charging locations.
f. Government light-duty fleets.
g. Corporate light-duty fleets.
h. Public transit buses.
i. Rideshare company charging hubs.
j. Other heavy-duty/DC Fast Charging locations.

Response:

The Company's proposed Charging Station Demonstration Program aims to test new investment and incentive approaches to increase the number of stations available to Rhode Island and bring down the cost of charging infrastructure for fleet and transit operators. The program is part of an overall initiative that intends to test multiple market development strategies and compare multiple strategies for achieving a single goal, for example, testing site host responsiveness to the choice of operating their own charging with Company incentives, or having the Company operate charging at their site. In accordance with these objectives, the Company took a portfolio approach to identifying consumer vehicle and fleet vehicle charging segments and proposing the target number of sites for each.

The number of targeted sites provided in Table 5-2 of Schedule PST-1, Chapter 5 – Electric Transportation (Bates Page 104 of PST Book 1) is intended to balance breadth and depth of impact from the demonstration program, within the proposed program budget. For example, workplace charging and public DC fast charging are two charging segments where the Company or industry have enough experience, and have determined charging access is especially critical[1], to warrant a focused approach. The proposal aims to develop charging at 20 Rhode Island workplaces with 10 ports per site, and four public DC Fast Charging sites with five ports each.

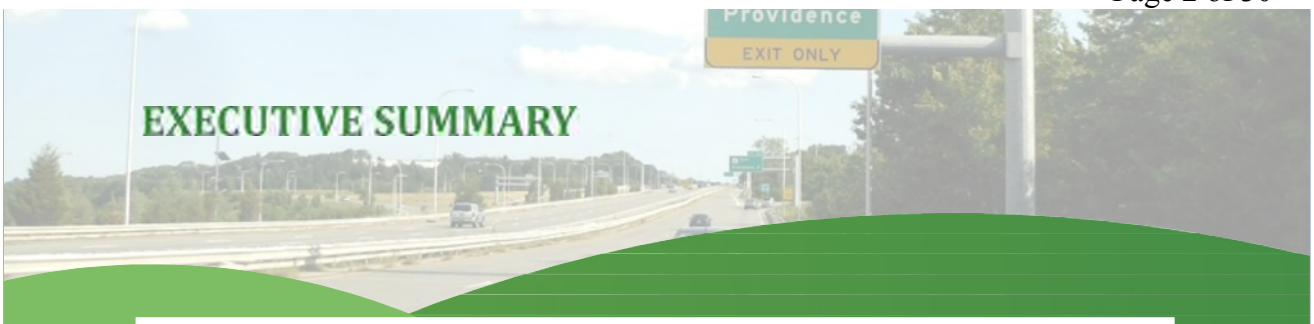
[1] For reference, *see, e.g.,* Attachment SC 1-3 for the Rhode Island ZEV Working Group's 2016 Action Plan, including Pages 12, 13, and 19 for workplace charging, and Pages 11, 13, 22, and 28 for public DC Fast Charging.

Certain other charging segments, including apartment-buildings and income-eligible charging sites, have been identified by stakeholders as important for the development of the electric vehicle market, but have not yet seen meaningful charging development take place. The Company proposes to develop fewer sites in these locations, in recognition of the challenges it expects to find in these segments.

The Company considers a substantial part of the value of the demonstration program to be obtained from the lessons learned while recruiting a diverse group of Rhode Island site hosts to participate in the program, developing these sites, and operating electric vehicle supply equipment under the program. The Company's approach to sharing lessons learned with agencies, stakeholders, and the public is described further in Schedule PST-1, Chapter 5 – Electric Transportation, Section 2.6. Initiative Evaluation (Bates Page 110 of PST Book 1).

# State of Rhode Island
# Zero Emission Vehicle Action Plan

2016




# EXECUTIVE SUMMARY

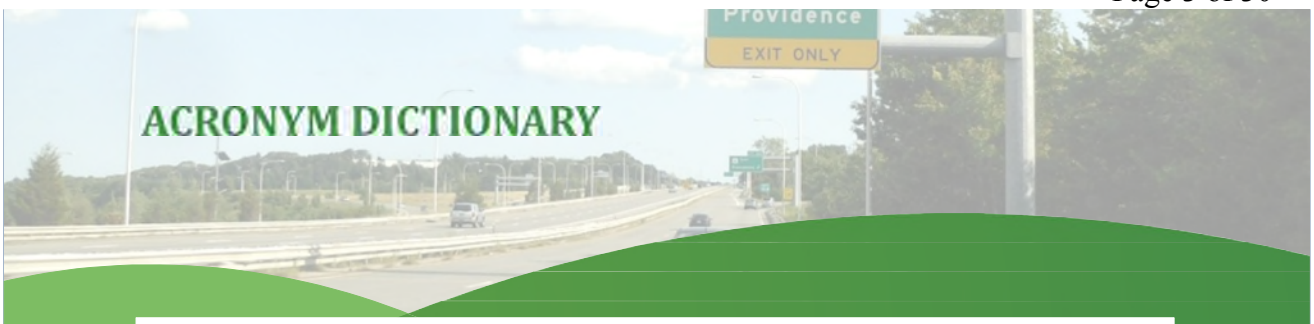
Transportation is the costliest energy sector in Rhode Island, accounting for nearly forty (40) percent of statewide energy expenditures, or $1.4 billion annually. Zero Emission Vehicles (ZEVs) are one of the most promising technologies to mitigate the effects of global warming and greenhouse gas (GHG) emissions. In Rhode Island, those who switch their conventional vehicle to a Plug-In Electric Vehicle (PEV) can reduce their GHG emissions by up to 73%.[1] According to the Acadia Center, vehicle electrification is one of the key pathways to cleaning up the transportation sector.[2]

In 2013, the governors of eight states signed a Memorandum of Understanding (MOU) with a goal to reduce greenhouse gas and smog-causing emissions and foster energy independence. Collectively, these states committed to have at least 3.3 million ZEVs operating on their roadways by 2025. In Rhode Island, that goal is roughly 43,000 vehicles. The MOU encourages states to undertake joint implementation of actions and programs, and to create individual state programs to address barriers in ZEV deployment and build a robust market. Accelerating the ZEV market is crucial if we are to meet the stringent climate and energy goals put into place here in Rhode Island. The ZEV MOU offers Rhode Island the ability to coordinate with other states both regionally and throughout the country in an ongoing collaborative forum to ensure that programs are implemented in an efficient and effective manner. The MOU also presents additional opportunities to create innovative solutions that improve our health and environmental quality and increase energy savings within our transportation sector, while at the same time creating new jobs and fostering local economic development.

On behalf of the Rhode Island Zero Emissions Vehicle Working Group, we are proud to present the following Action Plan to all stakeholders and interested parties. This plan is customized for Rhode Island's unique sets of strengths and challenges. It represents the culmination of meetings with stakeholders from both the private and public sectors. We asked these invested parties to develop and take stewardship of the action items outlined within this plan. The plan is a collaborative effort to take steps towards electrification of Rhode Island's vehicle fleet.

Thank you for taking the time to learn more about Rhode Island's strategic plan to build a robust electrified vehicle market within our state and across our region!

[1] Department of Energy's Alternative Fuel Data Center: http://www.afdc.energy.gov/
[2] Acadia Center: http://acadiacenter.org/initiative/transportation/




# ACRONYM DICTIONARY

| | | | |
|---|---|---|---|
| ARRA | American Recovery and Reinvestment Act | FHWA | Federal Highway Administration |
| BEV | Battery Electric Vehicle | GHG | Greenhouse Gas |
| CARB | California Air Resources Board | LEV | Low Emission Vehicle |
| CCAT | Connecticut Center for Advanced Technology | MOU | Memorandum of Understanding |
| CSE | Center for Sustainable Energy | NESCAUM | Northeast States for Coordinated Air Use Management |
| DEM | Department of Environmental Management | OER | Office of Energy Resources |
| DLT | Department of Labor and Training | OSCC | Ocean State Clean Cities |
| DMV | Department of Motor Vehicles | PEV | Plug-In Electric Vehicle |
| DOE | Department of Energy | PHEV | Plug-In Hybrid Electric Vehicle |
| DOT | Department of Transportation | PUC | Public Utilities Commission |
| DPUC | Division of Public Utilities and Carriers | RGGI | Regional Greenhouse Gas Initiative |
| EV | Electric Vehicle | TCI | Transportation Climate Initiative |
| EVSE | Electric Vehicle Supply Equipment | VEIC | Vermont Energy Investment Corporation |
| FCEV | Fuel-Cell Electric Vehicle | ZEV | Zero Emission Vehicle |


# INTRODUCTION AND BACKGROUND

As the second most densely populated state, Rhode Island is positioned to become a national leader for zero-emission vehicle deployment. Rhode Island leadership has engaged in many initiatives to foster ZEV market adaption, dedicating substantial time and financial resources towards this lower emission, energy efficient, and domestic resource for meeting transportation needs.

The governors of California, Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island, and Vermont signed a Memorandum of Understanding on October 24, 2013. The ultimate goals stated in the MOU are reducing greenhouse gas and smog-causing emissions and fostering energy independence by transforming the transportation sector. The MOU encourages states to undertake joint implementation of actions and programs, and to create individual state programs to address barriers in ZEV deployment and build a robust market. Since the MOU signing, state regulators, the auto industry, infrastructure developers, and other stakeholders have shared information and best practices to help move this effort forward.

Accelerating the ZEV market is crucial if we are to meet Rhode Island's climate and energy goals. The ZEV MOU offers Rhode Island the ability to coordinate with other states, both regionally and throughout the country, in an ongoing collaborative forum to ensure that programs are implemented in an efficient and effective manner. The MOU also presents additional opportunities to create innovative solutions to improve health and environmental quality and increase energy savings within our transportation sector, while at the same time creating new jobs and boosting local economic development.

# ONGOING REGIONAL INITIATIVES

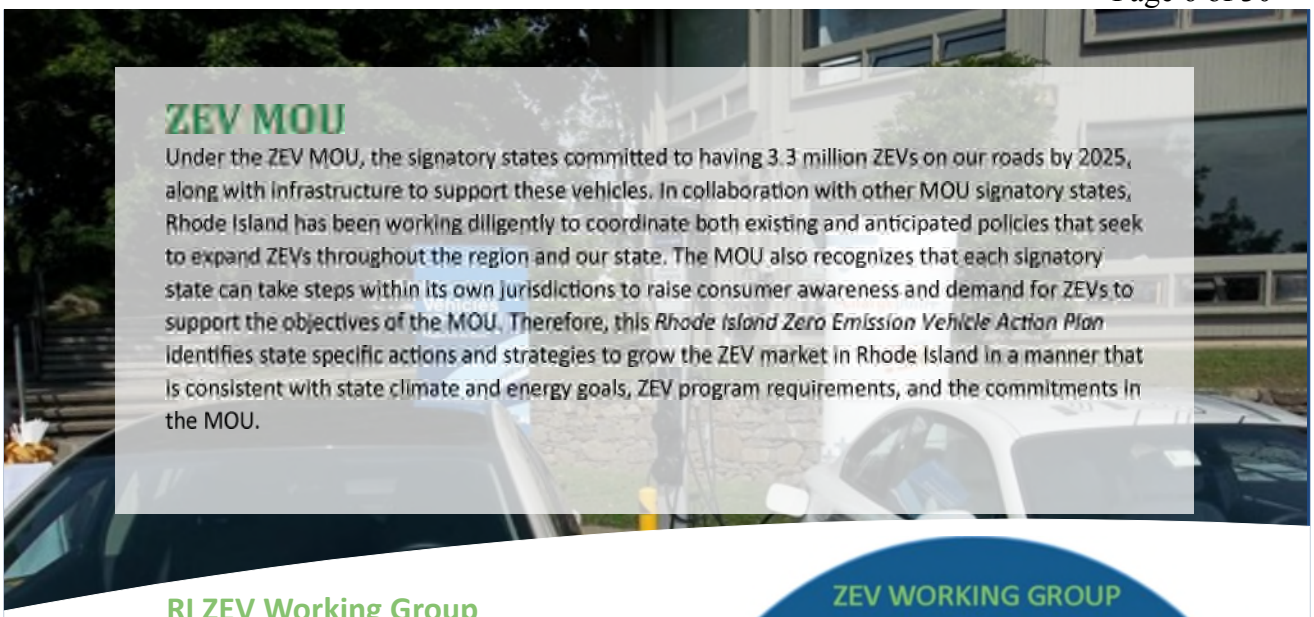
## Transportation Climate Initiative

Rhode Island participates in the Transportation and Climate Initiative (TCI).[3] TCI is a regional collaboration of transportation, energy, and environment officials in Northeastern and Mid-Atlantic states. TCI seeks to stimulate sustainable economic development and improve the environment by supporting innovative technologies and smart planning, and through finding greater efficiencies within the transportation sector. One of the biggest initiatives of TCI has been the launching of the Northeast Electric Vehicle Network. Participating TCI jurisdictions continue to develop partnerships with the private sector, utilities, Clean Cities Coalitions and other public entities; identify and remove barriers to the expanded use of electric vehicles; and support regional, state, and local planning efforts to ensure that electric vehicle charging stations are placed in locations that maximize both local and regional travel. The Northeast Electric Vehicle Network was started through a nearly $1 million planning grant from the U.S. Department of Energy.

## Northeast States for Coordinated Air Use Management

NESCAUM, a nonprofit association of state environmental agencies, serves as a facilitator for regional ZEV issues and provides technical and policy assistance to Rhode Island and member states. In September 2014, NESCAUM's ZEV Multi-State Task Force organized state staff into eight separate implementation teams with responsibility to execute the eleven high-level action items in the ZEV Multi-State Action Plan.[4] These eight multi-state implementation teams are focused on the following general topics that track the organization of the Action Plan: *Incentives; Dealers; Infrastructure Planning; Infrastructure Regulatory; Fleets; Hydrogen; Workplace Charging; and Outreach*. Rhode Island serves as the multi-state lead for the Fleets and Workplace Charging teams. As Rhode Island works through the implementation of activities associated with its own state action plan, NESCAUM and leaders from other states are contacted to collaborate with the goal of executing programs and policies in a coordinated manner.

[3]Transportation Climate Initiative: http://www.transportationandclimate.org/
[4]Northeast States for Coordinated Air Use Management: http://www.nescaum.org/topics/zero-emission-vehicles



## ZEV MOU

Under the ZEV MOU, the signatory states committed to having 3.3 million ZEVs on our roads by 2025, along with infrastructure to support these vehicles. In collaboration with other MOU signatory states, Rhode Island has been working diligently to coordinate both existing and anticipated policies that seek to expand ZEVs throughout the region and our state. The MOU also recognizes that each signatory state can take steps within its own jurisdictions to raise consumer awareness and demand for ZEVs to support the objectives of the MOU. Therefore, this *Rhode Island Zero Emission Vehicle Action Plan* identifies state specific actions and strategies to grow the ZEV market in Rhode Island in a manner that is consistent with state climate and energy goals, ZEV program requirements, and the commitments in the MOU.

## RI ZEV Working Group

Formed in 2014, the Rhode Island ZEV Working Group is a collaboration between the Office of Energy Resources (OER), the Department of Environmental Management (DEM), the Department of Transportation (DOT), and Ocean State Clean Cities (OSCC) to bring together state and quasi-state agencies, private and nonprofit companies, auto dealers, and utility providers to discuss the actions necessary to promote the responsible growth of the ZEV market in Rhode Island. The working group has been tasked with exploring issues critical to the efficient and effective deployment of ZEV solutions across the policy, regulatory, and business landscapes.


**Mission:**

The Rhode Island ZEV Working Group was established to:

- Further expand access to electric and fuel cell vehicle infrastructure in Rhode Island;
- Encourage the purchase and lease of electric and fuel cell vehicles;
- Reduce the up-front costs associated with electric and fuel cell vehicle purchases; and
- Identify strategies to remove barriers for electric and fuel cell vehicle deployment.

The ZEV Working Group is split into three subcommittees, with a Steering Committee overseeing the work and recommendations of the subcommittees. The three subcommittees have the following focus areas: Marketing & Outreach; State, Municipal, Consumer & Business Incentives; and Infrastructure, Planning & Regulatory Issues.

5

The ZEV Working Group brings together key public and private stakeholders to establish recommendations and guidelines to facilitate the growth of zero emission vehicles while maximizing, to the greatest extent possible, associated economic, energy, and environmental benefits .

**Goals:**

The goals of the Rhode Island ZEV Working Group are as follows:

- Create a Rhode Island ZEV implementation plan based on the multi-state ZEV action plan.
- Spur market growth through private, municipal, consumer and dealership incentives.
- Quantify necessary infrastructure and planning for the future.
- Expand consumer awareness.
- Research and address legal and statutory regulatory issues affecting ZEVs.
- Determine metrics and mechanisms for implementation, evaluation, and monitor actions outlined in the mission.

| Current Participants in the Working Group Include: |
|---|
| Rhode Island Office of Energy Resources |
| Rhode Island Department of Transportation |
| Rhode Island Department of Environmental Management |
| Drive Electric New England |
| Vermont Energy Investment Corporation |
| Rhode Island Statewide Planning |
| Acadia Center |
| Ocean State Clean Cities Coordination |
| Northeast States for Coordinated Air Use Management |
| National Grid |
| Connecticut Center for Advanced Technology |
| Rhode Island Public Utilities Commission |
| Town of North Smithfield |
| Conservation Law Foundation |
| Massachusetts Hydrogen Coalition |
| Rhode Island Public Transit Authority |
| New England Clean Energy Council |
| ChargePoint, Inc. |
| Rhode Island Department of Health |
| American Lung Association, Northeast |
| Rhode Island House of Representatives |

# RHODE ISLAND CLIMATE AND ENERGY GOALS

Transportation is the costliest energy sector in Rhode Island, accounting for nearly forty (40) percent of statewide energy expenditures. It is also a sector with major implications for long-term sustainability and remains heavily dependent on petroleum-based fuels. Annually, approximately $1.4 billion is spent on transportation-related energy costs, consuming 64 trillion BTUs of energy and releasing 4.5 million tons of CO2 into the atmosphere. The importance of reducing transportation-related energy costs and meeting our GHG emission reduction goal of 45% by 2035 are captured among various state efforts.

## Rhode Island State Energy Plan (RISEP)

Rhode Island's State Energy Plan (RISEP) identifies maintenance of the state's commitment to the low emission vehicle (LEV) program, including the ZEV requirements, as a key strategy to reduce petroleum consumption in Rhode Island. Although the federal government sets nationwide vehicle emission standards, Section 177 of the Clean Air Act allows California to request a waiver to adopt stricter standards.[5] Other states may adopt California's standards, which are promulgated by the California Air Resources Board (CARB). Rhode Island is one of 15 "Section 177 States" that opt to apply vehicle emission standards set by California.[6] In Rhode Island, the standards are set through air pollution regulations promulgated by the Rhode Island Department of Environmental Management Office of Air Resources. As of July 2013, DEM had amended Air Pollution Control Regulation No. 37[7] to reflect the most recent CARB Low Emission Vehicle (LEV) III Standards. The ZEV program, which is a technology-forcing component of the LEV program, has been a major contributor to the successful commercialization of hybrid-electric vehicles and ultra-low emission technologies.

## RI Executive Climate Change Coordinating Council (EC4)

The RI EC4 has been tasked to take a lead role in developing a comprehensive approach to address the potential threats from climate change to the State's environment, economy, and people. The approach includes both adaptation to impacts that can no longer be avoided, as well as mitigation measures, including the reduction of greenhouse gas emissions.

There are a variety of opportunities to reduce greenhouse gas emissions associated with transportation. One of the key strategies is to increase the deployment of zero emission vehicles. Reducing GHG through advancing alternative fuels, specifically electricity as a transportation fuel, is the priority objective of the ZEV Initiative.

The RIEC4 website[8] provides further detail on the specific duties of the Council, members, meeting schedule and materials, and reports and resources.

[5] EPA State Adoption of California Standards: http://www.epa.gov/otaq/cafr.htm#state
[6] EPA Cross-Border Sales Policy: http://iaspub.epa.gov/otaqpub/display_file.jsp?docid=24724&flag=1
[7] RI DEM Air Pollution Control Regulation No. 37: http://www.dem.ri.gov/pubs/regs/regs/air/air37_13.pdf
[8] RI EC[4] Website: http://www.planning.ri.gov/planning-areas/climate-change/riec4/

# BENEFITS OF ZEV MOU

## Current State of the ZEV Market

Ten states (the eight MOU states plus Maine and New Jersey), representing 28 percent of the automobile market in the United States, have embarked on an ambitious effort to revolutionize the transportation sector by requiring increasing sales of ZEVs under the auspices of the California LEV program. The annual sales requirements in state programs are modest at the outset, but increase over time, anticipating that consumer demand will expand as consumers become more familiar with a growing range of continually improving ZEV products. The ZEV program provides automakers substantial flexibility through mechanisms such as credit banking and trading, alternative compliance options, cross-state credit pooling and by allowing manufacturers to develop their preferred compliance strategy using battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), fuel cell electric vehicles (FCEVs), or some combination. The California Air Resources Board estimates that by 2025, about 15 percent of new vehicles sold in California will be required to be ZEVs. Rhode Island could see similar numbers if the state takes action now to build a robust market for these vehicles. Figure A estimates annual ZEV sales in the eight ZEV MOU states based on one possible regulatory compliance scenario. Assuming the ZEV sales are allocated proportionally among ZEV MOU states, figure B estimates the projected annual ZEV sales under the same regulatory compliance scenario.

Figure A

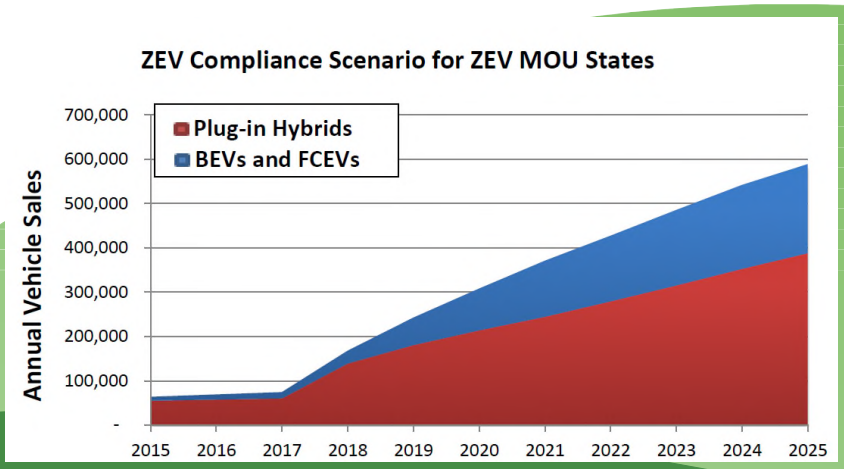
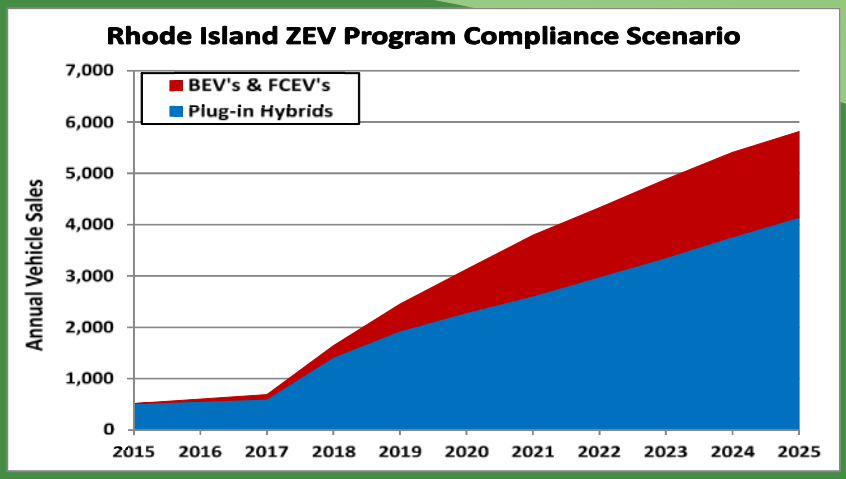



Figure B

*Note the 2017 spike in the graphs represents the expiration of the "travel provision" when new and stiffer ZEV-sales levels come into effect and CARB expands the ZEV requirements to more automakers[9].




[9] Green Car Reports: http://www.greencarreports.com/news/1098525_why-electric-cars-are-rare-outside-ca-arcane-travel-provision-rule

## PEV Adoption Nationwide

Total cumulative PEV sales in the United States are now in excess of 380,000.[10] Even during a period of depressed gasoline prices, PEV sales continue to rise. As technologies continue to improve and lower-priced 200-mile electric vehicles reach the market, consumer demand is expected to become significantly more powerful.

## Current RI Market

As of January 2015, 421 PEVs have been registered in Rhode Island. Of those, 88 are BEVs and 333 are PHEVs. Overall, 13 manufacturers with at least 16 models of PEVs are represented, giving Rhode Islanders a diverse selection of vehicles to choose from. With at least 6 more models slated to hit roadways within the next two years, the demand for ZEVs will continue to climb.

After installing 50 new EVSEs in 2013, the state has already begun to see the benefits of turning to alternative fuels. Since installation, these stations have offset over 36,000 kg of greenhouse gases (Figure E), going on to save motorists 11,000 gallons of gasoline. In all, Rhode Islanders have charged up over 13,000 times in less than two years, as detailed in Figure F below.

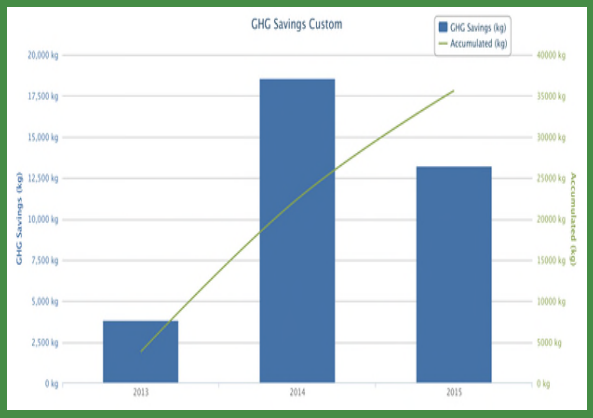



Figure E

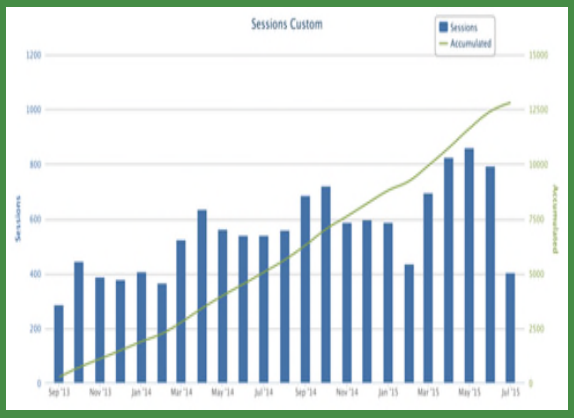


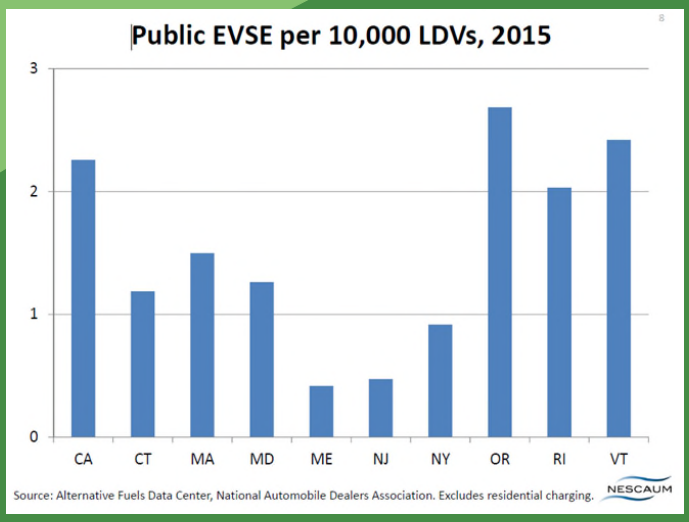

Figure F

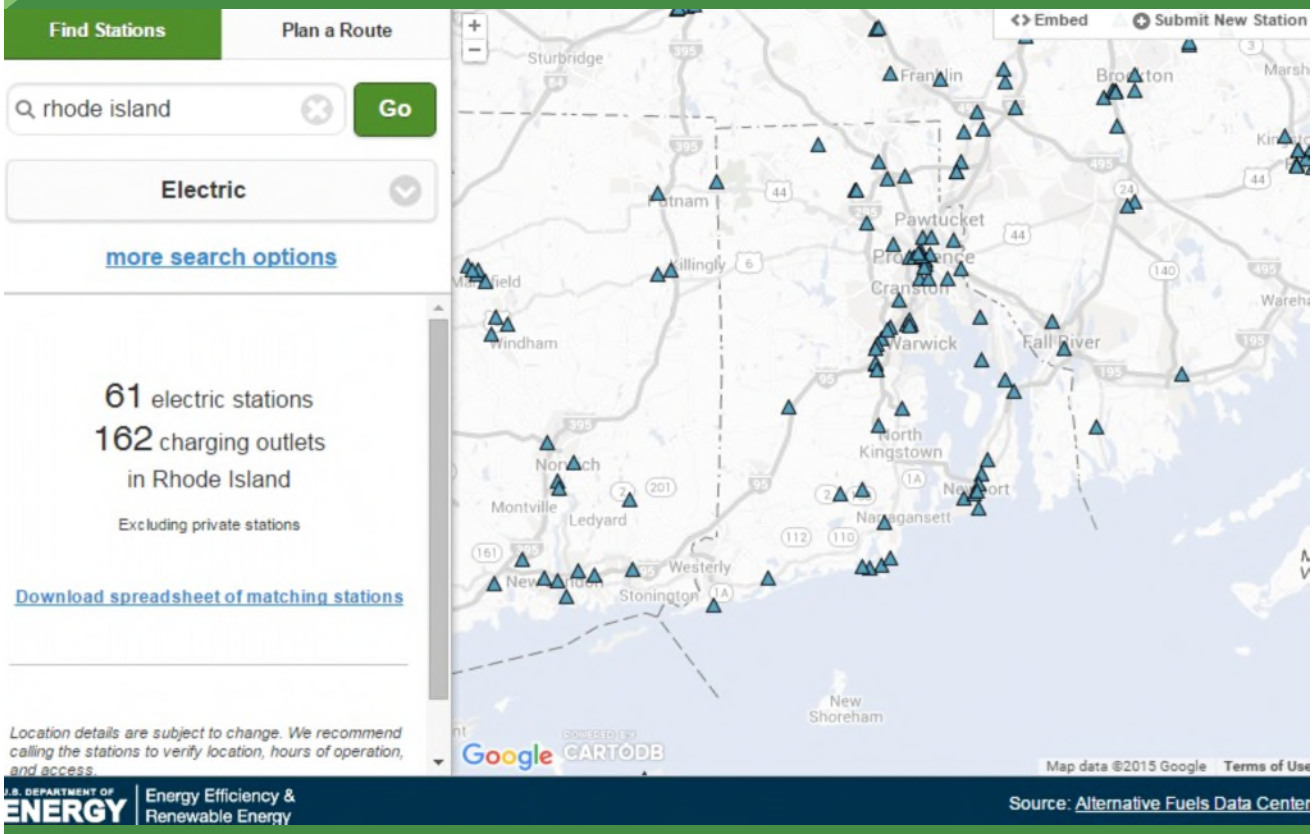
[10] PEV Collaborative: http://www.pevcollaborative.org/

## Current Infrastructure in RI

As noted in the *2013 ZEV Multi-State Action Plan*, the widespread use of ZEVs relies on adequate fueling infrastructure for these vehicles, including the expansion of the charging infrastructure as the PEV market grows and FCEVs are commercially launched. Charging a plug-in electric vehicle is analogous to filling a conventional vehicle's fuel tank with gasoline. A gasoline-powered vehicle is attached to a pump that sends gasoline through a hose into the fuel tank. Similarly, a PEV is plugged into the electric grid so that electricity can flow through wires into the battery.

To date, there are 60 publicly accessible level II electric vehicle charging stations throughout Rhode Island. In 2013, the Office of Energy Resources awarded $781,225 in American Reinvestment and Recovery Act Funding (ARRA) to site and install a network of 50-Level II stations.[11] In addition, a number of workplaces and businesses are leading by example by installing charging equipment for the use of their employees and fleets.




[11] Press Release: Governor Chafee Celebrates Launch of Electric Vehicle Network in RI: http://www.ri.gov/press/view/19599

## DC Fast Charging

Figure G shows the current DC Fast Charging Network (also known as Level III) in the Northeast. Level III stations provide a high-powered, quicker charge to a depleted battery, typically in 30 minutes (depending on the vehicle). These stations are strategically placed (usually about 40 miles apart) on high-volume local routes to provide drivers an option to quickly recharge. Rhode Island drivers, and those passing through the state, could benefit from the installation of a DC Fast Charging Station near the Route-95/Route-295 area.

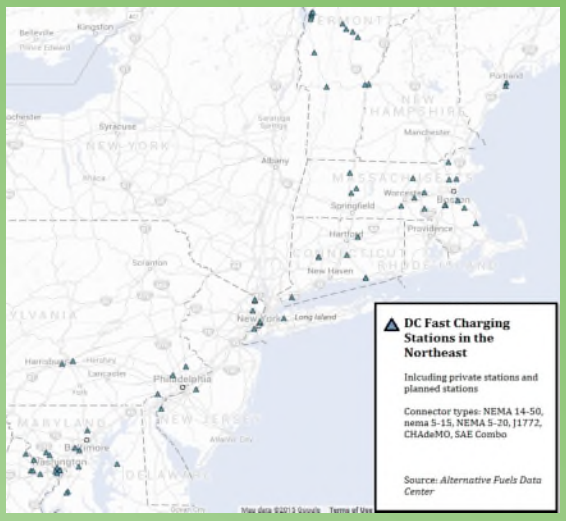



Figure G

## Expanding EV and EVSE Adoption

In 2016, OER added two new programs aimed at increasing EV adoption and infrastructure investment throughout [redacted]

**Driving Rhode Island to Vehicle Electrification (DRIVE) Electric Vehicle Rebate Program**
DRIVE is an electric vehicle rebate program administered by the OER to support the adoption of EVs by Ocean State [redacted] DRIVE represents a significant step toward filling this gap in the State's clean energy portfolio by facilitating consideration and, ultimately, consumer adoption of no-to-low carbon, clean transportation alternatives. Through DRIVE, qualified Rhode Island residents interested in the purchase or lease of an EV will be able to apply for a rebate of up to $2,500, based upon vehicle battery capacity. For more information, please visit: [redacted].

**Charge Up! Public Sector Vehicle Electrification Program—**
The Rhode Island Charge Up! Program offers incentives to state agencies and municipalities interested in installing electric vehicle supply equipment. Through Charge Up!, qualified applicants may receive for up to $60,000 in incentives to support the purchase and installation of electric vehicle charging stations (Level II or higher). In addition, applicants that install at least one charging station through this program may also qualify for up to $15,000 to support the purchase or lease of a new electric vehicle as **part of their public sector fleet.** For more information, please visit: www.energy.ri.gov/Transportation/ChargeUp/index.php.

# ZEV ACTION PLAN

The Rhode Island ZEV Working Group decided to build off of the eleven priority actions set forth in the Multi-State ZEV Action Plan.[13] To do this, the Working Group brought together stakeholders to identify, prioritize, and make the action items specific to Rhode Island during multiple meetings and phone calls.

The *Rhode Island ZEV Action Plan* lists state-specific actions and strategies to grow the ZEV market in Rhode Island, identifies state leads, and establishes timeframes for each action. It is intended to serve as a map that clearly communicates state government's efforts to advance ZEVs. It is also intended to serve as a "to-do" list for state agencies and working group members. The list of supporting roles identified for some of the action items listed below is not meant to be exhaustive. Many of these actions are and will be best addressed through new and existing collaborative partnerships.

## Marketing & Outreach

A variety of ZEVs are now available to Rhode Island consumers. The state can help the auto industry take appropriate actions to expand consumer awareness of ZEVs and supporting infrastructure in order to build demand. The top action items identified below include several strategies to help expand consumer awareness and interest in ZEVs, including but not limited to programs to identify and highlight "ZEV champions", and expansion of the number of Rhode Island employers becoming DOE Workplace Charging Challenge partners.

| | Marketing & Outreach | Leading Role | Supporting Role | Target Completion Date |
|---|---|---|---|---|
| **1.5** | Institute programs to identify and highlight "ZEV champions" among dealers, private fleets, workplaces, and local governments through Governor-recognition programs and other profile-raising approaches. | OSCC; OER | DEM | Spring 2016 |
| **5.4** | Educate major employers about the need for and benefits of workplace charging infrastructure and ZEV's. by leveraging resources from the U.S. DOE Workplace Charging Challenge and other associated initiatives. | OSCC | Multi-State Task Force; OER | Fall 2015 |
| **7.6** | Promote priority parking for ZEVs using consistent striping and signage. | FHWA; DOA | DOT; OER; Statewide Planning | Spring 2016 |

New Electric Vehicle License Plate now available to registered owners in RI.


[12] NESCAUM Multi-State ZEV Action Plan: http://www.nescaum.org/documents/multi-state-zev-action-plan.pdf/

## State, Municipal, Business, & Consumer Incentives:

The past few years have seen a proliferation of new technologies. From battery electric and plug-in hybrid electric vehicles to hydrogen fuel cell vehicles that could enter the state's market in the near future, consumers have a broader choice than ever before. However, these advanced technology vehicles are more expensive for manufacturers to produce and consumers to buy than traditional vehicles.

ZEV sales nationwide have surpassed 380,000 but lag in Rhode Island, partly due to the lack of consumer incentives available in states with higher ZEV adoption numbers. The Incentives Subcommittee reviewed and identified successful programs implemented by other states within the region and nationwide. The program recommended for implementation in Rhode Island is outlined in Appendix A. In addition, the following three action items were identified to help propel the sales of ZEVs here in Rhode Island.

| | Incentives | Leading Role | Supporting Role | Target Completion Date |
|---|---|---|---|---|
| **2.4** | Issue recommendations in the RI ZEV Action Plan to guide and inform state and local government policy on the implementation of an effective ZEV consumer incentive program. | Incentives Subcommittee | Multi-State Task Force; TCI; OER; DOA; DEM | Complete |
| **2.7** | Establish a ZEV consumer incentive program based off of the recommendations in the RI ZEV Action Plan. | OER | Multi-State Task Force; TCI; DOA; DEM | Spring 2016 |
| **6.7** | Expand the eligibility and simplify the current prerequisites of state financial incentive programs for workplace and DC fast charging stations in the near term (Note: Ongoing, RGGI program). | OER | DOT; Governor's Office; VEIC | Summer 2016 |
| **3.13** | Provide incentives for state, municipal, and public university ZEV and EVSE purchases. | OER | DEM; DOT | Spring 2016 |

## Infrastructure, Planning, & Regulatory Issues

Rhode Island has made considerable progress deploying ZEV Infrastructure, but much more remains to be done to improve and simplify planning and regulatory issues. As more electric vehicles and charging infrastructure become available and fuel cell infrastructure is explored, the need to ensure a competitive market structure for these technologies will be more pronounced. In order to promote competition and drive the market, the state will need to keep barriers to a minimum.

| | Infrastructure, Planning, & Regulatory | Leading Role | Supporting Role | Target Completion Date | |
|---|---|---|---|---|---|
| **10.1** | Promote necessary legislation, regulations, standards, or certifications to enable the commercial sale of electric vehicle charging and hydrogen as transportation fuel, including on a per-kilowatt-hour or on a per-kilogram basis, and ensure transparent pricing. | Steering Committee | DPUC; OER; EVSE Providers | Spring 2016/ Ongoing | **AREA 1** |
| **10.2** | Request that Public Utility Commissions (PUCs) open proceedings to: Ensure electric vehicle service providers or others that operate charging facilities for the sole purpose of providing electricity as a transportation fuel are not defined as a "public utility" and therefore are not subject to regulation as such an entity. | Steering Committee | DPUC; OER; EVSE Providers | Fall 2015 | |
| **6.5** | Strive to ensure that all appropriate charging/ fueling installations receiving public funding be open to the public and accessible to all PEV/FCEV drivers. | OER | DOT; EVSE Providers | Ongoing | **AREA 2** |
| **9.1** | Support the adoption and implementation of effective National Institute of Standards and Technology standards for EVSE measurement accuracy and price disclosure. | Steering Committee | Multi-State Task Force; EVSE Providers; DLT (Weights & Measures) | Spring 2016/ Ongoing | |
| **9.2** | Work with EVSE providers to ensure that PEV drivers have the information and freedom to use any public charging station by allowing common forms of payment, not requiring subscription or membership status, encouraging use of open-source protocols, and making fees transparent to customers. | Steering Committee | Multi-State Task Force; PUC/DPUC; EVSE Providers | Spring 2016 | |

| | Infrastructure, Planning, & Regulatory | Leading Role | Supporting Role | Target Completion Date | |
|---|---|---|---|---|---|
| **9.3** | Ensure that all public ZEV charging/fueling installations are registered with the National Renewable Energy Lab's Alternative Fuels Data Center database to provide a simple means for PEV drivers to locate available charging stations, identify the type of charging available, and determine charging costs. | Steering Committee | OER; OSCC; EVSE Providers | Ongoing | |
| **10.3** | Determine the appropriate level of consumer protection and regulatory oversight for providers of charging facilities, including utilities and non-utilities. | Steering Committee | PUC; DPUC | Ongoing | |
| **8.7** | Evaluate and design policies with respect to utility demand charges and service upgrade fees for PEV charging. | OER | PUC; DPUC; Acadia Center; National Grid | 2016 & Ongoing | **AREA 3** |
| **10.4** | Evaluate residential and business electric utility rate structures or other mechanisms, consistent with statutory authority, that provide lower-cost electricity for off-peak charging (also in conjunction with H7726). | Steering Committee; PUC; DPUC | National Grid | 2016 & Ongoing | |
| **10.5** | Encourage utilities to evaluate and revise, as necessary and consistent with statutory authority, appropriate rate structures based on PEV charging data, customer enrollment, and other customer feedback to promote off-peak charging and maximize consumer savings and grid reliability. | Steering Committee | National Grid; PUC/DPUC; EVSE Providers | 2016 & Ongoing | |
| **10.6** | Explore the role utilities, energy service companies, and other public or private entities can play in the deployment of ZEV fueling infrastructure, particularly with respect to fast charging to facilitate long distance travel and charging for those without dedicated home charging. | Steering Committee | Acadia Center; National Grid; EVSE Providers; Drive Electric Cars New England; PUC | 2016 & Ongoing | |

## Appendix A:

### *Recommended Consumer Incentive Program*

The RI ZEV Incentives Subcommittee reviewed consumer and infrastructure incentive programs in other states and analyzed their effectiveness and cost-efficiency. Successful ZEV incentive programs and policies do more than just meet ZEV targets, they lower reliance on fossil fuels, reduce climate-related emissions, and improve air quality and public health. After reviewing a variety of resources and evaluating the possibilities, a recommended program was identified. Our expectation is that the recommendation be considered for implementation by state and local government.

Currently, Rhode Island is trailing neighboring states in providing an easily accessible, high value incentive program. This is slowing ZEV adoption as seen in Table 1. As the ZEV markets expand, the State can help ZEVs become an attractive and affordable option to Rhode Islanders by implementing a consumer incentive program. Financial incentives continue to play a critical role in making the cost of ZEVs competitive with conventional vehicles during the early phases of their deployment, until economies of scale and technological advances lead to cost reductions and a self-sustaining market. It is crucial that the State take action to implement a consumer incentive program. If no action is taken, Rhode Island will continue to fall behind our neighboring states in ZEV adoption and will fail to meet ZEV target goals. Rhode Island consumers will have an unequal opportunity to purchase vehicles. Ultimately, a continued reliance on fossil fuels will make it more difficult to reduce climate-related emissions from the transportation sector.

### # of Registered PEVs as of January 1, 2015*

Table 1

| STATE | EV | PHEV | TOTAL |
|---|---|---|---|
| MASSACHUSETTS | 2,057 | 2,821 | 4,878 |
| CONNECTICUT | 832 | 1,653 | 2,485 |
| VERMONT | 261 | 650 | 911 |
| NEW HAMPSHIRE | 300 | 536 | 836 |
| MAINE | 178 | 570 | 748 |
| ***RHODE ISLAND*** | ***88*** | ***333*** | ***421*** |

***source, Polk Data**

The Subcommittee recommends that there be consideration of an approach similar to Connecticut's "Hydrogen and Electric Automobile Purchase Rebate" (CHEAPR) program. The CT program is modeled after "The Massachusetts Offers Rebates for Electric Vehicles" (MOR-EV) and California's "Clean Vehicle Rebate" programs. Financial incentive programs are more effective when rebates are granted closer to the time a consumer makes the decision to purchase a ZEV. That is why the CHEAPR program provides a point of sale cash rebate. Table 2 highlights rebates available to Connecticut residents, businesses and municipalities. Rebates up to $3,000 are available for the purchase or lease of an eligible vehicle. Rebates of $1,500 and $750 are provided for EVs that travel shorter distances on battery power. A powerful aspect of the CHEAPR program is the creation of an economic incentive to dealers. In addition to the point of sale rebate available to the consumer, licensed Connecticut dealerships can receive a rebate of up to $300 for the sale of every vehicle. Eligible vehicles must have an MSRP (Manufacturer Suggested Retail Price) that does not exceed $60,000 and be highway capable. These additional requirements apply:

Table 2

| Rebate Amount | Required Battery Capacity | Eligible Vehicle Examples |
|---|---|---|
| $3,000 | Greater than 18 kWh or any fuel cell electric vehicle | BMW i3 or i3 REx; Chevrolet Spark; Chevrolet Volt (2016MY); FIAT 500e; Ford Focus Electric; Kia Soul EV; Mercedes Benz B-Class Electric Drive; Nissan LEAF; Volkswagen e-Golf; Toyota Mirai; Hyundai Tuscon Fuel Cell |
| $1,500 | 7 to 18 kWh | Chevrolet Volt (2015MY); Ford C-MAX Energi; Ford Fusion Energi; Mitsubishi i-MiEV; Smart ED |
| $750 | Less than 7 kWh | Toyota Prius Plug-In (2015MY) |

Funds for the CHEAPR pilot program come from $1 million that was made available to Connecticut as a result of an agreement that allowed for the merger of Northeast Utilities and NSTAR. The MOR-EV program (1st round) was initially funded with $2 million in Regional Greenhouse Gas Initiative (RGGI) auction proceeds, which also financed an additional $2 million during the second round of funding. The CHEAPR and MOR-EV programs are administered by a third party contractor, the Center for Sustainable Energy® (CSE), in order to promote the production and use of zero and low emission vehicles. CSE has dedicated program staff available to answer consumers' questions, administer rebates, and track progress. CSE received $200,000 to administer the CHEAPR incentive program (with $1 million available to consumers).

The Incentives Subcommittee recommends that the Rhode Island program be multi-year to maximize effectiveness and stimulate consumer acceptance of ZEVs. As the ZEV market continues to grow, the State should continue to evaluate the incentive program to most effectively target incentives where they motivate consumer decisions. The Subcommittee also advises identification of a long term funding strategy for the program.

### Summary of Current Funding Available:

The State is making progress to provide financial incentives to municipalities, state agencies, and private and nonprofit entities. Regional Greenhouse Gas Initiative (RGGI) auction proceeds of $725,000 from 2014 have been dedicated to support EVSE deployment and/or to pay the cost differential between the purchase of a representative gasoline vehicle and a ZEV. This funding is currently only available to municipalities, state agencies, and private and nonprofit entities, so broadening the program in the future to include ZEV purchases by private entities and eliminating renewable energy requirements is recommended.

**Appendix B:**

***Action Items—Market & Outreach Subcommittee***

| | ACTION #1<br>Promote the availability and effective marketing of all ZEV models in our state | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **1.1** | Provide consumers and dealers with up-to-date information on ZEVs that are available in Rhode Island and links to state and automobile dealership websites. | DEM | NESCAUM; Multi-State Task Force; OER; OSCC; DMV | Short | High |
| **1.2** | Invite automobile dealers and dealer associations to join the MOU states and automobile manufacturers in our on-going "New Collaboration for ZEV Success" initiative to encourage dealer education, consumer awareness, develop communication, and effective marketing for the full range of ZEVs in Rhode Island. | DEM | NESCAUM ; Multi-State Task Force; OSCC | Short | Mid |
| **1.3** | Collaborate with dealers to identify, evaluate, and implement creative financing approaches and other effective strategies to reduce vehicle purchase price and increase ZEV sales. | DEM; OSCC; OER | NESCAUM; Multi-State Task Force; CCAT; Steering Committee | Medium | Mid |
| **1.4** | Collaborate with automobile dealers, Clean Cities programs, targeted workplaces, and other interested stakeholders to incorporate ZEV outreach and education events for consumers in conjunction with auto shows, Earth Day celebrations, and National Plug-In Day. | OSCC | OER; DEM; EVSE Providers | Complete/ Ongoing | Mid |
| **1.5** | Institute programs to identify and highlight "ZEV champions" among dealers through Governor-recognition programs and other profile-raising approaches. | OSCC | OER; DEM | Spring 2016 | High |
| **1.7** | Work with auto dealers to provide timely ZEV inventory. | DEM | OSCC; OER | Short | High |
| | **ACTION #4**<br>**Encourage private fleets to purchase, lease, or rent ZEV's** | | | | |
| **4.2** | Coordinate with academics, nonprofit partners, and the U.S. DOE to help fleet managers develop the business case for integrating ZEVs into their fleets. | DEM; OSCC | NESCAUM; Multi-State Task Force | Short | High |
| **4.3** | Explore opportunities to promote ZEV car-share programs. | OER | American Lung Association; EVSE Providers | Medium | Mid |

*Action Items—Market & Outreach Subcommittee (continued)*

| | ACTION #5<br>Promote workplace charging | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **5.1** | Lead by example by promoting state agency workplace charging with a goal that, by 2020, all interested state agency employees with PEVs will have a place to charge them. | DOA | OER; DEM; Drive Electric Cars New England | Medium | High |
| **5.2** | Promote the installation of charging infrastructure and adoption of ZEV's for commuters at public transit hubs. | DOT | OER | Medium | Mid |
| **5.3** | Implement high profile public-private programs, such as Governors' events, to promote and encourage the deployment of workplace charging, particularly at large companies, universities, and hospitals. | OSCC; OER | DEM; Drive Electric Cars New England; DOT; EVSE Providers | Short | High |
| **5.4** | Educate major employers about the need for and benefits of workplace charging infrastructure and ZEV's. by leveraging resources from the U.S. DOE Workplace Charging Challenge and other associated initiatives. | DEM; OSCC; OER | DOE; NESCAUM; Multi-State Task Force | Fall 2015 | High |
| **5.8** | Develop ZEV infrastructure policy for major new developments and include PEV charging requirement criteria in state environmental project reviews. | OER | Statewide Planning; H2USA; Building Code Commission | Short | High |
| | **ACTION #7**<br>**Provide clear and accurate signage to direct ZEV users to charging and fueling stations and parking** | | | | |
| **7.1** | Coordinate with the Federal Highway Administration (FHWA) to ensure sufficient and up-to-date coverage of uniform signage on federal highways using the "Alternative Electric Vehicle Charging Symbol Sign." | DOT | NESCAUM; Multi-State Task Force; DOA; FHWA; DEM | Medium | Mid |
| **7.2** | Develop and install uniform signage consistent with FHWA's Manual on Uniform Traffic Control Devices for use on state and local roadways to direct drivers to charging and hydrogen fueling stations. | DOT; DEM | NESCAUM; Multi-State Task Force; OER | Medium | High |
| **7.4** | Work with municipalities and the private sector to institute consistent regulatory signage programs that identify the availability of parking for ZEVs. | DOT | DOA | Medium | Mid |
| **7.5** | Develop uniform and effective regulatory signs to indicate PEV parking regardless of charging status or restrict parking to PEV charging only. | DOT | DOA | Medium | High |
| **7.6** | Promote priority parking for ZEVs using consistent striping and signage. | DOA; FHWA | DOT; OER; Statewide Planning | Spring 2016 | High |
| **7.7** | Include EVSE and hydrogen fueling station indicators on official State of RI map. | DOT; Statewide Planning | OER; OSCC | Medium | Mid |

*Action Items—Market & Outreach Subcommittee (continued)*

| | ACTION #8<br>Remove barriers to ZEV charging and fueling station installations | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **8.13** | Hold regional planning workshops to educate local governments on ZEV issues. | OER; OSCC | H2USA | Medium | Mid |
| | **ACTION #10**<br>**Remove barriers to the retails sale of electricity and hydrogen transportation fuels and promote com-** | | | | |
| **10.1** | Coordinate on PEV outreach efforts within each utility's service area. | National Grid; OER | DMV | Short | Mid |
| | **ACTION #11**<br>**Track and report progress toward meeting the goal of 3.3 million ZEVs on our roadways by 2025** | | | | |
| **11.1** | Report annually on ZEV MOU state landing page: (by community)<br>· The number of ZEVs registered in our states.<br>· The number of public fueling stations in our states.<br>· State fleet ZEV acquisitions. | DEM | NESCAUM; Multi-State Task Force; OER; OSCC; DMV | Short | High |
| **11.3** | Use annual reports to generate interest and educate the public and state legislatures about ZEVs. | DEM; OER; OSCC | NESCAUM; Multi-State Task Force; CCAT; Steering Committee | Medium | Mid |

*Action Items—Incentives Subcommittee*

| | ACTION #2<br>Provide consumer incentives to enhance the ZEV ownership experience | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **2.1** | Enable reciprocity for non-monetary ZEV incentives in Rhode Island. | DEM | NESCAUM; Multi-State Task Force; DOT; OER | Medium | Mid |
| **2.2** | Establish a common image or decal to identify qualifying vehicles (Note- Being done at Federal Level NHSA MY 2017). | DEM | NESCAUM; Multi-State Task Force; DOT; OER | Medium | Mid |
| **2.3** | Support the continuation of the federal tax credit for PEVs and FCEVs. | DEM | NESCAUM; Multi-State Task Force; Federal Delegation; OSCC | Medium | High |
| **2.4** | Issue recommendations in the RI ZEV Action Plan to guide and inform state and local government policy on the implementation of an effective ZEV consumer incentive program. | Incentives Subcommittee | NESCAUM; Multi-State Task Force; TCI; DEM; DOA | Complete | High |
| **2.5** | Develop recommendations to encourage the development of a viable secondary market for used ZEVs, with an emphasis on the low-income sector. | DEM | NESCAUM; Multi-State Task Force | Medium | High |
| **2.7** | Establish a ZEV consumer incentive program based off of the recommendations in the RI ZEV Action Plan. | OER | DOA; DEM | Spring 2016 | High |
| **2.8** | Encourage to promote utility programs and rate structures that compensate owners of ZEVs for services provided (Note- EPRI study underway for Grid Interactive Vehicles). | OER | DPUC | Medium | Mid |
| **2. 10** | Preferential Parking: Work with municipalities and private companies to encourage preferential parking and reduced parking rates for ZEVs. | OSCC | Municipalities | Medium | Mid |
| **2.11** | Preferential Parking: Coordinate with local authorities to put ordinances in place to enforce compliance with PEV-restricted spaces. | Statewide Planning | Municipalities | Medium | Mid |

*Action Items—Incentives Subcommittee (continued)*

| | ACTION #3<br>Lead by example through increasing ZEV's in state, municipal, and other public fleets | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **3.13** | Provide incentives for state, municipal, and public university ZEV and EVSE purchases. | OER | DEM; DOT | Spring 2016 | High |
| **3.14** | Assist fleet managers by: Providing information about the availability and applicability of ZEV vehicles. | OSCC | OER; DEM | Short | High |
| **3.15** | Assist fleet managers by: Developing near-term pilot projects to enhance understanding of ZEVs and infrastructure within state departments. | OER | OSCC; DEM; DOT | Short | High |
| **3.16** | Assist Fleet Managers by: Promoting training for fleet mechanics, infrastructure installers and maintenance personnel. | OSCC | | Medium | Mid |
| | **ACTION #6**<br>**Promote ZEV infrastructure planning and investment by public and private entities** | | | | |
| **6.7** | Expand the eligibility and simplify the current pre-requisites of state financial incentive programs for workplace and DC fast charging stations in the near term (Note: Ongoing, RGGI program). | OER | DOT; Governor's Office; VEIC | Summer 2015 | High |

*Action Items—Incentives Subcommittee (continued)*

| | ACTION #3<br>Lead by example through increasing ZEV's in state, municipal, and other public fleets | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **3.1** | Establish a goal that a minimum of 25 percent of new light-duty state fleet purchases and leases for applicable uses, to the extent available, will be ZEVs by 2025. | DOA | OER | Short | High |
| **3.3** | Develop best practice policies "Handbook" to maximize the "electric miles" driven by government fleet vehicles. | OER | DEM | Long | High |
| **3.4** | Establish state fleet rules or procedures that enable and include the full range of ZEVs and Electric Vehicle Supply Equipment (EVSE) to compete for state purchase and rental car contracts. | DOA | OER | Medium | High |
| **3.6** | Use common data collection elements and protocols to collect and share information among states on ZEV fleet purchases and operational cost savings. | DEM | DOA | Medium | High |
| **3.7** | Assess feasibility and opportunities for pooled purchases with other government and private fleets to secure greater price discounts, stronger contract terms and con- | DEM | OSCC | Medium | High |
| **3.8** | Develop implementation plans for state fleet ZEV purchases, with metrics to measure success. | DOA | OER | Medium | Mid |
| **3.11** | Integrate ZEV-based car sharing into the state's fleet management system. | DOA | OER | Medium | High |
| **3.12** | Direct state agencies responsible for vehicle fleet purchasing to consider cooperative contracts to aggregate demand when going out to bid on ZEVs and electric vehicle charging equipment. | DEM | NESCAUM; Multi-State Task Force | Medium | Mid |

*Action Items—Infrastructure, Planning, and Regulatory Subcommittee*

| | ACTION #6<br>Promote ZEV infrastructure planning and investment by public and private entities | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **6.1** | Research driver charging behavior to determine the need for non-residential charging, including the level of charging and importance of location. | DEM | NESCAUM; Multi-State Task Force | Long | Low |
| **6.2** | Collaborate in the coordinated deployment of DC fast chargers along key inter-state corridors to facilitate long-range PEV travel along priority roadways such as the I-95 Northeast Corridor. | DEM; OER | NESCAUM; Multi-State Task Force; DOT | Short | High |
| **6.3** | Coordinate with researchers to undertake multi-state mapping and modeling analyses to inform the design and implementation of efficient corridor charging networks. | DEM | NESCAUM; Multi-State Task Force; DOT | Long | Mid |
| **6.4** | Pursue resource partnerships to design and execute a hydrogen FCEV infrastructure feasibility study for the MOU states outside of California. | CCAT; H2USA; DEM | NESCAUM; Multi-State Task Force; DOT | Long | Low |
| **6.5** | Strive to ensure that all appropriate charging/ fueling installations receiving public funding be open to the public and accessible to all PEV/FCEV drivers. | OER | DOT; EVSE Providers | Ongoing | High |
| **6.6** | Initiate a dialogue to address federal restrictions on electricity and hydrogen sales within certain limited access rights-of-way. | CCAT; DEM; H2USA; DOT | NESCAUM; Multi-State Task Force | Long | Low |
| **6.8** | Explore opportunities for coordinated fueling station equipment procurement across local, state, and federal agencies. | DOA | DEM; OER; DOT; Municipalities; OSCC | Medium | Mid |
| **6.9** | Collaborate with auto manufacturers to provide ownership trends data to utilities, EVSE providers, local and regional planning agencies, and other interested parties to inform effective charging network design. | OER | DMV; DOT; H2USA; National Grid | Medium | Mid |
| **6.10** | Promote and support efforts by utilities to improve understanding of ZEV charging demand patterns, needed system upgrades, and associated grid impacts. | OER | Acadia Center; National Grid; EVSE Providers | Medium | Mid |

*Action Items—Infrastructure, Planning, and Regulatory Subcommittee (continued)*

| | ACTION #6<br>Promote ZEV infrastructure planning and investment by public and private entities | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **6.12** | Create appropriate utility notification requirements for EV purchasers and EVSE installers to allow for proper planning and prevent problems with the distribution grid. | OER | Acadia Center; National Grid; EVSE Providers | Medium | Mid |
| | **ACTION #8**<br>**Remove barriers to ZEV charging and fueling station installations** | | | | |
| **8.1** | Coordinate with nonprofit groups developing model codes and standards to promote consistency in the development of state and local government requirements related to the installation of PEV and hydrogen fueling infrastructure. | DEM | NESCAUM; Multi-State Task Force; OER; DOA; DOT | Medium | Mid |
| **8.2** | Establish consistent codes and standards for ZEV infrastructure through revisions to national and state building codes. | Steering Committee | NESCAUM; Multi-State Task Force; DEM; OER; DOT; Building Code Commission; EVSE Providers; State Fire Marshall | Medium | High |
| **8.3** | Promote the development of consistent policies, codes and standards to facilitate the deployment of charging stations: Consider amendments to state building or electrical codes to ensure that new buildings are ZEV-ready, including criteria such as pre-wiring and electric panel capacity requirements. | Steering Committee | DOA; OER; Building Code Commission; EVSE Providers | Medium | Mid |
| **8.4** | Develop model local government requirements to incorporate EVSE into new multi-family dwellings and non-residential buildings, and model ordinances requiring them to dedicate a portion of their parking spaces to PEV charging. | Steering Committee | NESCAUM; Multi-State Task Force; DOA; Building Code Commission | Medium | Mid |
| **8.5** | Develop a streamlined model permit and zoning process that local governments can adopt to ensure timely approval of DC fast charge installations. | Statewide Planning; Building Code Commission | NESCAUM; Multi-State Task Force | Medium | Low |
| **8.7** | Evaluate and design policies with respect to utility demand charges and service upgrade fees for PEV charging. | OER | DPUC; Acadia Center; National Grid | 2016 & Ongoing | High |

*Action Items—Infrastructure, Planning, and Regulatory Subcommittee (continued)*

| | ACTION #8<br>Remove barriers to ZEV charging and fueling station installations | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **8.8** | Provide planning and siting assistance and resources to municipalities and other local planning entities. | Statewide Planning; OER | OSCC; League of Cities & Towns | Long | Mid |
| **8.10** | Develop policies that guide businesses and homeowner associations on how to approach requests for charging, along with provisions that ensure that these requests cannot be ignored. | Steering Committee | Building Code Commission | Medium | Mid |
| **8.12** | Require that a certain percentage of parking spaces have charging stations. | Statewide Planning; Building Code Commission | DOA | Medium | Mid |
| **8.14** | Eliminate unreasonable restrictions on charging at multi-family buildings and condos. | Steering Committee | Building Code Commission | Medium | Mid |
| | **ACTION #9**<br>**Promote access, compatibility, and interoperability of the plug-in electric vehicle charging network and hydrogen fuel infrastructure.** | | | | |
| **9.1** | Support the adoption and implementation of effective National Institute of Standards and Technology standards for EVSE and hydrogen measurement accuracy and price disclosure. | Steering Committee | NESCAUM; Multi-State Task Force; EVSE Providers; H2 Providers; DLT (Weights & Measures) | Spring 2016 | High |
| **9.2** | Work with EVSE providers to ensure that PEV drivers have the information and freedom to use any public charging station by allowing common forms of payment, not requiring subscription or membership status, encouraging use of open-source protocols, and making fees transparent to customers. | Steering Committee | NESCAUM; Multi-State Task Force; DPUC; EVSE Providers | Spring 2016 | High |

*Action Items—Infrastructure, Planning, and Regulatory Subcommittee (continued)*

| | ACTION #9<br>Promote access, compatibility, and interoperability of the plug-in electric vehicle charging network | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **9.3** | Ensure that all ZEV charging/fueling installations are registered with the National Renewable Energy Lab's Alternative Fuels Data Center database to provide a simple means for PEV drivers to locate available charging stations, identify the type of charging available, and determine charging costs. | Steering Committee | OER; OSCC; EVSE Providers | Ongoing | High |
| **9.4** | Require all publicly funded chargers that are accessible to the public and networked to apply the Open Charge Point Protocol communication standard that allows charging stations and central systems from different vendors to communicate. | Steering Committee | NESCAUM; Multi-State Task Force; DPUC; EVSE Providers | Short | High |
| **9.5** | Encourage dual-compatibility for all new public DC fast charge stations to ensure that all PEVs can utilize any public charging station, whether equipped with CHAdeMO or Society of Automotive Engineers (SAE) charging ports. | Funding Organization | Steering Committee; EVSE Providers; OER; OSCC | Medium | Mid |
| **9.6** | Follow and support national and California efforts to develop hydrogen infrastructure codes and standards for station configuration, fuel quality, and dispensing accuracy. | Steering Committee; CCAT; H2USA | NESCAUM; Multi-State Task Force; Acadia Center DOE | Medium | Mid |
| **9.7** | Seek federal guidance on ensuring charging station compliance with the Americans with Disabilities Act. | DEM; Steering Committee | NESCAUM; Multi-State Task Force; EVSE Providers | Long | Low |

| | ACTION #10<br>Remove barriers to the retail sale of electricity and hydrogen transportation fuels and promote competitive plug-in electric vehicle charging rates | | | | |
|---|---|---|---|---|---|
| **10.1** | Promote necessary legislation, regulations, standards, or certifications to enable the commercial sale of electric vehicle charging and hydrogen as transportation fuel, including on a per-kilowatt-hour or on a per-kilogram basis, and ensure transparent pricing. | Steering Committee | DPUC; EVSE Providers; OER | Spring 2016 | High |
| **10.2** | Request that Public Utility Commissions (PUCs) open proceedings to: Ensure electric vehicle service providers or others that operate charging facilities for the sole purpose of providing electricity as a transportation fuel are not defined as a "public utility" and therefore are not subject to regulation as such an entity. | Steering Committee | DPUC; EVSE Providers; OER; EVSE Providers | Fall 2015 | High |

*Action Items—Infrastructure, Planning, and Regulatory Subcommittee (continued)*

| | ACTION #10<br>Remove barriers to the retail sale of electricity and hydrogen transportation fuels and promote competitive plug-in electric vehicle charging rates | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **10.3** | Determine the appropriate level of consumer protection and regulatory oversight for providers of charging facilities, including utilities and non-utilities. | Steering Committee | DPUC | Ongoing | High |
| **10.4** | Evaluate residential and business electric utility rate structures or other mechanisms, consistent with statutory authority, that provide lower-cost electricity for off-peak charging (also in conjunction with H7726). | Steering Committee; DPUC | National Grid | 2016 & Ongoing | High |
| **10.5** | Encourage utilities to evaluate and revise, as necessary and consistent with statutory authority, appropriate rate structures based on PEV charging data, customer enrollment, and other customer feedback to promote off-peak charging and maximize consumer savings and grid reliability. | Steering Committee | EVSE Providers; National Grid; DPUC | 2016 & Ongoing | High |
| **10.6** | Explore the role utilities, energy service companies, and other public or private entities can play in the deployment of ZEV fueling infrastructure, particularly with respect to fast charging to facilitate long distance travel and charging for those without dedicated home charging. | Steering Committee | Acadia Center; National Grid; EVSE Providers; DENEW; DPUC | 2016 & Ongoing | High |
| **10.8** | Explore the use of hydrogen for grid support, especially with regard to storage of excess electricity produced by renewables. | Steering Committee | Acadia Center; CCAT; H2USA; DOE; DPUC; OER | Long | Low |
| **10.9** | Work with utilities to promote targeted outreach to homeowners and fleets with PEVs, to ensure they are aware of existing electric rate options and the potential cost savings. | National Grid | DENEW; OER; OSCC | Medium | Mid |
| **10.11** | Coordinate with electricity providers and PUCs/PSCs to explore opportunities to explicitly identify PEV electricity usage on consumers' utility bills to highlight savings compared to the use of conventional fuels. | Steering Committee; DPUC | National Grid ; Utility providers | Medium | Mid |
| **10.12** | Establish policies to reduce costs and simplify the process for homeowners to install meters to access PEV-specific rates. | Steering Committee | National Grid; DPUC | Medium | Mid |
| **10.13** | Coordinate with electricity providers, PUCs/PSCs, and state energy offices to explore opportunities to connect renewable energy generation with PEVs. | OER | National Grid; DPUC | Short | Mid |

**Action item 10.7 was consolidated into item 8.7 and is no longer listed.*

*Action Items—Infrastructure, Planning, and Regulatory Subcommittee (continued)*

| | ACTION #10<br>Remove barriers to the retail sale of electricity and hydrogen transportation fuels and promote competitive plug-in electric vehicle charging rates | Leading Role | Supporting Role | Timeframe | Priority |
|---|---|---|---|---|---|
| **10.14** | (H7726) Explore the implications of allowing for the purchase of stored energy back from electric vehicle owners (vehicle-to-grid) and changes to rates and standards that would facilitate this. | Steering Committee | OER; Acadia Center; EVSE Providers | Short | Mid |
| **10.15** | (H7726) Develop procedures for accelerated utility review and service upgrades related to PEVs. | Steering Committee | OER; Acadia Center EVSE Providers | Long | Mid |
| **10.16** | (H7726) Address the issues related to the provision of electricity by non-utilities for delivery of PEV charging, and clarify whether companies that procure electricity at wholesale will be subject to the same set of regulations and requirements as any other entity wishing access to wholesale markets directly. | Steering Committee | OER; Acadia Center; EVSE Providers | Medium | Mid |

SC 1-4

Request:

Referring to Chapter 5, Table 5-2, if the number of actual ports per site is lower than the number of potential ports per site identified in the table for a particular charging segment, does the Company plant to target additional sites for that charging segment to achieve the full potential number of ports?

Response:

Yes. Subject to available budget and additional site host interest, the Company would plan to target additional sites for each charging segment to achieve the full potential number of ports identified in Schedule PST-1, Chapter 5 – Electric Transportation, Table 5-2 (Bates Page 104 of PST Book 1). The Company will manage the Charging Station Demonstration Program budget to achieve the target number of ports, rather than sites, indicated in Table 5-2.

Prepared by or under the supervision of: Carlos Nouel

SC 1-5

Request:

Referring to Chapter 5, Table 5-2, please identify how the Company will determine whether the public fast-charging locations will target corridor travel or intra-city charging.

Response:

The Company's intention for the four proposed public fast-charging locations is to develop two sites that serve electric vehicle drivers (including interstate drivers) for corridor travel, and two sites that serve electric vehicle drivers for local travel (*e.g.*, intra-city), with the potential for one or more sites to serve both purposes.

Prepared by or under the supervision of: Carlos Nouel

SC 1-6

Request:

Referring to Chapter 5, Section 2.2 (Charging Station Demonstration Program), please identify any steps that the Company is proposing to take to coordinate siting of public fast-chargers with any fast chargers that are being developed by Electrify America using Appendix C funds from the VW Settlement.

Response:

The Company will take into account the planned locations of any public fast-chargers Electrify America plans to develop in Rhode Island under its National Zero Emissions Vehicle Investment Plan within the three-year period of the proposed Charging Station Demonstration Program. The Company will consider whether the planned Electrify America stations are sufficient to meet the needs of its customers in that area such that the Company should seek an alternate location.

At this point, Electrify America has not indicated plans to locate any charging in Rhode Island, either under its national highway network build-out, or as part of its metro area charging development program.

Prepared by or under the supervision of: Carlos Nouel

SC 1-7

Request:

Referring to Chapter 5, Section 2.2 (Charging Station Demonstration Program), how does the Company plan to work with RIPTA and relevant school districts to ensure that stations deployed to serve public transit and school buses are used and useful?

Response:

The Company plans to require commitment from transit and school bus operators that they will be purchasing electric vehicles before installing stations. The Company will work closely with these customers to identify where charging should be located and to estimate electric service requirements and costs; however, the Company would not start construction until the customer demonstrated proof of ordering electric vehicles. The Company will ensure that there is no duplication of efforts between this proposal and other existing funding sources for charging infrastructure.

Prepared by or under the supervision of: Carlos Nouel

SC 1-8

Request:

Referring to Chapter 5, Section 2.2 (Charging Station Demonstration Program, would the stations deployed under the "rideshare company charging hub" segment be available for exclusive use for rideshare and other advanced mobility drivers?

Response:

Yes, the Company would reserve funds under its Charging Demonstration Program for the development of a station for exclusive use by rideshare and other advanced mobility drivers. If the Company is unable to identify a site host partner or fleet operator for that purpose within the timeframe of the Program, the Company would reallocate that planned funding for another charging segment.

Prepared by or under the supervision of: Carlos Nouel

SC 1-9

Request:

Referring to Chapter 5, Table 5-6, please identify the dollar per ton carbon dioxide equivalent figure used to calculate greenhouse gas externality costs.

Response:

The value of avoided greenhouse gas reduction is $100 per short ton $CO_2$, consistent with the value used across the Power Sector Transformation programs, and consistent with the recommendation of the 2015 Avoided Energy Supply Cost study.

Prepared by or under the supervision of: Carlos Nouel

SC 1-10

Request:

Referring to Chapter 5, Section 2.1 (Off-Peak Charging Rebate Pilot) at page 103, the proposal states that the Company "reserves the right to change the value per kWh as necessary during this Pilot to achieve the Pilot goals." Please identify when and on what basis the Company would make the determination to change the per-kWh value.

Response:

The Company could make this determination at any time during the Pilot based on relevant factors that could include, but will not be limited to, overall levels of customer participation, customer charging patterns observed in the Pilot, customer or industry feedback, or material changes to the inputs used in determining the per-kWh values identified in Schedule PST-1, Chapter 5 (on/off peak energy costs and forward capacity market costs). The Company will ensure that changes will be properly communicated to customers. The Company will also ensure that, through the evaluation process, the difference between the per-KWh values are identified and measured separately.

Prepared by or under the supervision of: Carlos Nouel

SC 1-11

Request:

Referring to Chapter 5, Section 2.1 (Off-Peak Charging Rebate Pilot), please identify the time frame on which the Company will identify a vendor for the off-peak charging rebate hardware and software.

Response:

The Company plans to conduct a Request for Information or Request for Proposals in the fall of 2018 to select its technology partner(s) to be ready to launch the Off-Peak Charging Rebate Pilot after Public Utilities Commission approval. The Company could add other technology partners over time.

Prepared by or under the supervision of: Carlos Nouel

SC 1-12

Request:

Referring to Chapter 5, Section 2.1 (Off-Peak Charging Rebate Pilot), please confirm if the Company intends to limit enrollment of the Off-Peak Charging Rebate Pilot to 500 customers. If so, please explain why.

Response:

Yes, the Company intends to limit enrollment of the Off-Peak Charging Rebate Pilot to 500 customers to limit the cost of the Pilot at this time. The Company considers 500 customers a sufficient number of customers to achieve the objectives of this Pilot and inform the subsequent design of a full-scale off-peak charging program or rate.

Prepared by or under the supervision of: Carlos Nouel

SC 1-13

Request:

Referring to Chapter 5, Section 2.1 (Off-Peak Charging Rebate Pilot), do the on-peak/off-peak windows and price differentials of the Off-Peak Charging Rebate Pilot align with the time-varying rates the Company intends to introduce via AMF deployment?

Response:

The Company has not yet determined the design of any time varying rates for Standard Offer Service to be implemented upon AMF deployment. The Company will undertake additional analysis to inform the design of such rates; however, the Company does not currently anticipate that the times between the AMF deployment and the Off-Peak Charging Rebate Pilot will be significantly different.

Prepared by or under the supervision of: Carlos Nouel

SC 1-14

Request:

Referring to Chapter 5, Section 2.2 (Charging Station Demonstration Program):

a. For make-ready stations supported by this program, please explain whether the Company will track the load profiles and rates charged to drivers at these stations. If so, how will the Company make that information publicly available?

b. For make-ready stations supported by this program, is the Company proposing to defray 100% of the cost of the make ready infrastructure up to, but not including, the charging station? If not, please describe the percentage of make ready costs the Company intends to cover under the Make Ready option.

c. For make-ready stations supported by this program, what is the magnitude of the rebate that the Company intends to offer for the charging station itself (i.e. not the make ready infrastructure)?

d. For make-ready stations supported by this program, has the Company considered modifying the magnitude of the rebate based on the segments the Company identifies in Table 5-2? Please explain why or why not.

e. For make-ready stations supported by this program, how does the Company plan to ensure that site hosts properly operate and maintain site host-owned equipment for a minimum of five years?

f. For Company-operated stations developed through this program, does the Company plan to calibrate Site Host Participation Payments such that, from the site host's perspective, the charging stations are equal in cost to stations that would have been deployed under the Make Ready option?

g. For Company-operated stations developed through this program, please explain how the Company will make publicly available information regarding rates charged to drivers at these stations.

Response:

a. Yes, the Company will track the load profiles and pricing, if any, charged at stations installed under the Make-Ready option as part of this program. Site Hosts and their selected electric vehicle (EV) charging network providers must consent to provide the Company access to non-personally identifiable information in connection with end-user

transactions for five years. The Company plans to publish aggregated information and analysis of charging station load profiles and pricing in the annual reporting described in Schedule PST-1, Chapter 5, Section 2.6. These reports will be available on the Company's website and discussed in public presentations, per Section 2.6.

b. Yes, the Company is proposing to fund 100 percent of the cost of the required electrical infrastructure (such as new electrical panel, conduit and wiring) up to, but not including, the electric vehicle supply equipment (EVSE). Eligibility for this offer will be subject to the terms of the Program, including the Company's approval of the site design and cost estimate.

c. The Company has proposed the following electric vehicle supply equipment rebate percentages, shown in Workpaper 5.1, Page 3 of 12, in the column labeled "Make-Ready EVSE Rebate Level".

| **Targeted Charging Segments – Estimates** | **Make-Ready EVSE Rebate Level** |
|---|---|
| ***Consumer Charging Segments*** | |
| Workplaces | 50% |
| Apartment buildings | 75% |
| Disadvantaged community sites (a.k.a. Income Eligible community sites) | 100% |
| Public transit stations | 50% |
| ***Fleet Vehicle Charging Segments*** | |
| Government light-duty fleet | 50% |
| Corporate light-duty fleet | 50% |
| Public transit buses | 50% |
| Rideshare company charging hub | 25% |
| Other heavy-duty/DCFC (port, airport) | 50% |
| Municipal school buses | 75% |

The Company may modify these at its discretion over the course of the program to achieve the goals of the program.

In Workpaper 5.1, the Company has estimated the resulting amount of the rebates that may be awarded under the program, using indicative equipment price quotes from electric vehicle supply equipment vendors. The actual rebate paid to each participating Site Host will be the lesser amount of: a) the specified percentages above applied to the actual equipment cost shown in invoices paid by the Site Host to the electric vehicle supply equipment vendor; or b) a pre-determined maximum dollar amount per electric vehicle supply equipment determined by the Company at its discretion.

d. Yes. Please see the response to part c. above. The Company anticipates that certain segments may require a greater level of incentive based on lesser familiarity with EV charging and/or lesser benefit to the Site Host.

e. The Company will require Site Hosts to execute a Site Host Agreement with the Company, explaining the Site Host's required commitment in exchange for the investment and incentives provided by the Program. If a Site Host fails to comply with the Program requirements over the five years of the agreement, the Site Host may be required to reimburse a prorated portion of the Program funding it received.

f. Yes. The Company has prepared a preliminary estimate of the Participation Payment levels for different Consumer Charging Segment Site Hosts, in Workpaper 5.1, Page 8 of 12, based on a method of calculating cost equivalence that includes five years of annual direct operation and maintenance expense per port (*e.g.*, repairs, maintenance, and network service fees), annual indirect overhead per site, and the upfront cost of electric vehicle supply equipment net of the rebate level. The Company reserves the right to change the Participation Payment level required of Site Hosts at any time to achieve the goals of the program.

g. For Company-operated stations, similar to the Make-Ready stations, information will be visible at the stations and via public app (such as Plugshare.com). Pricing information will also be available via the Company's website.

SC 1-15

Request:

Please refer to the article entitled "UK National Grid plans superfast country-wide EV charging network," available at https://www.engadget.com/2018/02/20/uk-national-grid-ev-charging-network/.

a. Please confirm whether UK National Grid intends to install 350 kW fast chargers in the United Kingdom.

b. Please identify the throughput of the direct current fast chargers (DCFC) that the Company intends to install as part of its Charging Station Demonstration Program in Rhode Island.

c. If the throughput of the DCFC that the Company intends to install as part of its Charging Station Demonstration Program differs from the throughput of the superfast charging stations the Company intends to install in the United Kingdom, please explain the reason for the difference.

Response:

a. The article in this question refers to a proposal by National Grid plc's regulated business in the U.K. to invest in enabling infrastructure to support third-party development of DC Fast Charging, up to the 350KW level.

b. The Company has not yet finalized the throughput of the DC Fast Charging it intends to install in Rhode Island, as DC Fast Charging equipment available from vendors changes regularly. The Company will conduct a Request for Proposals for the DC Fast Charging it proposes to install and operate to select the technology that best balances, among other factors, technical potential, long-term value, and cost. In addition, the Company's electric vehicle supply equipment qualification process will allow electric vehicle supply equipment vendors to qualify new technology systems for the Company's procurement on a regular basis.

c. Please see the response to part a. above.

Prepared by or under the supervision of: Carlos Nouel

SC 1-16

Request:

Referring to Chapter 5, please identify any actions that the Company is proposing as part of its Electric Transportation offerings to test alternatives to second meters for EV-only time-varying rates.

Response:

The Company has not proposed any specific actions geared toward the development of electric vehicle (EV)-only commodity-based (i.e., standard offer service) time-varying rates. As part of the EV Off-Peak Charging Rebate, the Company will evaluate the technical capability of Level 2 electric vehicle supply equipment to function as residential revenue-grade meters.

Prepared by or under the supervision of: Carlos Nouel

SC 1-17

Request:

Referring to Chapter 5, Section 2.1 (Off-Peak Charging Rebate Pilot), page 103, for the proposed summer and non-summer off-peak charging rebates, please quantify the amount of the rebate value that corresponds to the "difference in load-weighted on-peak and off-peak energy costs" and the amount that corresponds to the "additional payment intended to reflect a contribution to forward capacity market cost savings."

Response:

Narragansett Electric performed several high-level analyses to estimate the potential "summer" and "winter" charging rebates. First, the Company used the Independent System Operator-New England's (ISO-NE) data on Rhode Island hourly loads, looking at both real-time and day ahead locational market prices from September 1, 2015 through August 31, 2017, which enabled Narragansett Electric to estimate the difference in peak and off-peak energy costs seasonally.[1]

Next, the Company estimated avoided annual capacity costs based on ISO-NE's Forward Capacity Market "Auction 9" for the capacity commitment period 2018-2019 (*i.e.*, June 1, 2018 through May 31, 2019) and an estimated average avoided demand of 0.825 kW per vehicle. Capacity costs were allocated to each season using two methods: (1) the relationship of peak to off-peak hours for the summer and winter periods and (2) the relationship of peak to off-peak costs for the summer and winter periods.

Narragansett Electric's analyses all resulted in similar summer rebates of approximately $0.06 per kWh for the summer period, with approximately $0.04 per kWh associated with capacity savings and approximately $0.02 per kWh from the difference between on-peak and off-peak pricing. Similarly, the multiple analyses had similar winter rebates of approximately $0.04 per kWh, with approximately $0.035 per kWh due to capacity savings and $0.005 per kWh due to the difference between on-peak and off-peak pricing during these months. A table of the four analyses performed with the breakout of summer and non-summer rebates peak and off-peak pricing delta and capacity savings follows:

[1] Narragansett Electric segregated the year into two seasons: a "summer" season of June through September and a "winter" season of October through May.

Prepared by or under the supervision of: Carlos Nouel

| | Summer (June – September) | | | Winter (October – May) | | |
|---|---|---|---|---|---|---|
| | Peak to Off-Peak | Capacity | Total | Peak to Off-Peak | Capacity | Total |
| Day ahead costs, Capacity split on relationship of Peak to Off-Peak Hours | $0.01621 | $0.04137 | $0.05758 | $0.00547 | $0.04007 | $0.04554 |
| Day ahead costs, Capacity split on relationship of Peak to Off-Peak Costs | $0.01621 | $0.05002 | $0.06623 | $0.00547 | $0.03575 | $0.04122 |
| Real Time costs, Capacity split on relationship of Peak to Off-Peak Hours | $0.01550 | $0.04137 | $0.05687 | $0.00542 | $0.04007 | $0.04549 |
| Real Time costs, Capacity split on relationship of Peak to Off-Peak Costs | $0.01550 | $0.05002 | $0.06552 | $0.00542 | $0.03575 | $0.04117 |

SC 1-18

Request:

Referring to Chapter 5, Section 2.6 (Initiative Evaluation), page 110, please identify how and when the Company will determine the composition of the Electric Transportation Advisory Committee?

Response:

The Company proposes to form this committee upon approval of the Electric Transportation Initiative by the Rhode Island Public Utilities Commission. The Company will solicit participation from a broad group of stakeholders that may include, but is not necessarily limited to:

- State executive agencies of energy, environment, and transportation;
- The Rhode Island Division of Public Utilities and Carriers;
- Business community representatives, such as a large employer, apartment owner or property management company, or parking garage or lot owner/operator;
- Automotive sector representatives, including manufacturers' representative and dealers' representative;
- Environmental organizations with a significant focus on electric transportation;
- Income eligible community groups;
- Consumer organizations, such as electric vehicle driver membership organization; and/or
- Large fleet operators.

Participation by members will be on a voluntary basis and not funded through the Company's program.

Prepared by or under the supervision of: Carlos Nouel

SC 1-19

Request:

Referring to Chapter 5, Section 2.6 (Initiative Evaluation), page 110, given that the Company plans to conduct annual reporting on its identified metrics, please identify what information the Company plans to make available to members of the Electric Transportation Advisory Committee in advance of the Committee's quarterly meetings.

Response:

The Company expects to provide the Electric Transportation Advisory Committee with information on a quarterly basis that is substantially similar to the type of information the Company will report publicly on an annual basis, described in Schedule PST-1, Chapter 5 – Electric Transportation on Bates Page 113 of PST Book 1, subject to the availability of that data. The Company expects to seek input from the Electric Transportation Advisory Committee on other information that would be useful to its members in advance of quarterly meetings.

Prepared by or under the supervision of: Carlos Nouel

SC 1-20

Request:

Referring to Chapter 5, Section 2.3 (Discount Pilot for DC Fast Charging Station Account), please identify any examples of other time-limited utility demand charge discounts that the Company considers to have been successful and the basis for that conclusion.

Response:

The Company is aware that two other utilities, Southern California Edison and Consolidated Edison, Inc., each proposed time-limited incentive programs in 2017 to lower the demand-related charges as an encouragement to customers to install DC Fast Charging equipment. These incentives are both so recent that there is insufficient information to evaluate their success at this time. The Company's own proposal is designed as a pilot to test the effectiveness of its approach.

Prepared by or under the supervision of: Carlos Nouel

SC 1-21

Request:

Referring to Chapter 5, Section 2.3 (Discount Pilot for DC Fast Charging Station Account), how many DC Fast Charging stations does the Company expect to incentivize through the Discount Pilot?

Response:

The number of stations incentivized through the Discount Pilot will depend on site host participation and the specific charging configurations at each participating site.

As noted in Schedule PST-1, Chapter 5 – Electric Transportation on Bates Page 109 in PST Book 1, the Company intends to limit the annual value of the discount to $300,000 per year. The value of the discount each year will depend upon the billed distribution demand charges of all participating customers, which will generally result from the number of stations at all sites and the billed demand (kW) of each station.

At a distribution demand charge level of $4.41/KW per month (or $52.92 per kW per year), a discount value of $300,000 per year would provide a discount to approximately 5,668 KW of Fast Charging capacity.

If this power demand were incurred at 50KW per station (port), the discount value would support 113 stations (ports). Because distribution demand charges apply only to demand that is measured above a minimum threshold for each site host account[1], the discount value will only be applied to those charges. Accordingly, the number of stations installed by site hosts receiving an incentive under the Discount Pilot would likely be greater than what is estimated by the method above.[2]

[1] For site host accounts with a demand of 10kW up to 200KW (G-02 accounts), the distribution demand charge is $5.52/kW per metered kW greater than 10KW. For large site host customers with metered demand of 200 kW or greater (G-32 accounts), the distribution demand charge is $4.41/kW per metered kW greater than 200KW.
[2] For example, a site host with eight DC Fast Chargers that each produce a demand of 50KW would see 400KW of metered demand at their site. Because the first 200KW of demand would not see demand charges, four of the eight DC Fast Chargers at the site would not be "counted" under the above estimate of incentive value.

SC 1-22

Request:

Referring to Chapter 5, Section 2.5 (Company Fleet Expansion), has the Company considered redirecting resources from the Company Fleet Expansion initiative toward additional charging infrastructure to support the electrification of publicly accessible medium and/or heavy-duty vehicles?

Response:

Yes, the Company considered this, but does not propose doing so, in order to continue building its own experience base as part of the Electric Transportation Initiative. Given the early stage of maturity of the market for these types of vehicles, continued investment in the Company's own fleet is a necessary market development mechanism. For example, some of the Company's plug-in truck fleet have experienced challenges to date with vehicle performance and manufacturer support. By applying its own expertise to identify and resolve issues with these emerging technologies, and by expanding the number and type of electrified vehicles in its fleet, the Company will be best positioned to serve as an advocate and advisor for its customers considering medium and/or heavy-duty vehicle electrification into the future.

Prepared by or under the supervision of: Carlos Nouel

SC 1-23

Request:

Referring to Chapter 5, Table 5-6, why does the Company not include the Net Utility Revenue Increase and Net Utility Revenue Decrease components in its Societal Cost Test?

Response:

Net Utility Revenue Increase and Net Utility Revenue Decrease capture any cost shifts to or from customers participating in a proposed program/project from customers who do not participate, and are included only in the Ratepayer Impact Measure. They represent a net transfer of funds rather than a net cost or benefit to society and are therefore not included in the Societal Cost Test.

Prepared by or under the supervision of: Carlos Nouel

SC 1-24

Request:

Referring to Chapter 6:

a. Please explain the basis for the Company's decision to propose this program as part of its Power Sector Transformation proposal rather than its efficiency program plans.

b. How would the proposals in the Electric Heat Initiative (EHI) be coordinated with the efficiency programs currently underway?

c. In Division 5-4, the Division asked which of three approaches would be best – ramping up energy efficiency (EE) investments, supplementing EE with EHI, or shifting to EHI. On page 4, the Company answered that: "Barring an increase in the annual EE budget, attempting to achieve the entirety of the state's heat decarbonization targets exclusively through EE programs would quickly come to dominate that program." From the perspective of a ratepayer how would it matter whether heat pump incentives are funded through EE or EHI? Is there a difference in the BCA from one approach to another?

Response:

a. Please refer to the Company's response to Division 5-2, a copy of which is provided as Attachment SC 1-24-1 for ease of reference. Pursuing beneficial heat electrification in both the energy efficiency (EE) and Power Sector Transformation (PST) programs is currently the optimal approach, because this approach (i) allows for greater scale in the near-term than a smaller program in EE or PST alone, and (ii) encourages a process to explore new offerings and business models related to, but not wholly within, the EE program.

b. Although funding for beneficial heat electrification will originate from both the EE and PST programs, most parts of implementation and delivery (especially of the Equipment Incentives program of the PST Electric Heat Initiative) will be undertaken by the same internal staff. Between the EE program and the Equipment Incentives program, the Company will ensure harmonized offerings, marketing, rebate amounts, and HVAC contractor outreach. This approach is similar to other EE programs that leverage multiple funding streams. For example, in the EnergyWise program, the Company received funding from the Regional Greenhouse Gas Initiative to maximize dollars for oil weatherization. Although there were two different funding streams and accounting codes for these dollars, the delivery was seamless to the vendor and the customer.

For the three other programs of the Electric Heat Initiative (*i.e.*, Ground-Source Heat

Pump, Oil/Propane Dealer Training, and Community-Based Outreach), as needed, implementing staff will work closely with the energy efficiency delivery teams to ensure complementarity.

c. From the customer perspective, the source of funding for incentives (EE vs. PST) should not matter, as it is cost-effective in both programs. Beyond Equipment Incentives, however, there are advantages of establishing beneficial heat electrification within the PST framework rather than solely in the EE framework. For example, situating heat electrification within the PST framework allows for expanded options to pursue novel business models (such as the new business model proposed in the Ground-Source Heat Pump program), and, in the future, the potential to offer novel rate designs to encourage heat electrification. The Company envisions exploring these and other synergies between the EE and PST programs on an ongoing basis as part of its efforts to support transformation of the renewable thermal market.

Regarding the differences in the BCA frameworks of the EE and PST heat electrification programs, please refer to the Company's response to Division 1-2, a copy of which is provided as Attachment SC 1-24-2 for ease of reference.

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4780
Responses to Division's Fifth Set of Data Requests
Issued January 25, 2018

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Division 5-2

Request:

Schedule PST-1, Chapter 6 – Electric Heat, page 1 of 15 states: "Yet given the shortfall between that number and the vision laid out in the EC4 Plan, this Initiative dedicates additional resources to accelerate adoption of air-and ground-source heat pumps by the customers with the highest energy costs and largest emissions footprints."

a. Does the Company plan to implement electric heat measures through the Energy Efficiency programs moving forward (i.e., past the period of approved Energy Efficiency program plans)?
b. What does the Company believe is the optimal approach to increase the penetration of electric heat (i.e., including, but not necessarily limited to: i) ramping up EE program investments in these measures to the extent that supplemental funding through the Electric Heat Initiative is not needed; ii) maintaining EE program investments in these measures and supplementing EE program investments in these measures through the Electric Heat Initiative; or, iii) transitioning EE program investments to the Electric Heat Initiative)? Please explain why the approach can be considered optimal.

Response:

a. Yes. In order to meet the state's emissions goals, there is a need for thousands of conversions per year, and therefore, the Company plans to offer electric heat pump measures through both Energy Efficiency (EE) and Power Sector Transformation (PST) programs beyond the currently-approved Energy Efficiency program plan.

b. The Company believes that approach (ii) is currently the optimal approach, because it allows for greater scale in the near-term than a smaller program in EE or PST alone, and because it encourages a process to explore new offerings and business models related to, but not wholly within, the EE program. Specifically:
   - **Greatest potential for near-term scale.** Approach (ii) will leverage more sources of immediate funding to support a larger-scale program than the EE program alone, thereby supporting the state in reaching its greenhouse gas reduction targets. Barring an increase in the annual EE budget, attempting to achieve the entirety of the state's heat decarbonization targets exclusively through EE programs would quickly come to dominate that program.
   - **Greatest potential for new business models.** The optimal approach to transitioning to a low-carbon heating sector will require innovations in customer offerings and business models that will extend beyond EE alone. Innovation will be required in key areas such as rate design, leasing and financing, marketing,

Prepared by or under the supervision of: Mackay Miller

supply chain and workforce development, and bundling with complementary EE and distributed energy resource investments, such as electric vehicles and solar photovoltaic. The EE and PST platforms each have advantages and disadvantages in these areas, and an optimal approach for the State of Rhode Island should attempt to leverage the respective advantages of both programs.

(This response is identical to the Company's response to Division 16-2 in Docket No. 4770.)

Prepared by or under the supervision of: Mackay Miller

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4780
Responses to Division's Fifth Set of Data Requests
Issued January 3, 2018

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Division 1-2

Request:

For each benefit-cost analysis included in the rate case filing, please describe each methodology or assumption that is different from the methodologies and assumptions used by the Company when modeling the cost-effectiveness of its energy efficiency programs.

Response:

Wherever applicable and appropriate, the benefit-cost analysis (BCA) methodologies and assumptions relied upon for each of the investments proposed in the Company's Power Sector Transformation (PST) Plan are aligned with those used by the Company when modeling the cost-effectiveness of its energy efficiency programs. The methodologies and assumptions used for the PST BCAs that differ from those used by the Company when modeling the cost-effectiveness of energy efficiency programs in its 2018 Energy Efficiency Program Plan (EEP)[1] are as follows:

- **Cost test:** The cost-effectiveness of each PST investment was evaluated based primarily on a Societal Cost Test (SCT). For each PST investment, the Company also has included the results of a Rate Impact Measure (RIM) to present the monetary benefits to all customers relative to associated costs.[2] The benefits and costs included in the SCT and RIM are shown in Appendix 2.1 - Program BCA of the Company's Power Sector Transformation Plan.[3] The benefits and costs included in the SCT were those benefits and costs listed in Appendix B: Benefit-Cost Framework of the Docket 4600 Stakeholder Working Group Process, Report to the Public Utilities Commission (Stakeholder Report), which the Public Utilities Commission (PUC) incorporated into its Guidance on Goals, Principles and Values for Matters Involving The Narragansett Electric Company d/b/a National Grid (Docket 4600 Guidance Document),[4] and which represent net societal impacts resulting from utility investment that the Company was able to quantify and monetize based on available data and methods. The benefits and costs included in the RIM test were those benefits and costs listed in Appendix B of the Docket 4600

[1] The Narragansett Electric Company d/b/a National Grid, 2018 Energy Efficiency Program Plan (EEP) 8, Settlement of the Parties, RIPUC Docket No. 4755, November 1, 2017, Attachment 4– 2018 Rhode Island Test Description.
[2] *See* The Narragansett Electric Company d/b/a National Grid, Investigation as to the Propriety of the Proposed Tariff Changes, Rhode Island Public Utilities Commission, RIPUC Docket No. 4770, November 27, 2017, Schedule PST-1, Chapter 2 – 4600 Goals/Framework, at 5-6 (Bates Pages 36-37 of PST Book 1).
[3] *See Id*., Appendix 2.1 – Program BCA, at 4 (Bates Page 196 of PST Book 1).
[4] *See* Docket 4600 Stakeholder Working Group Process, Report to the Public Utilities Commission (Stakeholder Report), RIPUC Docket No. 4600, April 5, 2017, Appendix B: Benefit-Cost Framework; *see also* Report and Order No. 22851, RIPUC Docket No. 4600, at 23, 29 (July 31, 2017) (accepting the Stakeholder Report and adopting the Benefit-Cost Framework).

Prepared by or under the supervision of: Robert Sheridan

Guidance Document, which represent net monetary ratepayer impacts resulting from utility investment that the Company was able to quantify and monetize based on available data and methods.

The cost-effectiveness of the Company's energy efficiency programs are evaluated based on the Rhode Island Benefit Cost Test (RI Test), pursuant to the Least Cost Procurement Standards (Standards) for the procurement of energy efficiency resources.[5] The benefits and costs included in the RI Test for energy efficiency programs are listed in Attachment 4 – 2018 Rhode Island Test Description to the Company's 2018 EEP.[6] With the exception of economic development benefits, each benefit and cost listed in the RI Test Description for the Company's 2018 EEP aligns with a benefit or cost considered under the SCT that the Company to evaluate the proposed PST investments.[7] As described in Chapter 2 of the PST Plan[8], economic development benefits are not included in the SCT that the Company used to evaluate the proposed PST investments, but are included as qualitative benefits in Chapters 4 through 8 of the PST Plan as part of the overall business case for each proposed investment.

- **Discount rate:** The discount rate used to estimate the net present value of the costs and benefits associated with each PST investment is the Company's after-tax weighted average cost of capital (WACC). The discount rate used by the Company to evaluate energy efficiency programs for the Annual Energy Efficiency Plan for 2018 is the twelve-month average of the historic yields from a ten-year United States Treasury note, using the 2016 calendar year to determine the twelve-month average.[9] Please refer to the Company's response to Division 1-4 for more information on this difference.

- **Electric Transmission Capacity and Distribution Capacity Benefits/Avoided Transmission and Distribution Capacity Infrastructure:** Under the RI Test that the Company used to evaluate statewide energy efficiency programs, a statewide marginal cost of transmission and distribution capacity is calculated based on Company-specific historical and forecast incremental capital investments caused by load growth and is applied to summer demand reductions resulting from the energy efficiency measure. [10]

[5] *See* Rhode Island Energy Efficiency and Resource Management Council (EERMC) – Proposed Energy Efficiency Savings Targets for The Narragansett Electric Company d/b/a National Grid's Energy Efficiency and System Reliability Procurement for the Period 2018-2020, RIPUC Docket No. 4684, Least Cost Procurement Standards, , July 27, 2017, Section 1.2(B).
[6] *See* 2018 EEP, Settlement of the Parties, Attachment 4– 2018 Rhode Island Test Description, at 4-9.
[7] Under the SCT, which the Company used to evaluate the proposed PST investments, any water and sewer benefits resulting from the proposed investments would be a sub-category of Net Non-Energy Benefits; Natural gas benefits would be considered under Non-Electric Avoided Fuel Costs.
[8] *See* Investigation as to the Propriety of the Proposed Tariff Changes, Schedule PST-1, Chapter 2 – 4600 Goals/Framework, at 6 (Bates Page 37 of PST Book 1).
[9] *See* 2018 EEP, Settlement of the Parties, Attachment 4– 2018 Rhode Island Test Description, at 18.
[10] 2018 EEP, Settlement of the Parties, Attachment 4– 2018 Rhode Island Test Description, at 7-8.

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The methodology used to evaluate the proposed PST investments calculates avoided transmission and distribution capacity infrastructure benefits based on location-specific peak demand reductions valued at the marginal cost of distribution system infrastructure avoided or deferred by the project.[11] This methodology is included in the list of candidate methodologies for the distribution capacity costs benefit/cost category in Appendix B: Benefit-Cost Framework, which is incorporated into the Docket 4600 Guidance Document.[12]

- **Delivered Fuel Benefits/Non-Electric Avoided Fuel Cost:** The proposed Electric Heat Initiative BCA relies on the 2017 EIA Annual Energy Outlook forecasts[13] for oil and propane fuel price assumptions, while the Annual Energy Efficiency Plan for 2018 relies on oil and propane fuel price forecasts from the Avoided Energy Supply Costs in New England: 2015 Report.[14] The 2017 EIA forecast was chosen for evaluating the proposed Electric Heat Initiative investment to reflect the most recently modeled projections available at the time.

(This response is identical to the Company's response to Division 5-2 in Docket No. 4770.)

[11] The five proposed PST investments are not expected to result in load reduction impacts that avoid the need for incremental transmission or distribution infrastructure; therefore, these benefits are not included in the BCA results presented in Chapters 4 through 8 of the PST Plan.
[12] *See* Stakeholder Report, Appendix B: Benefit-Cost Framework.
[13] *See* U.S. Energy Information Administration, Annual Energy Outlook 2017, Table: Energy Prices by Sector and Source, New England Residential Energy Price Forecast, Reference Case.
[14] *See* Hornby, Rick et al., Avoided Energy Supply Costs in New England: 2015 Report, March 27, 2015, Revised April 3, 2015, Appendix D, Avoided Costs of Other Fuels.

Prepared by or under the supervision of: Robert Sheridan

SC 1-25

Request:

Referring to Chapter 6, Table 6-4 on page 132 and in consideration of the Massachusetts Special and Cross-Cutting Research Area: Low-Income Single Family Health-and Safety-Related Non-Energy Impacts (NEIs) Study:

a. In calculations for the benefit cost analysis (BCA) for 4780, did the Company include any non-energy impacts for heat pump installations in the homes of low-income single family homes? If not, why not?

b. If yes, how do the non-energy benefits for health and safety compare to the benefits established in the 2016 evaluation for Massachusetts energy efficiency program administrators conducted by Three Inc., and NMR Group.[1]

c. If the benefits in your BCA were different from those in the evaluation, please recalculate the BCA for low-income single family homes using the values in the evaluation. And please indicate the differences on BCA between your initial proposal and the new calculation isolating the low-income program without including costs and benefits associated with other elements of the Electric Heat Initiative.

Response:

a. Please refer to the Company's response to Division 8-19, a copy of which is provided as Attachment SC 1-25 for ease of reference. Consistent with the Rhode Island Benefit-Cost Framework adopted by the Public Utilities Commission in Docket No. 4600[2] (the Framework), two categories of non-energy benefits were included in the benefit-cost analysis (BCA): (i) Greenhouse Gas Externality Costs and (ii) Criteria Air Pollutant Costs and Other Environmental Costs.

b. As discussed in (a) above, the BCA did not include the full range of non-energy benefits included in the evaluation by Three Inc., and NMR Group.

c. Recalculating the BCA using the referenced Massachusetts study, which evaluated certain categories of non-energy benefits outside the scope of the Framework, would be inconsistent with the Power Sector Transformation filing. Accordingly, performing the requested recalculation will not produce meaningful results for this proceeding. The

[1] http://ma-eeac.org/wordpress/wp-content/uploads/Low-Income-Single-Family-Health-and-Safety-Related-Non-Energy-Impacts-Study.pdf.
[2] *See* Report and Order No. 22851 (July 31, 2017) in Docket No. 4600 at 29.

Framework provides the appropriate guidance on which benefits and costs to include in the BCA.

Division 8-19

Request:

Regarding the electric heat benefit-cost analysis:

a. Please identify all non-energy benefits included in the BCA for electric heat, including low-income non-energy benefits.

b. To what extent do non-energy benefits for electric heat align with the non-energy benefits included in the 2018 Energy Efficiency Plan for this type of measure?

Response:

a. Please refer to the Company's response to Division 1-2, included here as Attachment DIV 8-19 for ease of reference. Consistent with the Benefit-Cost Framework of the Docket 4600 Stakeholder Working Group Process,[1] all of the Power Sector Transformation (PST) Initiatives included two categories of non-energy benefits in the benefit-cost analysis (BCA): Greenhouse Gas (GHG) Externality Costs, and Criteria Air Pollutant Costs and Other Environmental Costs.

   In particular, the Company's response to Division 1-2 clarifies that the Docket 4600 Benefit-Cost Framework was the primary reference for the Electric Heat Initiative BCA:

   > "The benefits and costs included in the [Power Sector Transformation Societal Cost Test] SCT were those benefits and costs listed in Appendix B: Benefit-Cost Framework of the Docket 4600 Stakeholder Working Group Process, Report to the Public Utilities Commission (Stakeholder Report), which the Public Utilities Commission (PUC) incorporated into its Guidance on Goals, Principles and Values for Matters Involving The Narragansett Electric Company d/b/a National Grid (Docket 4600 Guidance Document), and which represent net societal impacts resulting from utility investment that the Company was able to quantify and monetize based on available data and methods."

b. Please refer to the Company's response to Division 1-2 regarding a thorough comparison of the Company's BCA methods in the PST Plan and the 2018 Energy Efficiency Plan.

(This response is identical to the Company's response to Division 25-19 in Docket No. 4770.)

[1] *See* Docket 4600 Stakeholder Working Group Process, Report to the Public Utilities Commission (Stakeholder Report), RIPUC Docket No. 4600, April 5, 2017, Appendix B: Benefit-Cost Framework; *see also* Report and Order No. 22851, RIPUC Docket No. 4600, at 23, 29 (July 31, 2017) (accepting the Stakeholder Report and adopting the Benefit-Cost Framework).

Prepared by or under the supervision of: Mackay Miller

Division 1-2

Request:

For each benefit-cost analysis included in the rate case filing, please describe each methodology or assumption that is different from the methodologies and assumptions used by the Company when modeling the cost-effectiveness of its energy efficiency programs.

Response:

Wherever applicable and appropriate, the benefit-cost analysis (BCA) methodologies and assumptions relied upon for each of the investments proposed in the Company's Power Sector Transformation (PST) Plan are aligned with those used by the Company when modeling the cost-effectiveness of its energy efficiency programs. The methodologies and assumptions used for the PST BCAs that differ from those used by the Company when modeling the cost-effectiveness of energy efficiency programs in its 2018 Energy Efficiency Program Plan (EEP)[1] are as follows:

- **Cost test:** The cost-effectiveness of each PST investment was evaluated based primarily on a Societal Cost Test (SCT). For each PST investment, the Company also has included the results of a Rate Impact Measure (RIM) to present the monetary benefits to all customers relative to associated costs.[2] The benefits and costs included in the SCT and RIM are shown in Appendix 2.1 - Program BCA of the Company's Power Sector Transformation Plan.[3] The benefits and costs included in the SCT were those benefits and costs listed in Appendix B: Benefit-Cost Framework of the Docket 4600 Stakeholder Working Group Process, Report to the Public Utilities Commission (Stakeholder Report), which the Public Utilities Commission (PUC) incorporated into its Guidance on Goals, Principles and Values for Matters Involving The Narragansett Electric Company d/b/a National Grid (Docket 4600 Guidance Document),[4] and which represent net societal impacts resulting from utility investment that the Company was able to quantify and monetize based on available data and methods. The benefits and costs included in the RIM test were those benefits and costs listed in Appendix B of the Docket 4600

[1] The Narragansett Electric Company d/b/a National Grid, 2018 Energy Efficiency Program Plan (EEP) 8, Settlement of the Parties, RIPUC Docket No. 4755, November 1, 2017, Attachment 4– 2018 Rhode Island Test Description.
[2] *See* The Narragansett Electric Company d/b/a National Grid, Investigation as to the Propriety of the Proposed Tariff Changes, Rhode Island Public Utilities Commission, RIPUC Docket No. 4770, November 27, 2017, Schedule PST-1, Chapter 2 – 4600 Goals/Framework, at 5-6 (Bates Pages 36-37 of PST Book 1).
[3] *See Id*., Appendix 2.1 – Program BCA, at 4 (Bates Page 196 of PST Book 1).
[4] *See* Docket 4600 Stakeholder Working Group Process, Report to the Public Utilities Commission (Stakeholder Report), RIPUC Docket No. 4600, April 5, 2017, Appendix B: Benefit-Cost Framework; *see also* Report and Order No. 22851, RIPUC Docket No. 4600, at 23, 29 (July 31, 2017) (accepting the Stakeholder Report and adopting the Benefit-Cost Framework).

Prepared by or under the supervision of: Robert Sheridan

Guidance Document, which represent net monetary ratepayer impacts resulting from utility investment that the Company was able to quantify and monetize based on available data and methods.

The cost-effectiveness of the Company's energy efficiency programs are evaluated based on the Rhode Island Benefit Cost Test (RI Test), pursuant to the Least Cost Procurement Standards (Standards) for the procurement of energy efficiency resources.[5] The benefits and costs included in the RI Test for energy efficiency programs are listed in Attachment 4 – 2018 Rhode Island Test Description to the Company's 2018 EEP.[6] With the exception of economic development benefits, each benefit and cost listed in the RI Test Description for the Company's 2018 EEP aligns with a benefit or cost considered under the SCT that the Company to evaluate the proposed PST investments.[7] As described in Chapter 2 of the PST Plan[8], economic development benefits are not included in the SCT that the Company used to evaluate the proposed PST investments, but are included as qualitative benefits in Chapters 4 through 8 of the PST Plan as part of the overall business case for each proposed investment.

- **Discount rate:** The discount rate used to estimate the net present value of the costs and benefits associated with each PST investment is the Company's after-tax weighted average cost of capital (WACC). The discount rate used by the Company to evaluate energy efficiency programs for the Annual Energy Efficiency Plan for 2018 is the twelve-month average of the historic yields from a ten-year United States Treasury note, using the 2016 calendar year to determine the twelve-month average.[9] Please refer to the Company's response to Division 1-4 for more information on this difference.

- **Electric Transmission Capacity and Distribution Capacity Benefits/Avoided Transmission and Distribution Capacity Infrastructure:** Under the RI Test that the Company used to evaluate statewide energy efficiency programs, a statewide marginal cost of transmission and distribution capacity is calculated based on Company-specific historical and forecast incremental capital investments caused by load growth and is applied to summer demand reductions resulting from the energy efficiency measure. [10]

[5] *See* Rhode Island Energy Efficiency and Resource Management Council (EERMC) – Proposed Energy Efficiency Savings Targets for The Narragansett Electric Company d/b/a National Grid's Energy Efficiency and System Reliability Procurement for the Period 2018-2020, RIPUC Docket No. 4684, Least Cost Procurement Standards, , July 27, 2017, Section 1.2(B).
[6] *See* 2018 EEP, Settlement of the Parties, Attachment 4– 2018 Rhode Island Test Description, at 4-9.
[7] Under the SCT, which the Company used to evaluate the proposed PST investments, any water and sewer benefits resulting from the proposed investments would be a sub-category of Net Non-Energy Benefits; Natural gas benefits would be considered under Non-Electric Avoided Fuel Costs.
[8] *See* Investigation as to the Propriety of the Proposed Tariff Changes, Schedule PST-1, Chapter 2 – 4600 Goals/Framework, at 6 (Bates Page 37 of PST Book 1).
[9] *See* 2018 EEP, Settlement of the Parties, Attachment 4– 2018 Rhode Island Test Description, at 18.
[10] 2018 EEP, Settlement of the Parties, Attachment 4– 2018 Rhode Island Test Description, at 7-8.

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The methodology used to evaluate the proposed PST investments calculates avoided transmission and distribution capacity infrastructure benefits based on location-specific peak demand reductions valued at the marginal cost of distribution system infrastructure avoided or deferred by the project.[11] This methodology is included in the list of candidate methodologies for the distribution capacity costs benefit/cost category in Appendix B: Benefit-Cost Framework, which is incorporated into the Docket 4600 Guidance Document.[12]

- **Delivered Fuel Benefits/Non-Electric Avoided Fuel Cost:** The proposed Electric Heat Initiative BCA relies on the 2017 EIA Annual Energy Outlook forecasts[13] for oil and propane fuel price assumptions, while the Annual Energy Efficiency Plan for 2018 relies on oil and propane fuel price forecasts from the Avoided Energy Supply Costs in New England: 2015 Report.[14] The 2017 EIA forecast was chosen for evaluating the proposed Electric Heat Initiative investment to reflect the most recently modeled projections available at the time.

(This response is identical to the Company's response to Division 5-2 in Docket No. 4770.)

[11] The five proposed PST investments are not expected to result in load reduction impacts that avoid the need for incremental transmission or distribution infrastructure; therefore, these benefits are not included in the BCA results presented in Chapters 4 through 8 of the PST Plan.
[12] *See* Stakeholder Report, Appendix B: Benefit-Cost Framework.
[13] *See* U.S. Energy Information Administration, Annual Energy Outlook 2017, Table: Energy Prices by Sector and Source, New England Residential Energy Price Forecast, Reference Case.
[14] *See* Hornby, Rick et al., Avoided Energy Supply Costs in New England: 2015 Report, March 27, 2015, Revised April 3, 2015, Appendix D, Avoided Costs of Other Fuels.

Prepared by or under the supervision of: Robert Sheridan

SC 1-26

Request:

Referring to Chapter 6, page 131, the Company is proposing to serve "approximately 220 customer conversions." The cost of outreach is $232,574, or $1,057 per customer conversion.[1] Can the Company explain the reasoning behind the proposed expenditure of $1,057 per customer conversion?

Response:

In addition to Schedule PST-1, Chapter 6 – Electric Heat (Bates Page 131 of PST Book 1), please refer to the Company's response to Division 5-12, a copy of which is provided as Attachment SC 1-26 for ease of reference, for an itemized budget for outreach by program.

The request above combines two different types of expenditures for outreach: (i) the estimated marketing cost for the Equipment Incentives program of $52, 574 over the three years of the Electric Heat Initiative and the estimated $180,000 in reimbursement of community outreach expenses over the three years of the Electric Heat Initiative. Dividing $52,574 by approximately 220 customer conversions produces an outreach cost per customer conversion of approximately $239 per customer, which should be compared to the estimated annual savings of $500 per year in heating costs and estimated lifetime savings of $7,500 in heating costs for the typical residential customer. As discussed in more detail below, an estimated $180,000 over the three years of the Electric Heat Initiative has been allocated to reimburse up to $20,000 per year to each of two communities (six communities in total) selected based on their ability to increase market awareness and drive heat pump adoption to be used to set and meet community heat conversion targets. Importantly, the purpose behind both types of expenditures is to help Rhode Island mature the renewable thermal market by accelerating efficient heat electrification in the state through multiple market development strategies.

The Electric Heat Initiative envisions pursuing Community-Based Outreach support and incentives as the central mechanism to build customer awareness around renewable thermal technologies. The initiative allocates $60,000 per year for community incentives, comprising the majority (approximately 77 percent) of expenditures for outreach for residential customer conversions. In addition, $52,574 is allocated for the Company to support marketing for Equipment Incentives.

The reasoning for proposing expenditures at this level is two-fold:

[1] $52,574 for Program Marketing of Equipment Incentives plus $180,000 for Community-Based Outreach.

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1) **First-of-its-kind.** This program of the Electric Heat Initiative will establish a first-of-its-kind community-based outreach mechanism for heat pumps in Rhode Island. Because this type of program is new, early startup expenses will be incurred, such as creating customized materials to support appropriate community outreach.

2) **Leveraging community engagement to achieve impact beyond the program.** The incentives paid to communities are envisioned as being used to support their outreach efforts around renewable thermal technologies. Therefore, these investments will have awareness impacts beyond just the individual customers adopting heat pumps, as well as beyond the initial startup phase of the program. For these reasons, community outreach efforts are expected to facilitate broader market transformation.

Division 5-12

Request:

Schedule PST-1, Chapter 6 – Electric Heat, page 9 of 15 features Table 6.2: Costs by Program.

a. Please provide table for each program that breaks out costs by year and in total for: i) program administration costs, ii) marketing costs, iii) customer incentive costs, iv) technical assistance costs, v) evaluation, measurement and verification costs, vi) participant costs, and vii) utility shareholder incentives.
b. Please provide a similar table for the electric heating efforts included in the 2018 Energy Efficiency Plan.

Response:

a. **Electric Heat Initiative.** An itemized breakdown of costs for the four programs is as follows:

| **GSHP Program** | **2019** | **2020** | **2021** | **Total** |
|---|---|---|---|---|
| Program Administration | **$** - | $ 27,115 | **$** - | $27,115 |
| Marketing | **$** - | $ 17,885 | **$** - | $17,885 |
| Technical Assistance + EM&V | **$** - | $ 50,000 | **$** - | $50,000 |
| Customer Incentives | **$** - | $ 500,000 | **$** - | $500,000 |
| ***Program Cost Subtotal*** | **$** - | **$ 595,000** | **$** - | **$ 595,000** |
| Participant Costs | **$** - | $ 465,000 | **$** - | $ 465,000 |
| ***Total*** | **$** - | **$ 1,060,000** | **$** - | **$ 1,060,000** |
| Approximate Max Utility Shareholder Incentive | $0 | $29,856 | $0 | **$ 29,856** |

| **Equipment Incentives** | **2019** | **2020** | **2021** | **Total** |
|---|---|---|---|---|
| Program Administration | $27,115 | $27,115 | $27,115 | $81,346 |
| Marketing | $17,525 | $17,525 | $17,525 | $52,574 |
| Technical Assistance + EM&V | $0 | $0 | $0 | $0 |
| Customer Incentives | $ 207,500 | $ 236,250 | $ 265,000 | $ 708,750 |
| ***Program Cost Subtotal*** | **$ 252,140** | **$ 280,890** | **$ 309,640** | **$ 842,670** |
| Participant Costs | $ 902,075 | $ 966,631 | $ 1,069,036 | $ 2,937,742 |
| ***Total*** | **$ 1,154,215** | **$ 1,247,521** | **$ 1,378,676** | **$ 3,780,412** |
| Approximate Max Utility Shareholder Incentive | $ 118,986 | $ 91,196 | $ 127,204 | **$ 337,386** |

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| **Community Based Outreach** | **2019** | **2020** | **2021** | **Total** |
|---|---|---|---|---|
| Program Administration | $27,115 | $27,115 | $27,115 | $81,346 |
| Marketing | $ - | $ - | $ - | $ - |
| Technical Assistance + EM&V | $8,385 | $8,385 | $8,385 | $25,154 |
| Customer Incentives (to Communities) | $60,000 | $60,000 | $60,000 | $180,000 |
| ***Program Cost Subtotal*** | **$ 95,500** | **$ 95,500** | **$ 95,500** | **$ 286,500** |
| Participant Costs | $ - | $ - | $ - | $ - |
| **Total** | **$ 95,500** | **$ 95,500** | **$ 95,500** | **$ 286,500** |
| Approximate Utility Shareholder Incentive (Max) | **$ -** | **$ -** | **$ -** | **$ -** |

| **Oil- and Propane-Dealer Training** | **2019** | **2020** | **2021** | **Total** |
|---|---|---|---|---|
| Program Administration | $27,115 | $27,115 | $27,115 | $81,346 |
| Marketing | $8,885 | $8,885 | $8,885 | $26,654 |
| Technical Assistance + EM&V | $25,000 | $25,000 | $25,000 | $75,000 |
| Customer Incentives | $ - | $ - | $ - | $ - |
| ***Program Cost Subtotal*** | **$ 61,000** | **$ 61,000** | **$ 61,000** | **$ 183,000** |
| Participant Costs | $ - | $ - | $ - | $ - |
| **Total** | **$ 61,000** | **$ 61,000** | **$ 61,000** | **$ 183,000** |
| Approximate Utility Shareholder Incentive (Max) | **$ -** | **$ -** | **$ -** | **$ -** |

b. **Energy Efficiency.** In the Company's annual Energy Efficiency Program Plan, the Company plans and reports administration, marketing, technical assistance, evaluation, measurement and verification costs at a program level. Many of the costs associated with these categories are shared across all the measures in a program and cannot be assigned on a per-measure basis. The utility shareholder incentive is calculated at the sector level, not the measure level.

In the Company's 2018 Energy Efficiency Procurement Plan (Docket No. 4755), electric heat pumps are included within the High-Efficiency Heating, Cooling and Hot Water (HVAC) program. The chart below is from Table E-2 of the Amended 2018 Energy Efficiency Program Plan – Revised Tables.

**ENERGY STAR® HVAC**

| | |
|---|---|
| Program Planning & Administration | $70,203 |
| Marketing | $108,511 |
| Sales, Technical Assistance & Training | $512,274 |
| Evaluation & Market Research | $20,690 |
| **Total** | **$711,678** |

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The Company does plan incentive costs at the measure level in this program. Below are the planned customer incentive costs for electrification of heating.

| **Measure** | **Customer Incentive** |
|---|---|
| Heat Pump – Oil Electrification (early replacement) | $4,000 |
| Heat Pump – Oil Electrification (replace on failure) | $3,000 |
| Heat Pump – Electric Resistance (early replacement) | $4,000 |

(This response is identical to the Company's response to Division 16-12 in Docket No. 4770.)

Prepared by or under the supervision of: Mackay Miller

SC 1-27

Request:

Referring to Chapter 6, page 123, Company indicates the Electric Heat Initiative is targeted to oil heat customers, and in response to Division 5-4, the Company similarly stated: "All systems would replace or displace oil heat." However, during the February 20, 2018 technical session the Company appeared to indicate that consumers with propane or electric resistance heat would be eligible to participate in the Electric Heat Initiative. And in response to Division 5-5, the Company stated that it will collaborate with EE program strategy and program management on a targeted marketing initiative for customers who have completed weatherization through the EnergyWise Home Energy Assessment program, and who likely use oil, propane, or electric resistance heat.

a. Are electric resistance customers eligible to participate in the Electric Heat Initiative?

b. Are propane customers eligible to participate in the Electric Heat Initiative?

c. Will the EHI serve New Construction?

d. Will the EHI serve small- or large Commercial & Industrial customers?

Response:

a. Electric resistance, fuel oil, and propane customers will be eligible to participate in the Equipment Incentives and Community-Based Outreach programs of the Electric Heat Initiative. The Ground Source Heat Pump program has been designed for one large or commercial or institutional building that currently heats with oil. The Oil/Propane Dealer Programs have been designed for oil and propane dealers. For simplicity, the Societal Cost Test ratio of the initiative was calculated as if all conversions were from fuel oil heating systems.

b. Yes, refer to the response to part a., above.

c. Yes, the Electric Heat Initiative will be available to new construction, both through the Equipment Incentives program as well as the Ground Source Heat Pump program, provided the new construction is within the parameters of those programs.

d. The Ground Source Heat Pump program has been designed to serve an eligible large commercial or institutional customer. The Equipment Incentives program has been designed to serve eligible residential customers. This initial launch of the Electric Heat

Initiative does not contain a program designed for small commercial and industrial customers.

SC 1-28

Request:

Referring to Chapter 6, page 131, the Company states that for market rate, it will offer a 20 percent rebate, and for low-income, a 100 percent rebate. Please describe the basis for the Company's proposed 20 percent rebate value for market rate.

Response:

The incentive values proposed for market rate customers were based on research into the level of incentives offered in states across the Northeast region. Please also refer to Schedule PST-1, Chapter 6 – Electric Heat, Page 11 of 15 (Bates Page 131 of PST Book 1) and to response to Division 5-13, a copy of which is provided as Attachment SC 1-28. The incentive levels described in the Electric Heat Initiative are illustrative. Precise incentive levels will be harmonized with the energy efficiency program, and both will be adjusted periodically to reflect prevailing market prices for heat pump technology and installation costs.

Prepared by or under the supervision of: Mackay Miller

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4780
Responses to Division's Fifth Set of Data Requests
Issued January 25, 2018

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Division 5-13

Request:

Schedule PST-1, Chapter 6 – Electric Heat, page 11 of 15 states, "For market-rate customers, incentive levels will be approximately 20% of the all-in cost of heating capacity".

a. What are the participant costs by measure for market-rate customers?
b. Will market-rate customers be able to finance these costs?
c. If so, which financing mechanisms are available to these customers?

Response:

a. As stated in Schedule PST-1, Chapter 6 – Electric Heat, page 11 of 15 (Bates Page 131, PST Book 1 of 3), precise incentive levels will be harmonized with the Energy Efficiency Program, and both will be adjusted periodically to reflect prevailing market prices for heat pump technology and installation costs. For the Electric Heat Initiative cost effectiveness test, the incentive amounts and corresponding participant costs, by measure type, are as follows:

| Measure | Total measure cost | Incentive | Participant cost | Participant share | Incentive share |
|---|---|---|---|---|---|
| **ASHP 3 ton** | $9,600 | $1,500 | $8,100 | 84% | 16% |
| **ASHP 5 ton** | $16,905 | $2,500 | $14,405 | 85% | 15% |
| **GSHP Horizontal Loop 4 ton** | $31,953 | $3,000 | $28,953 | 91% | 9% |

b. The Company has not performed a comprehensive survey of financing options available to Customers for heat pump installation. The 2017 RI Renewable Thermal Market Development Strategy (See Attachment DIV 5-11) identifies lack of financing options as one of the key market barriers to the growth of the renewable thermal market.

c. See the response to part (b), above. While the Company does not currently offer the Heat Loan program for these measures, as empirical data on the performance of heat pump technologies grows, the inclusion of heat pumps in public, private, or hybrid financing programs will become more feasible.

(This response is identical to the Company's response to Division 16-13 in Docket No. 4770.)

Prepared by or under the supervision of: Mackay Miller

SC 1-29

Request:

Referring to Chapter 6, page 131, $183,000 is allocated for Oil/Propane Dealer Training over three years.

a. Is there a commitment to continue a robust heat pump program afterwards?

b. Is it expected that Oil Heat Dealers will install heat pumps through this initiative subsequent to training? If so, how will this be ensured?

c. What is the timeline for this process?

d. What will the trainings entail?

Response:

a. At the end of the three-year period, the Company will work with stakeholders to evaluate the success of the Electric Heat Initiative and its component programs and, following that process, will make an appropriate determination of further offerings.

b. Although contractor selection is ultimately up to the customer, it is expected that oil and propane dealers participating in the training program will install heat pumps through the Equipment Incentives program. Upon satisfactory completion of the training, participating dealers will become verified installers and eligible for an additional incentive for each heat pump conversion they complete, thus encouraging them to become active in marketing and installing heat pump technology for appropriate customers.

c. The precise timeline of this process has not yet been determined. The Company envisions putting it in place shortly after Public Utilities Commission approval of the Power Sector Transformation Plan.

d. The training to support workforce development for oil and propane dealers will include, but will not be limited to, the following:

- Best practices for sizing, installation, and customer education;
- Alignment with the energy efficiency HVAC "AC Check Contractor Training"; and
- Marketing of complementary energy efficiency measures.

Prepared by or under the supervision of: Mackay Miller

SC 1-30

Request:

Referring to Chapter 6, what standards and quality control measures does the Company intend to implement to ensure that the heat pumps are properly installed and configured to optimize customer benefits?

Response:

Please refer to the Company's response to Division 5-7, a copy of which is provided as Attachment SC 1-30. The approach to standards and quality control will be the same approach currently employed in the Rhode Island Energy Efficiency "AC Check Contractor Training". Customers who elect an AC Check-trained and participating contractor may be eligible for an additional rebate.

Prepared by or under the supervision of: Mackay Miller

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4780
Responses to Division's Fifth Set of Data Requests
Issued January 25, 2018

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Division 5-7

Request:

Schedule PST-1, Chapter 6 – Electric Heat, page 4 of 15 states: "National grid staff will also participate in installer selection discussions to provide feedback and support evaluation of responses; however, it is expected that the ultimate selection of installer(s) will be determined by a community selection committee."

a. Who bears the risks if there are issues with specific contractors (i.e., customers, the community selection committee, the Company)?
b. What is the process for resolving any contractor issues that customers experience? Please explain the roles and responsibilities of each of the key parties (i.e., customers, the community selection committee, the Company)?
c. The 2018 Energy Efficiency Plan also includes Community-Based Initiatives. Please explain the similarities and differences between the contractor management process in the Community-Based Outreach program within the Electric Heat Initiative and in the Community-Based Initiatives within the 2018 Energy Efficiency Plan. Please provide the rationale behind any differences.

Response:

a. The *Community-Based Outreach* program is limited in scope to supporting enhanced outreach by participating municipalities in support of the *Equipment Incentive* program, and as such does not constitute a Company or municipal endorsement, guarantee, or warranty of any particular contractor, manufacturer or product installation.

   The contractor selection program will be similar to the list of HVAC "Quality Installation Verification" contractors and to the list of insulation and air sealing contractors made available through the EnergyWise Home Energy Assessment Program. Customers reached by the *Community-Based Outreach* program may elect to receive an incentive through the the *Equipment Incentive* program, in which case they will fill out an application, which contain Terms and Conditions that indemnify the Company and the rebate administrator from issues with specific contractors. Attachment Division 5-7 provides an example of the indemnification language.

   In the Ground-Source Heat Pump program, in which the Company owns the ground heat exchanger, the Company will bear the risk for that portion of the asset, while the Customer will bear the risk of the customer-owned portion.

Prepared by or under the supervision of: Mackay Miller

b. Attachment Division 5-7 contains the Terms and Conditions of similar energy efficiency rebate programs. Relevant language is found in the Limitation of Liability clause:

> "**Limitation of Liability—**National Grid and the rebate administrator's liability is limited to paying the rebate specified. National Grid and the rebate administrator are not liable for: (1) the quality, safety, and/or installation of the equipment, including its fitness for any purpose; (2) the estimated energy savings of the equipment; (3) the workmanship of the installation contractor; and (4) any consequential or incidental damages or for any damages in tort connected with or resulting from participation in these offers."

c. The two initiatives are similar in intent, in the nature of the collaboration between the Company and the participating communities, in contractor management process, and in the structure of the incentives.

   The main differences are in technologies offered. The 2018 Energy Efficiency (EE) Procurement Plan Community-Based Initiatives does not currently envision featuring electric heat pumps, so the learnings from the Electric Heat Initiative *Community-Based Outreach* program will provide insights into whether and how to incorporate heat pumps into subsequent years of the EE Community-Based Initiatives. Similarly, learnings from the 2018 EE Community-Based Initiatives will inform the design and delivery of the Community-Based Outreach program of the Electric Heat Initiative.

(This response is identical to the Company's response to Division 16-7 in Docket No. 4770.)

Prepared by or under the supervision of: Mackay Miller

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HERE WITH YOU. HERE FOR YOU.

**2018 Rhode Island**

# Residential electric heating and cooling rebates

Save energy and money, improve comfort, and make your home better with these energy savings offers for residential electric customers.

- **Central Air Conditioning Systems**
- **Central Heat Pumps**
- **Mini-Split Heat Pumps**
- **Wi-Fi Enabled Thermostats**

These programs are funded by the energy efficiency charge on all customers' utility bills, in accordance with Rhode Island law.

**1-800-473-1105 | www.ngrid.com/ri-electricheatingcooling**

## Rhode Island Residential Electric Heating & Cooling Rebate Application 2018

National Grid offers rebates of up to $500 for energy efficient central air conditioning systems, central heat pumps, and mini-split heat pumps. A licensed contractor must install the equipment in order to qualify for rebates (with the exception of Wi-Fi thermostats, which may be self-installed by the customer). Only qualifying equipment models are eligible. See qualifying equipment and rebate amounts below.

| REBATES (check all that apply) | # OF UNITS | QUALIFYING PRODUCTS | SEER[1] | EER[2] | HSPF[3] |
|---|---|---|---|---|---|
| ☐ $250 | | Central Heat Pump | ≥16 | N/A | ≥8.5 |
| ☐ $500 | | Central Heat Pump | ≥18 | N/A | ≥9.6 |
| ☐ $100 per indoor unit | | Mini-Split Heat Pump* | ≥18 | N/A | ≥10 |
| ☐ $300 per indoor unit | | Mini-Split Heat Pump* | ≥20 | N/A | ≥12 |
| ☐ $250 | | Central Air Conditioning | **≥16** | ≥13 | **N/A** |
| *Mini-split heat pump units that only provide cooling are not eligible. [1]SEER–Seasonal Energy Efficiency Ratio. [2]EER–Energy Efficiency Ratio is a measure of instantaneous cooling efficiency. [3]HSPF–Heating Seasonal Performance Factor is a ratio of a central heat pump's heat output to electricity use over an average heating season. Rounding up of SEER/EER ratings is not acceptable. | | | | | |
| ☐ Up to $75/each | | Wi-Fi Enabled Thermostat** | | | |
| **Limit two Wi-Fi enabled thermostats per account. Rebate amount cannot exceed purchase price. | | | | | |

## TO APPLY:

1. Verify that the equipment you will be purchasing qualifies for a rebate by consulting with a licensed contractor. Qualifying equipment is noted above.
2. Purchase the qualified equipment and have a licensed contractor install it. The equipment must be installed at a property with an active National Grid residential electric account.
3. Obtain an invoice from your contractor. The invoice must contain the following information: equipment make, coil and condenser model numbers, size in tons, date and location of installation, total installation cost, and contractor's name and address. It must indicate "paid in full" or "zero balance."
4. Save time and apply online at **www.rebatesee.com/nationalgridri**. Or, mail the following items:
   - This application, completed accurately and legibly.
   - A dated invoice from your contractor providing the information listed above in step 3.
   - Copy of your most recent National Grid electric bill.
   - Copy of the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) certificate. Visit **www.ahridirectory.org** or contact your contractor to obtain a copy.

Mail to: RI Residential Electric Heating & Cooling Program
Offer # 17-28373
P.O. Box 540064
El Paso, TX 88554-0064

Rebate form and required documentation must be **postmarked or submitted online within 60 days of equipment installation date**, or by January 31, 2019, whichever comes first.

**IMPORTANT:** Photocopy your entire submission for your records. You could be required to mail these photocopies. Offer valid on equipment purchased and installed between January 1, 2018 amd December 31, 2018 (subject to funding availability.) From the time the application is processed and approved, please allow 6–8 weeks for payment. Payment processing will take longer if information or documentation are missing from the application. To review the status of your application, please contact us at 1-877-711-3013 or visit **www.rebatesee.com/#/tracker**.

**1-800-473-1105 | www.ngrid.com/ri-electricheatingcooling**

EE5139 (1/18) RI Residential Electric Heating & Cooling

# Rhode Island Residential Electric Heating & Cooling Rebate Application 2018

Form must be completed in its entirety.

Rebates are available to eligible residential electric customers only. One electric account number per form. Some restrictions may apply. Rebate offers are subject to change without notice. Please review terms and conditions. Form must be completed in its entirety.

Submit online at **www.rebatesee.com/nationalgridri**
or mail completed form with all required documents to:
**RI Residential Electric Heating & Cooling Program**
**Offer # 17-28373**
**P.O. Box 540064**
**El Paso, TX 88554-0064w**

Please make sure your invoice includes:

- Equipment installed
- Quantity installed
- Installer name and address
- Equipment & installation costs
- Model number of indoor and outdoor equipment
- Manufacturer
- "Paid in full" or "zero balance"
- Installation date & location
- Size in tons

## CUSTOMER/ACCOUNT HOLDER INFORMATION — FORM MUST BE COMPLETED IN ITS ENTIRETY.

ELECTRIC ACCOUNT NUMBER AT INSTALLATION ADDRESS

ACCOUNT HOLDER FIRST NAME | ACCOUNT HOLDER LAST NAME

INSTALL ADDRESS | CITY | STATE **RI** | ZIP

EMAIL ADDRESS | PHONE

## PAYEE INFORMATION — ADDITIONAL PROCESSING TIME MAY BE REQUIRED IF ACCOUNT HOLDER IS DIFFERENT THAN PAYEE NAME.

PAYEE FIRST NAME/COMPANY NAME (if different than above) | PAYEE LAST NAME

MAILING ADDRESS (if different than above) | CITY | STATE | ZIP

EMAIL ADDRESS | PHONE

HOW DID YOU HEAR ABOUT THIS PROGRAM? (Select the appropriate ballot box.)

☐ Plumber or Contractor ☐ Energy Assessment ☐ Equipment Supplier ☐ Trade Show ☐ Sales Rep/Account Executive
☐ Print Advertising ☐ Internet ☐ Radio/TV ☐ Direct Mail/E-mail ☐ Other _____
☐ Home Energy Report ☐ Rhode Island Energy Challenge: Find Your Four!

## CONTRACTOR INFORMATION — THIS INFORMATION MUST ALSO APPEAR ON THE CONTRACTOR INVOICE.

CONTRACTOR COMPANY NAME | CONTACT NAME

STREET ADDRESS | CITY | STATE | ZIP

EMAIL ADDRESS | PHONE

**CUSTOMER: Please sign the Work Completion and Rebate Validation section.**
**It is required to validate your rebate submission.**

**1-800-473-1105 | www.ngrid.com/ri-electricheatingcooling**

EE5139 (1/18) RI Residential Electric Heating & Cooling

# Rhode Island Residential Electric Heating & Cooling Rebate Application 2018

Form must be completed in its entirety.

## NEW EQUIPMENT INSTALLED

☐ New construction ☐ Replacement system ☐ Adding cooling to existing ductwork
☐ New or additional ductwork and air conditioning ☐ Replacing failed equipment

### ELECTRIC HEATING & COOLING EQUIPMENT

| EQUIPMENT | DATE INSTALLED (MM/DD/YYYY) | AHRI* REFERENCE NUMBER | WAS AN A/C CHECK TEST PERFORMED? |
|---|---|---|---|
| ☐ Central Air Conditioning<br>☐ Central Heat Pump<br>☐ Mini-Split Heat Pump | | | ☐ Yes ☐ No ☐ Pending |
| ☐ Central Air Conditioning<br>☐ Central Heat Pump<br>☐ Mini-Split Heat Pump | | | ☐ Yes ☐ No ☐ Pending |
| ☐ Central Air Conditioning<br>☐ Central Heat Pump<br>☐ Mini-Split Heat Pump | | | ☐ Yes ☐ No ☐ Pending |

*AHRI = Air-Conditioning, Heating, and Refrigeration Institute

Was the previous system operational at the time of replacement? ☐ Yes ☐ No

### REPLACEMENT THERMOSTATS

| EQUIPMENT | DATE INSTALLED (MM/DD/YYYY) | MANUFACTURER | MODEL NUMBER | INSTALLED/ PURCHASE COST | QUANTITY | REBATE AMOUNT | TOTAL REBATE |
|---|---|---|---|---|---|---|---|
| **Wi-Fi Enabled Thermostat** | | | | $ | ☐ 1 ☐ 2 | up to $75 each | $ |

Installation Completed By: ☐ Contractor ☐ Customer Does your home have central air conditioning? ☐ Yes ☐ No

**Limit two Wi-Fi enabled thermostats per account. Rebate amount cannot exceed purchase price.

## WORK COMPLETION AND REBATE VALIDATION

I hereby request a rebate for the listed work. Attached are copies of all receipts. I certify that all information above is correct to the best of my knowledge and that I have read and agree to all Terms and Conditions of this rebate. I certify that a licensed contractor has installed the listed energy efficient equipment in accordance with Program Guidelines and Terms and Conditions as described on this form. This rebate is for the benefit of Rhode Island residential electric customers of National Grid. This rebate may not be combined with any other utility or energy efficiency service provider offer and may be subject to change without notice. I understand that some restrictions may apply. National Grid reserves the right to conduct field inspections to verify installations.

| DATE | NAME (PRINT) | CUSTOMER SIGNATURE |
|---|---|---|
| | | X |

**1-800-473-1105 | www.ngrid.com/ri-electricheatingcooling**

EE5139 (1/18) RI Residential Electric Heating & Cooling

Rhode Island Residential Electric Heating & Cooling 2018

## TERMS AND CONDITIONS

**ENERGY STAR® Equipment Requirements**

1. **System Requirements—** All rebated central air conditioning (A/C) units/systems, central heat pumps, and mini-split heat pumps must be ENERGY STAR® certified; listed with and certified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI) ; and meet the program SEER, EER and HSPF requirements (see table on page 2). The A/C condenser and the evaporative coil must be new and replaced together. The condenser and coil are separate components in a split A/C or central heat pump system, but for rebate purposes, are considered one unit. For mini-split heat pumps, for rebate purposes, the unit consists of outdoor condenser and indoor unit(s). All units must have a thermostatic expansion valve (TXV) or electronic expansion valve (EXV) to qualify for rebate.
2. **Sizing—** Load calculation requires proper design temperatures for area. Unit installed must be within ½1/2 ton of calculation.
3. **Proof of Purchase—** A copy of the customer's invoice itemizing the purchased equipment must accompany the rebate form. The invoice must indicate the equipment type, size, make, model, name of purchaser, installation date and location, date of purchase and total installed cost.
4. **Information Sources to Verify ENERGY STAR Equipment—** EER, SEER and HSPF ratings (HSPF ratings are for central heat pumps only) for condenser, evaporator and air handler (if applicable) must be provided. The AHRI directory web site at **www.ahridirectory.org** lists SEER and EER values; if you do not have internet access, please call 1-703-600-0384. AHRI also provides AHRI numbers. Manufacturer's spec sheets may be accepted ONLY if equipment is not yet AHRI rated and ONLY if AHRI listing is pending.

**General Requirements**

1. **Time Limit—** Qualifying units for equipment rebate must be purchased and installed between **January 1, 2018** and **December 31, 2018**. Rebate form and required documentation must be postmarked or submitted online within 60 days of equipment installation date or by January 31, 2018, whichever comes first. Program is subject to change without prior notice, including rebate levels.
2. **Geographic Requirements—** Offers valid only for residential electric customers in Rhode Island.
3. **Application Form—** This application must be filled out completely, truthfully, and accurately. The customer must date and submit the completed application along with all required documentation for specific rebates. By submitting the rebate application, the customer agrees to abide by these Terms and Conditions.
4. **Payments—** From the time the application is processed and approved, please allow 6–8 weeks for payment. Payment processing will take longer if information or documentation are missing from the application. If payee information is different from account holder information, additional processing time will be needed for payee verification.
5. **Approval and Verification—** National Grid reserves the right to verify and to have reasonable access to the residence to inspect the electric heating and cooling system installed prior to issuing rebates.
6. **Tax Liability—** National Grid will not be responsible for any tax liability that may be imposed on the customer or contractor as a result of the payment of rebates.
7. **Endorsement—** National Grid does not endorse any particular contractor, manufacturer, dealer, materials, product, system design or technology in promoting these offers.
8. **Warranties—** NATIONAL GRID DOES NOT GUARANTEE THE PERFORMANCE OF INSTALLED EQUIPMENT EXPRESSLY OR IMPLICITLY. National Grid makes no warranties or representations of any kind, whether statutory, expressed, or implied, including, without limitations, warranties or merchantability or fitness for a particular purpose regarding the electric heating and cooling equipment or services provided by a manufacturer or vendor. Contact your contractor for details regarding equipment performance and warranties.
9. **Limitation of Liability—** National Grid and the rebate administrator's liability is limited to paying the rebate specified. National Grid and the rebate administrator are not liable for: (1) the quality, safety, and/or installation of the equipment, including its fitness for any purpose; (2) the estimated energy savings of the equipment; (3) the workmanship of the installation contractor; and (4) any consequential or incidental damages or for any damages in tort connected with or resulting from participation in these offers.
10. **Contractor Certification—** Contractor certifies that installation and services performed have been in accordance with all applicable municipal, state and federal codes, standards and regulations, as well as program requirements.
11. **Wi-Fi Thermostats—** Wi-Fi thermostats need to be connected to a Wi-Fi network. Limit two per household. Must provide receipt as proof of purchase.
12. **Payments Assignable to a Third Party—** (a) The Customer may request that the rebate be paid directly to a third party by so indicating on the rebate application. Notification of third-party payment will be sent to the Customer upon submission of the rebate application for the purpose of Customer confirmation. (b) If no payment choice is made, the Company will send the rebate payment directly to the Customer at the address indicated in the rebate application.
13. **ISO-NE Capacity Payments or Environmental Credits—** Customer agrees that the Energy Efficiency Program Provider (EEPP) has the unilateral right to apply for any ISO-NE capacity payments or environmental credits resulting from this energy efficiency project, and agrees not to file for such payments or credits either directly or indirectly. Contractors agree to provide the EEPP with such further documentation as the EEPP may request to confirm the EEPP's ownership of such benefits."

**1-800-473-1105 | www.ngrid.com/ri-electricheatingcooling**

EE5139 (1/18) RI Residential Electric Heating & Cooling

SC 1-31

Request:

Referring to Appendix 2.1, which shows an assumption of reduced electric load and a benefit of reduced Forward Capacity Market costs, please describe any benefits particular to electric resistance heat customers.

Response:

Significant reduction in electric heating load is the one benefit particular to electric resistance customers. Other benefits are not unique to electric resistance customers. For example, electric resistance customer conversions are expected to achieve the same reductions in summer electric load relative to other (fuel oil and propane) customers, due to the common assumption that all customers would have otherwise installed air conditioning. The avoided Forward Capacity Market costs are driven by peak summer demand reductions and, as a result, would be consistent for electric resistance and other (fuel oil and propane) customers.

Prepared by or under the supervision of: Mackay Miller

SC 1-32

Request:

Referring to Chapter 6, page 132, Table 6-4, what is the dollar value for Avoided GHG reduction per ton?

Response:

The value of avoided greenhouse gas reduction is $100 per short ton $CO_2$, consistent with the value used across the Power Sector Transformation programs, and consistent with the recommendation of the 2015 Avoided Energy Supply Cost study.

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SC 1-33

Request:

Referring to Attachment 5-4-1 to Division-5 (page 15), Benefit Cost Ratios (BCRs) increase without dealer training and community outreach. The EHI as proposed would have a BCR of 1.12. Please indicate what the BCR's would be in the following scenarios:

a. Heat pump incentives are offered to oil customers and the ground-source heat pump program is taken out.

b. Heat pump incentives are offered to oil customers and the Oil Heat Dealer Training program is taken out.

c. Heat pump incentives are offered to oil customers and the Community Outreach program is taken out.

d. Heat pump incentives are offered to oil customers and the ground-source heat pump program, Oil Heat Dealer Training program, and Community Outreach program are all taken out.

e. Heat pump incentives are offered to electric resistance customers and the ground-source heat pump program is taken out.

f. Heat pump incentives are offered to electric resistance customers and the Oil Heat Dealer Training program is taken out.

g. Heat pump incentives are offered to electric resistance customers and the Community Outreach program is taken out.

h. Heat pump incentives are offered to electric resistance customers and the ground-source heat pump program, Oil Heat Dealer Training program, and Community Outreach program are all taken out.

Response:

a. Please refer to the Company's response to Division 5-4 and Attachment DIV 5-4-1, copies of which are provided here as Attachment SC 1-33. The Societal Cost Test (SCT) ratios generated for that response can be applied to each of the questions above.

Specifically, all SCT ratios in Attachment SC 1-33 clarify the specific cost-effectiveness of various heating system replacement scenarios by only including costs and benefits

unique to the particular heating system replacement scenario, and removing all costs and benefits not directly related to the replacement scenario under consideration. For example, each of the SCT ratios in "Scenario Family 1" zeroes in on the respective cost effectiveness of a specific market-rate residential heating system permutation contemplated by the Equipment Incentives program, and strips out the costs and benefits associated with extraneous program elements (Income-eligible Equipment Incentives, Ground-Source Heat Pump Program, Oil/Propane Dealer Training, and Community-Based Outreach).

The 28 SCT ratios in Attachment SC 1-33 can be viewed as targeted estimates of the cost-effectiveness of specific conversion types supported by the Equipment Incentives and Ground-Source Heat Pump programs.

All of these SCT estimates would be lower with the inclusion of the costs of the Community-Based Outreach and Oil- and Propane-Dealer Training programs ($286,500 and $183,000 over the three years, respectively). Because these two programs incur costs but do not generate direct, quantifiable benefits on their own, re-inserting their costs into the net benefits reported in Attachment SC 1-33 would reduce the SCT ratio of all permutations described.

b. Please refer to the response to part a. above.

c. Please refer to the response to part a. above.

d. Please refer to the response to part a. above.

e. Please refer to the response to part a. above.

f. Please refer to the response to part a. above.

g. Please refer to the response to part a. above.

h. Please refer to the response to part a. above.

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The Narragansett Electric Company
d/b/a National Grid
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Division 5-4

Request:

Schedule PST-1, Chapter 6 – Electric Heat, page 3 of 15 states: "In the EE Program, rebates are available only to market-rate customers. In contrast, approximately 50% of the Electric Heat Initiative equipment incentive budget will be set aside for Income Eligible customers."

a. Please provide the number of heat pump installations per year and in total for all future years the Company can provide projections by:
   i. program (i.e., GSHP, Equipment Incentives, and Community-Based Incentives);
   ii. sector (i.e., commercial, residential market-rate, residential single-family income eligible);
   iii. base heat fuel type (i.e., electric resistance and oil);
   iv. base cooling; and,
   v. measure type (i.e., air- vs. ground-source and replace-on-failure vs. early retirement).

b. Please provide the average incentive per year and in total for all future years the Company can provide projections by:
   i. program (i.e., GSHP, Equipment Incentives, and Community-Based Incentives);
   ii. sector (i.e., commercial, residential market-rate and residential income eligible);
   iii. base heat fuel type (i.e., electric resistance and oil);
   iv. base cooling; and,
   v. measure type (i.e., air- vs. ground-source and replace-on-failure vs. early retirement).

c. Please provide the total incentive costs per year and in total for all future years the Company can provide projections by:
   i. program (i.e., GSHP, Equipment Incentives, and Community-Based Incentives);
   ii. sector (i.e., commercial, residential market-rate and residential income eligible);
   iii. base heat fuel type (i.e., electric resistance and oil);
   iv. base cooling; and,
   v. measure type (i.e., air- vs. ground-source and replace-on-failure vs. early retirement).

d. Please provide the total benefits per year and in total for all future years the Company can provide projections by:
   i. program (i.e., GSHP, Equipment Incentives, and Community-Based Incentives);
   ii. sector (i.e., commercial, residential market-rate and residential income eligible);
   iii. base heat fuel type (i.e., electric resistance and oil);

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iv. base cooling; and,
v. measure type (i.e., air- vs. ground-source and replace-on-failure vs. early retirement).

e. Please provide the cost effectiveness ratio per year and in total for all future years the Company can provide projections by:
i. program (i.e., GSHP, Equipment Incentives, and Community-Based Incentives);
ii. sector (i.e., commercial, residential market-rate and residential income eligible);
iii. base heat fuel type (i.e., electric resistance and oil);
iv. base cooling; and,
v. measure type (i.e., air- vs. ground-source and replace-on-failure vs. early retirement).

f. Please provide the carbon reductions in short tons per year and in total for all future years the Company can provide projections by:
i. program (i.e., GSHP, Equipment Incentives, and Community-Based Incentives);
ii. sector (i.e., commercial, residential market-rate and residential income eligible);
iii. base heat fuel type (i.e., electric resistance and oil);
iv. base cooling; and,
v. measure type (i.e., air- vs. ground-source and replace-on-failure vs. early retirement).

g. How many Income Eligible customers exist in the Company's territory?

h. Please provide the number and percent of Income Eligible customers by heating fuel type.

i. How did the Company determine that a set aside of 50% of the equipment incentive budget for Income Eligible customers was most appropriate? What proportion of this budget will be allocated to single family versus multi-family properties?

j. Did the Company examine any other equipment incentive breakouts for Income Eligible and market-rate customers?

k. If so, why didn't the Company propose any of these breakouts? Please provide the Company's rationale separately for each breakout it examined.

Response:

a. (i) through (v) The Company prepared three years of projections for the Electric Heat Initiative, included in the PST BCA submitted in the Company's response to Division

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1-1. The projections can be found in tab *12.EH – Inputs, cells D365:H377* in Attachment DIV 1-1-3 and are copied below.

| | 2019 | 2020 | 2021 | Total |
|---|---|---|---|---|
| **GROUND SOURCE HEAT PUMP PROGRAM** | | | | |
| Commercial / Large Building | 0 | 1 | 0 | 1 |
| **Total** | **0** | **1** | **0** | **1** |
| | | | | |
| **EQUIPMENT INCENTIVES PROGRAM** | **2019** | **2020** | **2021** | **Total** |
| **Residential - Income Eligible** | | | | |
| Air-Source Heat Pumps (ASHPs) | 5 | 6 | 6 | 17 |
| Ground-Source Heat Pumps (GSHPs) | 1 | 1 | 2 | 4 |
| Sub-total | **6** | **7** | **8** | **21** |
| **Residential - Market Rate** | | | | |
| ASHP | 34 | 39 | 44 | 117 |
| GSHP | 17 | 19 | 22 | 58 |
| **Sub-total** | **51** | **58** | **66** | **175** |
| **Total Residential** | **57** | **65** | **74** | **196** |

These projections are illustrative, and actual adoption will vary based on market appetite. Regarding question 5-4(a) (iii-v), the Electric Heat Initiative BCA as filed makes the following assumptions:

- All systems in the program replace or displace oil-based heat.
- All systems are assumed to avoid the purchase of $500 worth of standard efficiency window air conditioning units. In practice, some adoption would likely avoid the purchase of a more expensive central air conditioning system, which would increase the participant DER cost benefits.
- All air-source heat pump (ASHP) systems are assumed to be partial conversions. In other words, the existing heating system remains in place for peak loads, and the ASHP would displace 80% of annual heating fuel use and 100% of all cooling. In practice, adoption will likely vary, and some customers may adopt larger systems for new construction or to completely replace existing heating systems.
- All ground-source heat pump (GSHP) systems are assumed to be complete replacements, for example, replace-on-failure or new construction, and displace 100% of annual cooling and heating fuel use.
- Incentives for ASHP and GSHP systems are the same whether the customer is replacing a failed system or retiring it early. This assumption will be revisited when harmonizing with the Energy Efficiency program.

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b. (i) through (v) In the *Equipment Incentives* program, the average incentive amounts per customer for ASHP and GSHP systems are projected to stay the same over the three-year program, and are summarized below. These incentives are denominated as $ per ton of heating capacity, where a ton is 12,000 BTU/hr of rated heating capacity. Note that these incentive amounts are indicative, and will be harmonized with the Energy Efficiency program prior to implementation.

| Customer Type | Measure | Tons per system | Approximate installed system cost ($/ton) | Rebate ($/ton) | Rebate (as % of installed system cost) |
|---|---|---|---|---|---|
| Low-Income | ASHP 3 ton | 3 | $3,200 | $3,200 | 100% |
| | ASHP 5 ton | 5 | $3,381 | $3,381 | 100% |
| | GSHP Horizontal Loop 4 ton | 4 | $7,988 | $7,988 | 100% |
| Market | ASHP 3 ton | 3 | $3,200 | $500 | 16% |
| | ASHP 5 ton | 5 | $3,381 | $500 | 15% |
| | GSHP Horizontal Loop 4 ton | 4 | $7,988 | $750 | 9% |

c. (i) through (v) The total *Equipment Incentives* budget is proposed to be $708,750 over the three years of the program. This total budget is proposed to be apportioned 50/50 between Market Rate and Low-Income customers. These projections can be found in *D337:H350* of the *12.EH-Inputs* tab Attachment DIV 1-1-3, and are copied below:

| Mix of Equipment Incentive Funds | 2018 | 2019 | 2020 | Total |
|---|---|---|---|---|
| **Low-Income** | $103,750 | $118,125 | $132,500 | $354,375 |
| **Market Rate** | $103,750 | $118,125 | $132,500 | $354,375 |
| **Total** | **$207,500** | **$236,250** | **$265,000** | **$708,750** |

Within these annual incentive budgets, customer adoption may vary. The proposed Performance Incentive Mechanisms for the program incentivizes the Company to maximize the amount of CO2 reduced while still allocating 50% of the incentive budget to low-income customers.

d. (i) through (v) The BCA tool does not allow for the full granularity of outputs for all variables requested. The Company developed a set of scenarios (see Attachment Division 5-4-1) to help illuminate changes in benefits, cost effectiveness ratios, and carbon reduction under varying assumptions of measure type, customer class, and base heating system.

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For the *Equipment Incentives* program, 24 scenarios (in two families of 12) were created.

- *"Scenario Family 1"* assumes only Market-Rate customers adoption, and illustrates 12 permutations spanning 3 systems ("a"=ASHP 3-ton, "b"=ASHP 5-ton, and "c"=GSHP 4-ton) replacing 4 base fuels (oil, propane, natural gas, and electricity).
- *"Scenario Family 2"* assumes only Income-Eligible customer adoption, and illustrates the same 12 permutations as Scenario Family 1.

To ensure apples-to-apples comparisons, each of these 24 scenarios had the following in common:

- Annual and total incentives were held constant across all scenarios according to the table in response (c): $207,500 in year 1, $236,250 in Year 2, $265,000 in Year 3, for a total of$708,750.
- *Equipment Incentives* Program Administration and Consulting costs were held constant.
- All costs and benefits associated with the *Ground Source Heat Program* were removed.
- All *Community-Based Outreach* and *Oil- and Propane Dealer Training* program expenses were removed from the costs. In the BCA model, these programs on their own do not generate direct benefits.

Effectively, these scenarios illustrate what would happen if the entire *Equipment Incentives* budget were delivered to support one system configuration, replacing one heating system within one customer class. This allows evaluation of the relative impacts of the three most impactful variables. Modifying the type of cooling system was found to have only limited impact on costs and benefits, but would result in 72 total scenarios.

In addition to the 24 *Equipment Incentives* scenarios, *"Scenario Family 3"* examines 4 permutations of the *Ground Source Heat Pump program,* replacing 4 base fuels (oil, propane, natural gas, and electricity). In this family of scenarios, the same methods as above were employed:

- Annual and total incentives were held constant.
- All costs and benefits of the *Equipment Incentives* programs were removed
- *Ground Source Heat Program* Administration and Consulting costs were held constant.
- All *Community-Based Outreach* and *Oil- and Propane Dealer Training* program expenses were removed from the costs.

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The results of these Scenarios are included in Attachment Division 5-4-1.

e. (i) through (v) See Attachment DIV 5-4-1.

f. (i) through (v) See Attachment DIV 5-4-1.

g. As stated in Docket 4770, Book 4, Bates pages 98-99, which is provided as Attachment DIV 5-4-2: "Demographic and census data suggest that as many as 100,000 households in Rhode Island have income levels that would qualify them for the various forms of state and federal assistance that, if the customer of record or the principal wage earner is the recipient of the benefits provided by these programs, would make them eligible for the Company's low-income electric rates. Despite this, the Company averaged only 34,060 electric 1 accounts and 18,634 gas accounts enrolled in these rates during the twelve-month period from July 2016 to June 2017."

h. Beyond the estimate of 18,634 average enrolled gas accounts referenced in response (g) above, the Company does not currently have a robust estimate of the heating fuels used by Income Eligible customers.

i. The Company constructed the Electric Heat Initiative BCA to transparently calculate the BCA of the Initiative under differing levels of Income Eligible set aside. As filed in the Response to Docket 4780, Division 1-1, Attachment DIV 1-1-3 tab "12.EH – BCA Summary" cells R7:V22 allow the user to dynamically calculate the Societal Cost Test by changing the assumed fraction of budget set aside for IE customers and the level of the IE rebate (as a percentage of total system cost). The 50% set aside was determined to balance the goal of serving Income Eligible customers while still achieving a positive Societal Cost Test value (1.12).

Beyond a certain fraction of budget set aside for Income Eligible customers, the SCT value of the entire program drops below 1. This is because Income Eligible rebates are assumed to cover 100% of system cost, compared to roughly 20% of a market rate system cost, thus fewer total Income Eligible customers can be served within a fixed budget. The following sensitivity table (taken from the BCA as filed) illustrates the relationship between the IE set-aside and the SCT ratio.

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**Sensitivity Analysis of Low-Income Participation & Low-Income Rebate %**

| | |
|---|---|
| **% Low-Income Customers** | 50% |
| **Low-Income Rebate %** | 100% |

| Low-Income Customers (% of Total) | Low-Income Rebate (%) | | | | |
|---|---|---|---|---|---|
| 1.12 | 5% | 25% | 50% | 75% | 100% |
| 10% | 1.31 | 1.27 | 1.26 | 1.26 | 1.26 |
| 20% | 1.35 | 1.25 | 1.24 | 1.23 | 1.23 |
| 30% | 1.37 | 1.24 | 1.21 | 1.20 | 1.20 |
| 40% | 1.39 | 1.22 | 1.18 | 1.17 | 1.16 |
| 50% | 1.41 | 1.21 | 1.15 | 1.13 | 1.12 |
| 60% | 1.43 | 1.19 | 1.11 | 1.08 | 1.06 |
| 70% | 1.44 | 1.17 | 1.06 | 1.02 | 0.99 |
| 80% | 1.45 | 1.14 | 1.00 | 0.93 | 0.89 |
| 90% | 1.47 | 1.11 | 0.93 | 0.82 | 0.77 |

j. Yes. See previous answer.

k. Yes. See previous answer.

(This response is identical to the Company's response to Division 16-4 in Docket No. 4770.)

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| Scenario | Forward Commitment: Capacity Value | Energy Supply & Transmission Operating Value of Energy Provided or Saved | Avoided Renewable Energy Credit (REC) Cost | Greenhouse Gas (GHG) Externality Costs | Criteria Air Pollutant and Other Environmental Costs | Non-Electric Avoided Fuel Cost | Total Benefits |
|---|---|---|---|---|---|---|---|
| **As Filed** | **$ 277,788** | **$ (1,121,845)** | **$ (99,926)** | **$ 527,088** | **$ 222** | **$ 4,162,394** | **$ 3,745,721** |
| 1a_Oil | $ 334,547 | $ (2,544,711) | $ (239,285) | $ 586,463 | $ 392 | $ 7,719,761 | $ 5,857,167 |
| 1a_Propane | $ 334,547 | $ (2,544,711) | $ (239,285) | $ 223,258 | $ 332 | $ 6,876,820 | $ 4,650,962 |
| 1a_NaturalGas | $ 334,547 | $ (2,544,711) | $ (239,285) | $ (81,877) | $ (212) | $ 4,473,641 | $ 1,942,103 |
| 1a_Electricity | $ 334,547 | $ 5,086,569 | $ 478,302 | $ 3,407,376 | $ - | $ - | $ 9,306,793 |
| 1b_Oil | $ 196,821 | $ (1,904,440) | $ (179,072) | $ 444,994 | $ 294 | $ 5,797,819 | $ 4,356,416 |
| 1b_Propane | $ 196,821 | $ (1,904,440) | $ (179,072) | $ 172,215 | $ 249 | $ 5,164,727 | $ 3,450,501 |
| 1b_NaturalGas | $ 196,821 | $ (1,904,440) | $ (179,072) | $ (56,952) | $ (159) | $ 3,359,864 | $ 1,416,062 |
| 1b_Electricity | $ 196,821 | $ 2,680,771 | $ 252,070 | $ 1,795,736 | $ - | $ - | $ 4,925,398 |
| 1c_Oil | $ 680,835 | $ (1,270,245) | $ (101,705) | $ 1,150,581 | $ 352 | $ 6,278,789 | $ 6,738,606 |
| 1c_Propane | $ 680,835 | $ (1,270,245) | $ (101,705) | $ 847,334 | $ 298 | $ 5,549,660 | $ 5,706,177 |
| 1c_NaturalGas | $ 680,835 | $ (1,270,245) | $ (101,705) | $ 592,569 | $ (145) | $ 3,620,096 | $ 3,521,405 |
| 1c_Electricity | $ 680,835 | $ 4,419,364 | $ 353,847 | $ 2,652,195 | $ - | $ - | $ 8,106,241 |
| 2a_Oil | $ 51,152 | $ (388,991) | $ (36,572) | $ 89,635 | $ 60 | $ 1,179,913 | $ 895,196 |
| 2a_Propane | $ 51,152 | $ (388,991) | $ (36,572) | $ 34,123 | $ 51 | $ 1,051,048 | $ 710,810 |
| 2a_NaturalGas | $ 51,152 | $ (388,991) | $ (36,572) | $ (12,514) | $ (32) | $ 683,756 | $ 296,798 |
| 2a_Electricity | $ 51,152 | $ 777,546 | $ 73,103 | $ 520,782 | $ - | $ - | $ 1,422,582 |
| 2b_Oil | $ 27,805 | $ (269,189) | $ (25,321) | $ 62,924 | $ 42 | $ 819,770 | $ 616,031 |
| 2b_Propane | $ 27,805 | $ (269,189) | $ (25,321) | $ 24,352 | $ 35 | $ 730,314 | $ 487,997 |
| 2b_NaturalGas | $ 27,805 | $ (269,189) | $ (25,321) | $ (8,053) | $ (23) | $ 475,084 | $ 200,304 |
| 2b_Electricity | $ 27,805 | $ 378,921 | $ 35,643 | $ 253,923 | $ - | $ - | $ 696,293 |
| 2c_Oil | $ 60,866 | $ (113,488) | $ (9,080) | $ 102,725 | $ 31 | $ 560,609 | $ 601,664 |
| 2c_Propane | $ 60,866 | $ (113,488) | $ (9,080) | $ 75,651 | $ 27 | $ 495,458 | $ 509,433 |
| 2c_NaturalGas | $ 60,866 | $ (113,488) | $ (9,080) | $ 52,905 | $ (13) | $ 323,207 | $ 314,397 |
| 2c_Electricity | $ 60,866 | $ 394,840 | $ 31,591 | $ 236,790 | $ - | $ - | $ 724,087 |
| 3_Oil | $ 2,892 | $ (62,831) | $ (5,051) | $ 56,995 | $ 17 | $ 311,302 | $ 303,325 |
| 3_Propane | $ 2,892 | $ (62,831) | $ (5,051) | $ 41,973 | $ 15 | $ 274,913 | $ 251,911 |
| 3_NaturalGas | $ 2,892 | $ (62,831) | $ (5,051) | $ 29,353 | $ (7) | $ 179,330 | $ 143,687 |
| 3_Electricity | $ 2,892 | $ 218,596 | $ 17,573 | $ 131,379 | $ - | $ - | $ 370,440 |

| Scenario | Net Benefits | Cost Effectiveness Ratio (Societal Cost Test) | Lifetime CO2 savings from electricity supply (short tons) | Lifetime CO2 reduction from avoided fuel use (short tons) | Net Lifetime avoided CO2 (Short Tons) |
|---|---|---|---|---|---|
| **As Filed** | **$ 396,389** | **1.12** | **(15,277.35)** | **30,091.02** | **14,813.66** |
| 1a_Oil | $ 2,430,127 | 1.71 | (33,293.77) | 49,326.29 | 16,032.52 |
| 1a_Propane | $ 1,223,922 | 1.36 | (33,293.77) | 41,506.68 | 8,212.91 |
| 1a_NaturalGas | $ (1,484,936) | 0.57 | (33,293.77) | 34,937.28 | 1,643.51 |
| 1a_Electricity | $ 5,879,754 | 2.72 | 66,550.22 | - | 66,550.22 |
| 1b_Oil | $ 522,657 | 1.14 | (24,916.98) | 37,047.08 | 12,130.10 |
| 1b_Propane | $ (383,259) | 0.90 | (24,916.98) | 31,174.07 | 6,257.09 |
| 1b_NaturalGas | $ (2,417,698) | 0.37 | (24,916.98) | 26,240.05 | 1,323.07 |
| 1b_Electricity | $ 1,091,639 | 1.28 | 35,074.21 | - | 35,074.21 |
| 1c_Oil | $ 2,014,127 | 1.43 | (18,536.29) | 51,272.46 | 32,736.17 |
| 1c_Propane | $ 981,698 | 1.21 | (18,536.29) | 43,144.33 | 24,608.04 |
| 1c_NaturalGas | $ (1,203,074) | 0.75 | (18,536.29) | 36,315.73 | 17,779.44 |
| 1c_Electricity | $ 3,381,762 | 1.72 | 64,490.38 | - | 64,490.38 |
| 2a_Oil | $ 273,147 | 1.44 | (5,089.49) | 7,540.32 | 2,450.83 |
| 2a_Propane | $ 88,761 | 1.14 | (5,089.49) | 6,344.97 | 1,255.48 |
| 2a_NaturalGas | $ (325,251) | 0.48 | (5,089.49) | 5,340.73 | 251.24 |
| 2a_Electricity | $ 800,534 | 2.29 | 10,173.28 | - | 10,173.28 |
| 2b_Oil | $ (25,962) | 0.96 | (3,521.83) | 5,236.34 | 1,714.50 |
| 2b_Propane | $ (153,996) | 0.76 | (3,521.83) | 4,406.23 | 884.39 |
| 2b_NaturalGas | $ (441,689) | 0.31 | (3,521.83) | 3,708.84 | 187.01 |
| 2b_Electricity | $ 54,300 | 1.08 | 4,957.48 | - | 4,957.48 |
| 2c_Oil | $ 74,588 | 1.14 | (1,656.43) | 4,581.79 | 2,925.36 |
| 2c_Propane | $ (17,643) | 0.97 | (1,656.43) | 3,855.45 | 2,199.02 |
| 2c_NaturalGas | $ (212,679) | 0.60 | (1,656.43) | 3,245.24 | 1,588.80 |
| 2c_Electricity | $ 197,011 | 1.37 | 5,762.97 | - | 5,762.97 |
| 3_Oil | $ (9,060) | 0.97 | (914.82) | 2,530.43 | 1,615.62 |
| 3_Propane | $ (60,474) | 0.81 | (914.82) | 2,129.29 | 1,214.47 |
| 3_NaturalGas | $ (168,698) | 0.46 | (914.82) | 1,792.28 | 877.46 |
| 3_Electricity | $ 58,055 | 1.19 | 3,182.77 | - | 3,182.77 |

Key: *"Scenario Family 1"* assumes only Market-Rate customers adoption ("a"=ASHP 3-ton, "b"=ASHP 5-ton, and "c"=GSHP 4-ton)
*"Scenario Family 2"* assumes only Income-Eligible customer adoption
*"Scenario Family 3"* assumes only large GSHP adoption

the Company's most vulnerable customers throughout the collections process and who advise those customers of available assistance programs. The Company also provides training and tools to customer service representatives to prepare them to respond to customer bill inquiries in a knowledgeable, empathetic, and solution-oriented way. These efforts demonstrate the Company's continuing commitment to assist income-eligible customers in managing their arrears, which, in turn, helps minimize uncollectible expense.

**Q. Will the Company explore other strategies to collect on accounts with arrears?**

A. Yes. The Company is constantly exploring and evaluating strategies to collect on accounts with arrears.

**Q. Why does the Company see a need to propose additional investment in its income-eligible customer programs?**

A. As noted, the Company is concerned about the ability of income-eligible customers to pay their electric and gas bills. Despite current support and investments, the Company sees multiple opportunities to better engage and serve these customers:

- Demographic and census data suggest that as many as 100,000 households in Rhode Island have income levels that would qualify them for the various forms of state and federal assistance that, if the customer of record or the principal wage earner is the recipient of the benefits provided by these programs, would make them eligible for the Company's low-income electric rates. Despite this, the

Company averaged only 34,060 electric accounts and 18,634 gas accounts enrolled in these rates during the twelve-month period from July 2016 to June 2017.

- Despite being the customer segment most vulnerable to volatility in their energy bills, only approximately 20 percent of income-eligible accounts participate in Company-offered budget billing programs.
- In 2016, the Company's multi-family income-eligible energy efficiency program and single-family income eligible services energy efficiency program served 10,067 and 3,738 customers, respectively. The Company is planning for growth in participation in these programs in coming years, and believes that expanded participation in these programs is consistent with broader goals around increased energy affordability and decreased bill volatility.
- As of June 2017, nearly 60 percent of the Company's income-eligible customer accounts were in arrears. Despite representing only approximately ten percent of the Company's residential account base, these accounts represented over 40 percent of the Company's aggregate residential arrearages as of that same period.

Through the targeted investments identified in this testimony, the Company is aiming to secure a greater level of income-eligible customer engagement. Greater income-eligible customer engagement will lead to improved energy affordability and customer satisfaction among the income-eligible customer segment. Greater participation in existing programs will also help customers stay current on their utility bills and will drive improved income-eligible customer bill payment performance.

SC 1-34

Request:

Referring to Chapter 6, page 124 (Community Outreach):

a. Please describe the methods and results of the cited community-based programs in Massachusetts. Did those programs involve marketing air-source heat pumps and/or ground-source heat pumps to single-family households?

b. Please clarify what the Company means when it states that "outreach will be driven at the grassroots level by communities."

c. Will marketing and outreach for EHI be targeted to low-income communities?

Response:

a. To date, the Massachusetts community-based energy efficiency programs referenced in Schedule PST - 1, Chapter 6 - Electric Heat, Page 4 of 15 (Bates Page 124 of PST Book 1) have not involved marketing of air- or ground-source heat pumps.

Regarding the methods and results of those programs, two relevant studies have been released. One focused on the effectiveness of the "Efficient Neighborhoods +" program (released July 2015; please refer to Attachment SC 1-34-1), and another on the broader slate of Community Based Programs (released October 2017;, please refer Attachment SC 1-34-2). The methods utilized by different program administrators are quite diverse, and the findings are described in detail in the attached studies.

b. The Company envisions that local outreach will be managed by a designated Campaign Coordinator (a city staff member or local community member), who will engage local community groups to secure volunteer support, convene events, and conduct other relevant outreach activities. In some examples of community-based outreach, grassroots outreach targets pre-existing community events to ensure engagement through many channels, such as public libraries, sporting leagues, school functions, and environmental and energy committee meetings.

c. Generally, outreach and marketing of the Electric Heat Initiative will aim to maximize adoption in both the market rate and low-income customer segments. Therefore, marketing and outreach will be targeted to low-income communities. Regarding the outreach conducted through the Community-Based Outreach program, the Company plans to consider the income makeup of communities as one of various selection criteria.

Prepared by or under the supervision of: Mackay Miller

*Methodology*

# Efficient Neighborhoods+ Incremental Cost Assessment

**To: Massachusetts PAs**
**From: Opinion Dynamics Evaluation Team**
**Date: July 8, 2015**
**Re: Incremental Cost Assessment of the First Round of the Efficient Neighborhoods+ Initiative**

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This memorandum presents the results of the incremental cost analysis of the Efficient Neighborhoods+® (EN+) initiative. The results presented in this memo cover communities targeted during the first round of the EN+ initiative. Opinion Dynamics gathered incremental cost data through a series of data requests and follow-up discussions with Program Administrators (PAs) and implementation contractors. The sections below summarize data collection, cleaning, analysis, and estimation methods and present the results of the analysis, as well as provide caveats associated with the available data and analysis.

***Note of Caution: Incremental costs for EN+ have been difficult to obtain and parse out from the costs associated with regular HES program activity. Cost data that we obtained were frequently rough estimates accompanied by considerable caveats as to their accuracy. This was particularly true for the incremental administrative costs. Neither PAs nor implementation contractors tracked administrative costs, and, due to the amount of time elapsed since the first round of the initiative, those costs were difficult to estimate accurately. The process was further complicated by internal PA staff changes and one PA hiring a new firm to implement the initiative. As a result, the evaluation team had to impute some costs. Consequently, the reader should treat the results presented below with caution.***

## Methodology

### Definition and Data Collection Approach

For the purposes of this assessment, incremental costs include the following four cost sources:

- Incremental incentives paid for measures installed as part of the initiative
- Incremental marketing costs incurred by PAs and implementation contractors
- Incremental administrative (labor) costs incurred by PAs
- Incremental administrative (labor) costs incurred by implementation contractors

We defined administrative costs as staff time spent planning the initiative, coordinating between internal and external parties (across PAs, PAs with implementation contractors, etc.), answering customer or stakeholder questions and resolving issues, preparing and providing status reports, developing and making presentations, and conducting periodic status update meetings. We should note that these cost data are based on rough PA and implementation contractor estimates due to the amount of time elapsed since the initiative implementation.

Opinion Dynamics only included core communities in the analysis (Adams, Hyde Park, Lowell, North Adams, Plymouth, Townsend, Watertown, and West Springfield) and did not include the Liberty (Fall River) or the Cape Light Compact's initiatives, both of which had somewhat different program designs from that of EN+.

Opinion Dynamics collected incremental marketing cost data as part of the EN+ evaluation in 2014. We leveraged the collected data for this analysis but confirmed them with PAs. As a first step in obtaining the remaining incremental cost data, we prepared and submitted a detailed data request to PAs and implementation contractors. As a second step, we confirmed our understanding of the data through follow-up emails and telephone interviews. During the follow-up discussions, we explored any gaps, discrepancies, and possible omissions associated with the provided cost data. We were unable to gather incremental cost data for EN+ initiative efforts being implemented in the town of Townsend.

## Data Analysis Approach

The incremental cost data analysis included the following steps:

- Analysis of program tracking data to isolate incremental incentives associated with the EN+ initiative
- Conversion of incremental staff hours into costs
- Allocation of incremental costs by PA and community
- Imputation of missing cost data
- Normalization of incremental costs by participation and energy savings

### Incremental Incentive Calculation

Opinion Dynamics leveraged the HES program tracking data obtained from the PAs as part of the 2014 impact evaluation. For the purposes of the incremental cost analysis, we isolated EN+ program participants, namely customers residing in EN+ targeted census block groups who completed energy assessments and follow-up installation work during the EN+ implementation timeline.

The data contained detailed information on each participant including the energy efficient improvements completed through the program, as well as costs associated with each improvement. The incentive information, however, was provided as a combined total incentive amount per participating site. The evaluation team confirmed with the implementation contractor that it did not track more detailed incentive amounts. As such, we conducted an analysis to isolate the incentives paid for each individual measure. As part of the analysis, we assigned incentives to each measure using our knowledge of the program incentive structures (both EN+ enhanced and standard HES program incentives) and calculated incentives that customers would have received under the standard HES program as well as those they did receive under EN+. The difference between the two incentives represent the incentives that are incremental to EN+. It is important to note that, due to how the incentive information was tracked, this analysis was time consuming and required a considerable amount of manual review. In some cases, the analysis involved making assumptions about incentive allocation by measure.

### Incremental Labor Costs Estimation

PAs and implementation contractors provided an estimate of the incremental hours that their staff spent administering the EN+ initiative. Implementation contractors also provided labor rates associated with the staff involved in the implementation of the EN+ initiative, therefore we easily converted the incremental hours into costs by multiplying them by labor rates.

To convert the PA staff time into costs, the evaluation team estimated loaded wage rates for relevant employee levels using the United States Bureau of Labor Statistics (BLS) data for the utility sector. We matched labor categories from the BLS to the labor categories that PAs provided to us and applied unloaded labor rates for those labor categories for the state of Massachusetts. We loaded wage rates for the applicable labor categories based on the BLS's national estimates of employer compensation costs. The BLS produces these estimates of compensation costs each quarter. We also included estimates of staff benefit costs. For the utility sector, the BLS estimates that the cost of total benefits for employees in the utility sector makes up 38.7% of total compensation. Total benefits include costs associated with insurance and retirement benefits while wages and salaries include the employee's direct pay. We calculated the labor loading factor as:

$$Labor\ Loading\ Factor = 1 + \left(\frac{Total\ Benefits}{Wages\ and\ Salaries}\right)$$

In the case of the utility sector, the resulting labor loading factor is 1.63. We multiplied each of the unloaded labor rates from the BLS by this factor to arrive at a loaded labor rates. The evaluation team then multiplied the loaded labor rates by the estimated hours provided by the PA staff to arrive at the labor costs. Other factors could be considered in a labor loading factor, including the cost of employee paid leave but such information was not available and therefore not included.

### Incremental Cost Allocation and Imputation

Incremental marketing and administrative costs varied in their rigor and level of detail. Some were invoice-based and quite detailed, while others were rough estimates. Some costs were at the PA and community level, while some were at a more aggregate level (e.g., by PA across all targeted communities). In order to perform the analysis by community and fuel type, the evaluation team used the following assumptions to allocate costs:

- In cases where PAs and implementers were unable to provide **incremental administrative costs** by community, we split them evenly across communities.
- In cases where **incremental incentives** were associated with savings across more than one fuel type, we allocated the costs to fuel types in proportion to each fuel type's contribution to overall savings.
- Incremental costs (incentives, marketing and administrative costs) associated with savings from other fuels were assigned to electric PAs for homes with no gas provider. Cases where a home had a gas provider and savings from other fuels were extremely rare. In those instances, we split costs in proportion to savings.

Furthermore, we were unable to obtain the electric portion of the incremental PA administrative costs for West Springfield. We assumed the same per-community costs as Eversource. Also, due to a change in the implementation contractor, we did not have access to the gas portion of implementation contractor

administrative costs in West Springfield. We therefore assumed the same per-community incremental costs as for Eversource.[1]

### Cost Normalization and Final Cost Calculation

We calculated the total incremental costs by summing incremental marketing, incentive, and administrative costs and dividing them by participation and energy savings:

*Total incremental costs/Participant=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/Participants*[2]

*Total incremental costs/kWh=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/kWh*

*Total incremental costs/Therm=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/therms*

*Total incremental costs/Other Fuels (MMBTU)=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/Other Fuels (MMBTU)*

*Total incremental costs/MMBTU=(Incremental marketing costs + Incremental incentives + Incremental administrative costs)/All Fuels (MMBTU)*

## Summary of Results

Combined, PAs spent an estimated additional $429,790 to administer the EN+ initiative relative to the standard HES program. Marketing and administrative costs represented the largest portion (84% combined) of the incremental costs. Total incremental costs vary considerably by PA, because of the differing number of communities targeted by each PA, the scope of the marketing efforts, as well as the differing numbers of targeted customers and resulting participation levels.

**Table 1. Incremental Costs by Cost Type and by PA**

| Program Administrator | Incremental Marketing $ | Incremental Incentive $ | Incremental Administrative $ | Total Incremental $ |
|---|---|---|---|---|
| Berkshire Gas | $33,118 | $17,585 | $18,069 | **$68,772** |
| Columbia Gas | $12,514 | $0 | $31,186 | **$43,701** |
| Eversource | $65,984 | $7,082 | $58,119 | **$131,185** |
| National Grid | $61,776 | $44,778 | $79,579 | **$186,133** |
| **Total** | **$173,392** | **$69,445** | **$186,953** | **$429,790** |

** Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

[1] We considered using the incremental implementation contractor costs for Berkshire Gas, but those costs were very similar to Eversource's.

[2] Participants are customers who completed an energy assessment.

*Summary of Results*

Table 2 provides total incremental costs by targeted community. Total incremental costs are lowest for Hyde Park and Plymouth due to a small number of targeted customers and participants (discussed later in the memo), and are highest in Adams and North Adams due to a large number of targeted customers and resulting participants.

**Table 2. Incremental Costs by Cost Type by Community**

| Community | Electric PA | Gas PA | Incremental Marketing $ | Incremental Incentive $ | Incremental Administrative $ | Total Incremental $ |
|---|---|---|---|---|---|---|
| Adams | National Grid | Berkshire Gas | $28,203 | $25,956 | $29,873 | **$84,031** |
| Hyde Park | Eversource | | $18,999 | $962 | $15,473 | **$35,433** |
| Lowell | National Grid | | $19,274 | $6,931 | $20,838 | **$47,043** |
| North Adams | National Grid | Berkshire Gas | $34,678 | $26,371 | $29,873 | **$90,922** |
| Plymouth | Eversource | | $21,745 | $2,903 | $15,473 | **$40,121** |
| Watertown | Eversource | National Grid | $25,148 | $5,528 | $28,765 | **$59,440** |
| West Springfield | Eversource | Columbia Gas | $25,345 | $795 | $46,659 | **$72,799** |
| **Total** | | | **$173,392** | **$69,445** | **$186,953** | **$429,790** |

**Note that the sum of costs may be slightly off (not more than by $1) from the total costs due to rounding.*
***Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

To better compare incremental costs across PAs and communities and explore the reasons for cost differences, the evaluation team normalized them by the number of participants.[3] Table 3 provides per-participant incremental costs by cost category and by PA. Across all PAs, EN+ cost an extra $470 per-participant above the standard HES program. As can be seen in the table, per-participant costs are the lowest for Berkshire Gas and National Grid, and are the highest for Columbia Gas. Incremental costs for Columbia Gas are driven by high administrative costs. Administrative costs include costs associated with planning and designing the initiative, which consumed anywhere between 24% and 41% of the PA time. The incremental administrative cost category is the most prone to error due to rough estimates and data imputations.

Per-participant incremental marketing costs vary from $86 incurred by National Grid to $282 incurred by Eversource. Differences in incremental marketing costs are likely reflective of the total number of targeted customers (discussed further in this memo), the scope of marketing and outreach efforts, as well as success engaging customers with the initiative. Differences in costs could but do not necessarily reflect the relative success of marketing and outreach strategies. While PAs targeted similar communities, the demographic composition and the housing stock across communities could vary, possibly driving the ultimate success of engaging customers with the initiative.

Per-participant incremental incentives for National Grid and Berkshire Gas are twice as high as for Eversource. The reason for higher per-participant incremental incentives is because National Grid and Berkshire Gas customers were more likely to complete improvements for which enhanced incentives were

[3] For the purposes of this analysis, we define participants as customers who completed energy assessments.

offered than Eversource customers. Our analysis of the program tracking data did not identify any incremental incentives paid by Columbia Gas.

Community-based initiatives such as EN+ could place a heavier administrative burden on smaller PAs. Smaller service territories mean that the pool of customers to target as part of these initiatives is limited and therefore the energy savings achieved per staff hour spent coordinating and administering the initiative could be lower than what is possible for larger PAs. Furthermore, these initiatives could further constrain a smaller staff dedicated to administration and implementation of energy efficiency programs. Despite these expectations, we did not see a clear relationship between PA size and per-participant administrative costs. Berkshire Gas's (smaller PA) per participant incremental administrative costs are the lowest, and National Grid's (large PA) costs are the second lowest. It is important to note again that incremental administrative cost estimates may be the least valid, as they are mostly based on rough estimates.

**Table 3. Per Participant Incremental Costs by PA**

| Program Administrator | Total Number of Participants* | Incremental Marketing $ Per Participant | Incremental Incentive $ Per Participant | Incremental Administrative $ Per Participant | Incremental Total $ Per Participant |
|---|---|---|---|---|---|
| Berkshire Gas | 272 | $122 | $65 | $66 | $253 |
| Columbia Gas | 55 | $228 | $0 | $567 | $795 |
| Eversource | 234 | $282 | $30 | $248 | $561 |
| National Grid | 720 | $86 | $62 | $111 | $259 |
| **Total** | **914** | **$190** | **$76** | **$205** | **$470** |

**Participants are those who completed energy assessments. Note that the sum of participants by PA is higher than the total number of participants because a single customer could receive services from two PAs (gas and electric).*
***Note that the sum of costs may be slightly off (not more than by $1) from the total costs due to rounding.*
**** The data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

Table 4 provides per-customer and per-participant incremental costs by community.[4] Analysis of incremental costs per targeted customer and participant shows that they tend to be lower in larger communities.

[4] We do not show incremental costs per targeted customer because the total number of targeted customers for Gas PAs is not readily available to us.

**Table 4. Per Customer and Per Participant Incremental Costs by Community**

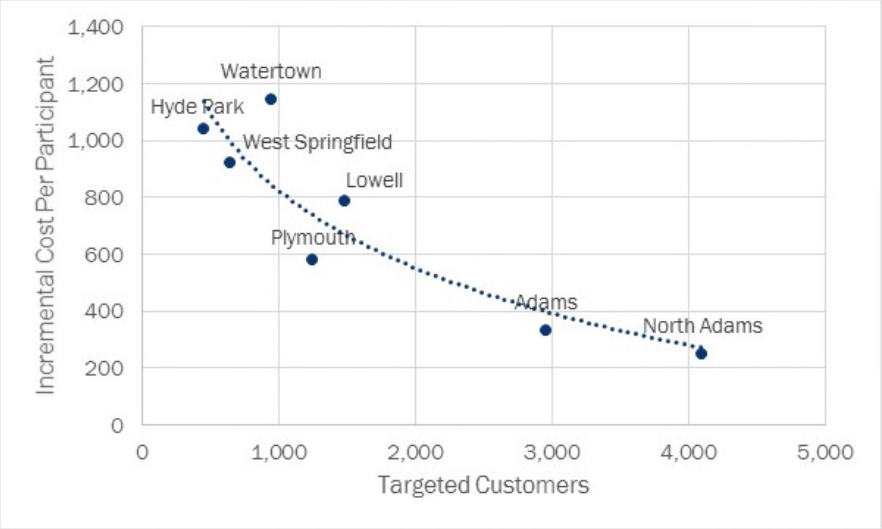
| Community | Electric PA | Gas PA | Total Incr. $ | Total Target Customers | Total Partici-pants* | Energy Assess-ment Rate | $ Per Targeted Customer | $ Per Participant |
|---|---|---|---|---|---|---|---|---|
| North Adams | National Grid | Berkshire Gas | 90,922 | 4,098 | 367 | 9% | $22 | $248 |
| Adams | National Grid | Berkshire Gas | 84,031 | 2,956 | 253 | 9% | $28 | $332 |
| Lowell | National Grid | | 47,043 | 1,483 | 60 | 4% | $32 | $784 |
| Plymouth | Eversource | | 40,121 | 1,250 | 69 | 6% | $32 | $581 |
| Watertown | Eversource | National Grid | 59,440 | 948 | 52 | 5% | $63 | $1,143 |
| West Springfield | Eversource | Columbia Gas | 72,799 | 639 | 79 | 12% | $114 | $922 |
| Hyde Park | Eversource | | 35,433 | 451 | 34 | 8% | $79 | $1,042 |
| **Total** | | | **429,790** | **11,825** | **914** | **8%** | **$36** | **$470** |

**Participants are those who completed an energy assessment.*
***Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

Figure 1 plots communities by per-participant cost and total number of targeted customers. The trend in the chart illustrates the economies of scale achieved by targeting a larger number of customers. This trend is not surprising given that some of the costs either remain fixed as the number of targeted customers increases (such as planning and design costs, marketing and collateral development) or increase only incrementally (distribution of marketing and collateral to a larger group of customers). The results suggest that scaling up EN+ by either targeting more customers in a single community or engaging multiple communities will result in lower incremental cost per participant. The results, however, may not fully reflect the full potential for achieving economies of scale due to statewide implementation. As previously noted, the incremental costs reported here include start-up and design costs. Broader implementation will allow to spread these costs and amortize them over time. Furthermore, broader implementation of the initiative could lead to gaining efficiencies in administration procedures, systematization and concentration of staffing functions, recycling of marketing materials and strategies, etc.

Scaling the initiative, however, may not be a feasible option for smaller PAs whose service territory limits the number of customers and communities that they can engage. An example can be Unitil Gas and Electric whose service territory consists of four and six towns respectively.

**Figure 1. Per-Participant Cost Relationship to the Number of Targeted Customers**




*Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

Table 5 provides incremental costs normalized by energy savings achieved during the implementation of EN+ by PA.[5] We used energy savings values calculated as part of the 2014 EN+ Evaluation. Appendix of this memo contains savings by PA and by community.

Overall, incremental costs per kWh is $0.13 and the average cost per therm is $5.86. To put these costs in perspective, cost per annual kWh saved by the Residential program portfolio in Q4 2014 was $0.40, while cost per annual therm saved during the same time frame was $6.17.[6]

Our analysis shows that per-kWh costs incurred by Eversource are six times higher than those incurred by National Grid. Overall, National Grid achieved three times the amount of electric savings at nearly half the cost. This difference are due at least in part by a much larger number of targeted customers and participants in National Grid's communities. A part of the difference, however, can also be attributed to the relative success engaging customers with the initiative.

Per-therm costs also vary across PAs from a low of $3.66 for Berkshire Gas to a high of $10.19 for Columbia Gas. Berkshire Gas spent 57% more incrementally than Columbia Gas, but achieved 338% higher gas savings.

[5] Please note that we normalized incremental costs by total energy savings achieved through the initiative, and not net energy savings that are due to the initiative.

[6] http://ma-eeac.org/wordpress/wp-content/uploads/MA-EEAC-Consultant-Team-2016-18-Three-Year-Goals-Framework-Memo.pdf

A considerable portion of the PA incremental dollars was paid to achieve savings from other fuels. Over $39,000 was paid in incremental incentives for savings from other fuels. This amounts to 57% of all incremental incentive dollars and 9% of overall incremental costs.

**Table 5. Incremental Costs per Unit of Energy by PA**

| Program Administrator | $ Per kWh | $ Per Therm | $ Per MMBTU (Other Fuels) | $ Per MMBTU (Total) |
|---|---|---|---|---|
| Berkshire Gas | | $3.66 | | $36.63 |
| Columbia Gas | | $10.19 | | $101.89 |
| Eversource | $0.35 | $18.37 | $68.56 | $92.33 |
| National Grid | $0.06 | $6.57 | $25.59 | $30.23 |
| **Total** | **$0.13** | **$5.86** | **$33.06** | **$43.48** |

**Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

Table 6 provides incremental costs normalized by energy savings achieved during the implementation of EN+ by community. North Adams and Adams, the communities with the largest number of targeted customers, have the lowest incremental costs per MMBTU, while Hyde Park, the community with the lowest number of targeted customers, has the highest.

**Table 6. Incremental Costs per Unit of Energy by PA**

| Community | Electric PA | Gas PA | $ Per kWh | $ Per Therm | $ Per MMBTU (Other Fuels) | $ Per MMBTU (Total) |
|---|---|---|---|---|---|---|
| North Adams | National Grid | Berkshire Gas | $0.05 | $3.37 | $21.07 | $22.85 |
| Adams | National Grid | Berkshire Gas | $0.06 | $4.09 | $29.54 | $30.09 |
| Plymouth | Eversource | | $0.18 | $0.17 | $4.87 | $53.76 |
| Lowell | National Grid | | $0.19 | $0.16 | $5.55 | $61.03 |
| Watertown | Eversource | National Grid | $0.31 | $8.21 | $106.40 | $88.85 |
| West Springfield | Eversource | Columbia Gas | $0.47 | $10.19 | $146.10 | $114.11 |
| Hyde Park | Eversource | | $0.67 | $0.66 | $20.15 | $192.58 |
| **Total** | | | **$0.13** | **$5.86** | **$33.06** | **$43.48** |

*Note that the data from the administrator of Columbia Gas program is unreliable/faulty/incomplete, therefore one must be careful to draw any conclusions about CMA's incremental costs.*

## Conclusions and Considerations

Opinion Dynamics provides the following conclusions and considerations as a result of our data acquisition and analysis efforts:

- Incremental cost data were difficult to obtain and were often based on rough estimates. Incremental incentive data were not clearly tracked and required a considerable amount of time to parse out. Incremental administrative cost data were not tracked and therefore based on rough estimates from data provided for more than one community. Many of these difficulties were due to internal and external staffing changes and required the evaluation team to make assumptions when preparing the data. As a result, our confidence in the results and the conclusions we are able to draw is somewhat limited. However, if PAs were to put in place systems to track more data for future evaluations, the incremental costs of the initiative may be even higher.
- Despite uncertainties in the incremental cost estimates, the results of the analysis point to:
  - Considerable per-participant and per-unit of energy costs for the initiative. Across all PAs combined, the incremental costs per EN+ participant was $470, $0.13 per kWh and $5.86 per therm. To put these costs in perspective, cost per annual kWh saved by the Residential program portfolio in Q4 2014 was $0.40, while cost per annual therm saved during the same time frame was $6.17.[7]
  - Economies of scale might diminish incremental costs with an initiative expansion. Comparison of per-participant costs across communities revealed that as the number of targeted customers increased, per-participant costs decreased. This is not surprising because larger communities should have a larger absolute number of participants yet some of the costs either remain fixed as the number of targeted customers increases (such as planning and design costs, marketing and collateral development) or increase only incrementally (distribution of marketing and collateral to a larger group of customers). The results suggest that scaling up EN+ by either targeting more customers in a single community or engaging multiple communities will result in lower incremental costs per participant. The results, however do not account for additional gains in economies of scale due to statewide implementation (e.g., spreading and amortizing design and start-up costs, systematizing and centralizing staffing, recycling marketing, etc.). Scaling the initiative, however, may not be a feasible option for smaller PAs whose service territory limits the number of customers and communities that they can engage.
- As part of the initiative, PAs spent a considerable amount of incremental dollars to achieve savings for fuels other than gas and electric. More specifically, over $39,000 was paid in incremental incentives for savings from other fuels. This amounts to 57% of all incremental incentive dollars paid and 9% of overall incremental costs.

[7] http://ma-eeac.org/wordpress/wp-content/uploads/MA-EEAC-Consultant-Team-2016-18-Three-Year-Goals-Framework-Memo.pdf

# Appendix A. Efficient Neighborhoods+ Energy Savings

This Appendix contains energy savings achieved during the implementation of the EN+ initiative by fuel type, by PA, and by Target Community. Note that these savings are not necessarily incremental to the initiative – they are a summary of savings that were achieved **during the course** of the initiative.

Table 7. Energy Savings by Fuel Type by PA

| Program Administrator | kWh Saved | Therm Saved | Other Fuels Saved (MMBTU) | Total MMBTU Saved |
|---|---|---|---|---|
| Berkshire Gas | | 18,775 | | 1,878 |
| Columbia Gas | | 4,289 | | 429 |
| Eversource | 173,991 | 1,220 | 706 | 1,421 |
| National Grid | 519,332 | 10,347 | 3,352 | 6,158 |
| **Total** | **693,323** | **34,631** | **4,058** | **9,885** |

Table 8. Energy Savings by Fuel Type by Community

| Community | kWh Saved | Therm Saved | Other Fuels Saved (MMBTU) | Total MMBTU Saved |
|---|---|---|---|---|
| Adams | 195,533 | 7,601 | 1,366 | 2,793 |
| Hyde Park | 19,019 | 1,078 | 6 | 179 |
| Lowell | 41,151 | 6,384 | 83 | 862 |
| North Adams | 282,648 | 11,174 | 1,898 | 3,979 |
| Plymouth | 62,415 | 142 | 538 | 765 |
| Watertown | 37,945 | 3,963 | 143 | 669 |
| West Springfield | 54,612 | 4,289 | 23 | 638 |
| **Total** | **693,323** | **34,631** | **4,058** | **9,885** |

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# Massachusetts Energy Efficiency Program Administrators

## Community Based Program Design Effectiveness Study: Phase 1 Report –FINAL

October 2, 2017

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# 1. Executive Summary

This Phase 1 report presents findings from the Community Based Program (CBP) Design Effectiveness Study for the Massachusetts energy efficiency Program Administrators (PAs). This study had three overarching goals: (1) to identify and document the breadth of CBP designs and attributes nationally, (2) to explore the relative effectiveness of various community engagement strategies, and (3) to explore what factors help to explain why community engagement strategies are variably effective across contexts. Phase 1 addresses the first of these goals, comments on the second and third, and lays the groundwork for the development of a Phase 2 study to answer an additional question about the long-term effectiveness of CBPs.[1]

This study represents a comprehensive synthesis of 25 CBPs, which by our knowledge is the largest review of these programs to date and offers a comprehensive look at the entire program process, from origins to evaluation results. It also fills important gaps in the Massachusetts PAs' knowledge related to benefits that CBPs can offer that go beyond energy-reduction goals. This report brings together multiple interim documents to present a synopsis of all methods, findings, and recommendations.

## 1.1 Overview of Community Based Programs (CBPs)

Community-based energy efficiency programs are partnerships to enhance energy efficiency uptake among residential populations by delivering programs (e.g., outreach, education, incentives, technical support) in a way that is meaningful to the local community. Elements of CBPs have shown promise for ratepayer-funded energy efficiency PAs looking to overcome barriers to energy efficiency adoption that persist after decades of upstream or mass-marketed offerings. Uptake goals vary across programs but generally focus on increasing metrics related to participation and savings, like program awareness among the customer population, the total number of participants, participant diversity, measure mix, energy savings, and/or demand reduction.

To better meet those goals, PAs can develop CBPs either by involving community stakeholders in program planning or implementation, or by adjusting existing program marketing and delivery to capitalize on or accommodate the unique characteristics of a community. PAs have engaged with community stakeholders including municipal governments, regional advocacy groups, non-profits, and other community-based organizations (CBOs). Some CBP administrators have focused on reaching specific customer populations (e.g., by customer attributes, geography, current or expected system demand constraints, or others). Others have delivered offerings to the general customer population but drew on community-based social marketing approaches to personalize outreach. In working to help overcome the selected customers' barriers to energy efficiency, CBPs have leveraged a wide range of community attributes, like community pride or sense of place, locally-trusted organizers, geographic clustering, inter- and intra-community relationships, and others. In turn,

[1] This study was originally scoped out as a two-phase effort and evolved significantly over its course. Phase 1 was to be a brief literature review and series of CBP stakeholder interviews to refine hypotheses about the effectiveness of individual CBP tactics that could be tested in a multilevel modeling framework (i.e., is tactic A is more successful than tactic B, and why). Ultimately, Phase 1 completed a much more extensive and in-depth literature review and provided more detailed research on CBP tactic effectiveness vis a vis secondary literature and qualitative interviews than was originally envisioned. Because community engagement entails knowing the audience and adapting to it, a generalized community engagement strategy (e.g., local messenger; event tabling) will see variable effectiveness across contexts based on how well the administrator customized and adapted the generic approach to their specific context.

partner CBOs gain access to the PA's financial, technical, and institutional support that can help them better provide social and economic services to their constituents.

## 1.2 Study Motivation and Scope

The Massachusetts energy efficiency PAs[2] are among those who have tested ratepayer-funded CBPs. Despite potential benefits, Massachusetts PAs have observed that CBPs tend to be a comparatively costly way to achieve savings given the extensive collaboration and personalized implementation approaches central to their program design. Additionally, it has not always been clear whether there is a specific aspect of CBPs that drives savings, and if so, why. For example, where evaluations show that community programs "lifted" participation, energy savings, and/or demand reduction, results suggest varying conclusions about which program elements drove the result. The amount of local tailoring inherent to the CBP design has also posed an evaluation challenge, previously making it hard to understand why CBPs and community-centric tactics have found mixed success when viewed across multiple programs. Broadly, the highly-tailored nature of many CBPs implies that the tactical results of one individual program iteration may depend as much on context specifics as they do on inherent properties of a given tactic. In other words, it has been challenging to disentangle the effectiveness of design elements from community context.

The Massachusetts PAs now face decisions about whether to continue investing in CBPs, and if so, how to maximize program savings while minimizing costs. To reflect on the viability and value of the CBP design, the MA PAs commissioned a retrospective review of CBPs developed in Massachusetts and throughout the United States. In executing this review, our goals were to (1) document the breadth of CBP designs and attributes, (2) explore the relative effectiveness of various community engagement strategies and (3) explore what factors help to explain why community strategies have been variably effective across contexts.

### CBP Definition for the Study

This report includes a variety of the types of communities and community groups engaged in CBPs. PAs may tailor their programs to customer communities defined in terms of municipality/geography, socioeconomics, culture, linguistics, or propensity to participate; or, even, the general population of all customers in their service area. CBPs are also diverse in their approaches to implementation. Across the board, PAs have leveraged both public and private money from a range of entities; collaborated with myriad state, regional, and municipal leaders from cultural, religious, environmental, and other types of groups; and have often—but not always—engaged local citizen volunteers. Additionally, some evolved organically or opportunistically, while others were developed to meet a state utilities regulatory commission mandate. Further, not all have been evaluated against formal metrics. To add structure to the synthesis while allowing an approach that can capture lessons from all corners of the practice, we developed a working definition of CBPs that was purposefully broad: "*A CBP is a clean energy partnership with stated goals that leverages community attributes or institutions to tailor delivery of energy efficiency or renewable energy services to a target community*."

Given our aim to provide the Massachusetts PAs with a review of programs relevant to CBPs in Massachusetts, we further focused on CBPs that have design elements pertinent to the Massachusetts context. This included: programs which actively involved an electric or gas utility energy efficiency PA; which were used to drive increased participation and/or savings in a PA program; which included a substantial residential component; and which were implemented within the last five to seven years (i.e., initiated no later than 2009). We reviewed

[2] Berkshire Gas, Columbia Gas, Cape Light Compact, Eversource, Liberty Utilities, National Grid, and Unitil.

many CBPs which did not meet all our criteria. Focusing on the most relevant programs means that results are transferrable to Massachusetts.

## 1.3 Research Approach

For the Phase 1 research, Opinion Dynamics used two qualitative research activities to assess CBP effectiveness: a review of secondary literature on CBPs, and interviews with CBP administrators and stakeholders. All research was completed between June 2016 and April 2017. We provide a brief synopsis of the research performed for each research objective below:

- **Document the breadth of CBP designs and attributes.** We designed the literature review to gain broad insights about CBP design, implementation, and outcomes. We developed a matrix of programs (Appendix A) and used it to record elements of each program's design, implementation, and outcomes that were reported in available program evaluation reports and other sources.
- **Explore the relative effectiveness of various community engagement strategies.** In reviewing the literature, we documented the broad methods that CBPs used to assess program effectiveness. We also reviewed reports to determine whether each program's core elements had been evaluated, and if so, what results had been found. We also conducted a series of in-depth interviews with CBP stakeholders to further explore community barriers to energy efficiency, CBP origins, and lessons-learned by the CBP administrators. In conversations, we asked interviewees to reflect on which engagement strategies were effective and which offered the biggest bang-for-the-buck. Overall, combined results of the literature review and interviews provide directional results about the value of various community outreach and engagement approaches.
- **Explore what factors help to explain why community strategies have been variably effective across contexts.** We brought together the literature review and in-depth interview results to determine what aspects of program theory could explain observed results about CBP design and element effectiveness (e.g., barriers, activities, outputs, short-term outcomes, and long-term outcomes).

## 1.4 Classifying CBP Designs and Successes

In compiling 25 CBPs, exploring the relative effectiveness of community-based tactics, and assessing their value to PAs and the community, we recognized the need for a classification system to organize the breadth of program designs, with attention to understanding how administrators conceptualize community-based elements relative to any existing mass-marketed energy efficiency programs. Unlike some standard energy efficiency offerings that administrators implement with relatively little variation from state to state,[3] CBPs vary widely across administrators in terms of implementation strategy.[4]

Table 7 presents a classification system that organizes programs based on 12 design elements. The classification system shows the range of operating contexts (e.g., resources and constraints) and program

[3] For example, upstream lighting programs, multifamily direct install, Home Performance with Energy Star, and other designs are planned, implemented, and evaluated in relatively similar fashion from state-to-state.

[4] An exception is made for programs which have evolved from prior iterations over time, e.g., programs that evolved from ARRA-funded trials may retain some elements as it evolves.

design choices administrators have made. Many programs' attributes fall somewhere in the middle of the range endpoints.

Administrators and evaluators can use this classification to determine which best-practices are sensitive to context and applicable to their CBP. When transferring findings across studies, we suggest that evaluators consider, at minimum, similarities and differences between their program and past programs in terms of program origins (mandates/regulatory environment), the mix of ratepayer and other funder resources used to support a program (e.g., federal, NGO, municipal), basic program structure (nature of utility-community partnership, measures, delivery) and program goals (savings, target participants, non-resource, other). Additionally, evaluators should consider whether the CBP is working with communities that have an intrinsically-high level of bandwidth and preparedness, or whether the program was designed to build capacity where there was none before.

**Table 1. A Proposed Community Based Program Classification System**

| Program Element | Range | |
|---|---|---|
| Origins | Regulatory mandate | Voluntary |
| Administration | EE administrator only | Community only |
| Funders | Ratepayer only | Federal/state/municipal/private |
| Goals | Non-specific<br>(*e.g., enhanced relationships, community capacity-building, participation "lift"*) | Specific<br>(*e.g., # new energy efficiency jobs, kWh/kW savings*) |
| Portfolio position | CBP is a cross-cutting marketing activity promoting existing programs | CBP is an original (new) stand-alone program |
| Design | Umbrella program offered to multiple communities with no customization | Program developed for and customized to one specific community |
| Customer type | Non-specific/general population | Specific customer segment(s) |
| Participation goal(s) | Customer-level measures<br>*(e.g., home audit)* | Community-level measures<br>*(% participation; municipal retrofits)* |
| Geographic scale | U.S. Census block | Utility territory |
| Program messenger | Administrator materials only | Community materials only |
| Non-resource/ non-energy benefits | Incidental to resource/energy goals, but not tracked or claimed | Part of formal goals (see above) and tracked |
| Longevity | Limited engagement (e.g., 1 program year) | Extended/multi-year partnership process |

The processes of reviewing secondary literature on CBP effectiveness and listening to CBP stakeholders' views about program success also provided an opportunity to identify and classify the types of successes important for achieving energy savings with CBPs. Overall, the literature review and in-depth interview findings suggested that five criteria mark the CBP design's value and viability (Table 4).

**Table 2. Community-Based Program Success Metrics Indicating Program Viability and Value**

| Indicator of Design Viability and Value | Description |
|---|---|
| Program savings goal achievement | Programs have historically tracked total achievements like customer participation, energy savings, and goal realization, but also should be set up to tie these achievements to program outputs/outcomes (e.g., participant tracking per event, mailers sent, or enrollment via CBP's specific website). (*Short-term metric*) |
| Customer reach, awareness, actions | Some CBPs tracked changes in participation, measure mix and savings per participant, or hard-to-reach population participation. Fewer evaluations examined changes in community engagement relative to a territory-wide program. (*Short-term metric*) |
| Process outcomes | CBPs tend to be innovative designs. For PAs that are just beginning to pilot their first CBPs, success metrics may also include process signals, such as evidence that the program worked as it was designed to do (e.g., proof of concept). Areas to explore would include the extent to which the PA and community based organizations worked well together, that tracking systems capture relevant information and met community needs (e.g., benchmarking), or that observed activities and outcomes are consistent with a community-based theory of change (*Short-, medium- or long- term metric*) |
| Community capacity/ structural change in the utility-community interface | While not explored/documented consistently across CBP evaluations, administrators reported higher-level benefits including: increased community capacity, administrator's improved understanding of customer needs, improved administrator-community relations, and spillover benefits like readiness to participate in future programs. (*Medium- or long- term metric*) |
| Program longevity | Program longevity or evolution to a fully-funded/full-scale program, expansion to additional towns, adding to or refining features of a basic design, etc. show that CBPs are valuable and may have a longer-term place in the administrator's portfolio. (*Long-term metric*) |

## 1.5 Findings and Recommendations

We reviewed 25 CBPs tied to ten energy efficiency program administrators' existing ratepayer-funded offerings over the past ten years. Among these, we documented a diversity of goals, approaches, activities, and outcomes. We also encountered numerous additional programs that fell slightly outside of this scope but which provide context to the world of energy efficiency CBPs. Notably, there are many local programs throughout the United States and elsewhere which draw on community attributes, community-based social marketing, or other CBP design elements but which do not entail significant partnership with ratepayer-funded programs.[5] Reviews of those programs provide useful insight about how best to complete grassroots community campaigns, but we did not review them in detail given our focus on the utility-community nexus.

### Key Findings

#### Objective: Document the breadth of CBP designs and attributes

1. **CBPs usually deploy a multi-touch approach to overcome barriers to energy efficiency, commonly drawing on community institutions and attributes to better connect with customers.** CBPs generally offer multi-touch outreach and use a holistic strategy to work around multiple barriers to energy efficiency. CBPs that

[5] See, for example, Klein and Coffey's (2016) review and classification of community renewable energy projects (link) and the U.S. DOE Better Buildings Residential Network's (2017) "Community Based Social Marketing Toolkit" (link).

we reviewed have, for example, worked on barriers related to cost, customer awareness, municipal capacity, customer trust, a lack of excitement or follow-through, and the general challenge of connecting with customer segments that have historically not participated in energy efficiency offerings. While "traditional" ratepayer-funded energy efficiency programs also address these barriers, CBPs tend to emphasize overcoming non-monetary barriers in particular. Moreover, the CBP framework often explicitly treats community institutions as trusted implementation partners. While a utility may be able to implement some of the community-based strategies without a community partner, results from the process evaluations that we reviewed suggest that the approaches are more likely to come "alive" in the eyes of the customer when community-based organizations are involved.

2. **The CBP design is not a one-size-fits-all program design, but relies on local customization to stakeholders' (e.g., utility and community) wants and needs**. The community-based design is a customizable approach to achieving program savings that allows administrators to better leverage local flavor in working through their constituents' unique barriers to energy efficiency. Some administrators, for example, may need strategies to bring basic efficiency offerings to customers who do not speak English, while others may have different needs, like building excitement in a rural community for a complex weatherization offering. CBP customization also extends more broadly to program structure. For one, some are set up to enhance existing energy efficiency programs, while others are set up as new and stand-alone programs. Additionally, administrators can choose to either work to boost capacity where communities are struggling, or to be more selective in choosing only the most capable community partners. By way of these examples, it should be clear that most administrators can use the community-based framework because it is so customizable, but each will need to make it their own by selecting different tactics. In selecting the best approach, a PA should consider their policy environment, community readiness to serve as an active partner in program delivery, and the primary (energy savings) and ancillary (goodwill, etc.) goals.

### Objective: Explore the relative effectiveness of various community engagement strategies

3. **Grassroots local messengers were the most commonly praised customer-focused outreach strategy.** Many programs recruited local messengers to spread program information, including a mix of citizens and/or local organizations. Key messengers were past participants, important local figures like mayors, and trusted local non-profits like youth groups. In concept, using trusted messengers means that potential participants are more receptive to marketing compared to mass-market outreach. For example, uncertainty about the potential benefits of home upgrades may leave customers reluctant to invest the time and resources needed to participate in energy efficiency programs, despite advertisements proclaiming the benefits of participation. According to interviewed administrators, customers that heard about the benefits of participation first-hand from known and trusted compatriots seemed to be more receptive to it.

4. **Effective community engagement designs often layer technical and programmatic support for the community on top of customer outreach.** The kind of support provided ranges from basic energy efficiency trainings and marketing support to true technical support (e.g., program staff helping municipal officials set up and use U.S. EPA's Portfolio Manager). Regardless of the content or purpose of the communication, PAs found that direct and frequent communication with community based organizations can increase an organization's willingness and capacity to partner with the PA. This support enables the organization's effectiveness in serving as a link between the program and community constituents. In addition, administrators said that these structured, regular communications were an effective design tactic because they indirectly strengthen the community partner's interest in, and ability to, communicate with constituents about energy efficiency issues after the program has ended.

5. **CBPs are not often structured in a manner that facilitates the comparative evaluation of program design strategies and marketing tactics.** Evaluations studying CBP tactic effectiveness tend to rely on post-program participant surveys, process interviews with program administrators, and triangulation. As with other types of energy efficiency programs, evaluators commonly surveyed CBP participants post-participation to determine rates of marketing recall and factors motivating participation. Evaluators less-frequently completed experimental or quasi-experimental analyses to estimate marginal increases in program participation, or explored program attribution to determine what, specifically, about the CBP drove marginal increases in participation relative to other influences or compared to another program type. As a result, we found that the CBP evaluation literature offers sparse material for evaluating the relative effectiveness of program design strategies.

6. **As energy-reduction programs, CBPs have been evaluated in terms of their direct outputs (participation and savings). Notably, the programs also benefit community capacity, goodwill, and indirect energy savings.** CBP success can be classified in terms of five dimensions, including: (1) program savings goal achievement; (2) customer reach, awareness, and actions; (3) implementation process; (4) community capacity or a structural change in the utility-community interface, and (5) program longevity.[6] Despite the original intent of a CBP to reduce energy in the short term, administrators noted that community capacity and goodwill were some of the most notable benefits from their CBPs. While not explored/documented consistently across CBP evaluations, administrators reported higher-level benefits including: increased community capacity, the administrator's improved understanding of customer needs, improved administrator-community relations, and spillover or longer-term benefits like readiness to participate in future programs. Structural and long-term outcomes were generally discussed anecdotally rather than via a formal research design. This seems to be because few CBPs have tracked these outcomes in a way that enables evaluators to establish a link between program outputs, non-resource outcomes in the short term, and indirect savings in the long term.

7. **CBP benefits may ultimately depend on "the eye of the beholder."** In EM&V frameworks mandated by many regulatory commissions, the focus is on achieving a set energy savings target within budget, and doing so cost-effectively. CBPs inherently require added costs (e.g., customization) yet their added benefits either may be relatively small or may be hard to measure in the short term. Hard-to-measure benefits include enhanced community goodwill towards utilities and community capacity (with associated spillover savings), neighborhood ties, health benefits, environmental justice benefits, and others. Not all EM&V frameworks allow administrators to capture non-energy benefits. In contrast, from the community view, those hard-to-measure benefits may be the primary success metrics. In at least one case, regulatory frameworks count non-energy outcomes in equal measure to energy savings (i.e., Sustainable Jersey, and its capacity for community building). Many utilities, however, perceive that there are plenty of other, possibly less-costly, ways to build community relationships.

**Objective: Explore what factors help to explain why community strategies have been variably effective across contexts**

8. **It is often necessary to let CBPs evolve and grow so that the PA identifies the right mix of elements for their utility and community.** Interviewed administrators repeatedly noted that CBPs have been most successful when they took the time to find and leverage the right opportunities in a community. In terms of how to find these opportunities, administrators of longer-running CBPs counted on "learning by doing" and noted that finding the right approach took time and a commitment to sticking with a program while

[6] We discuss these metrics further in Section 2.2.3 below.

initial challenges were being worked out. CBPs, therefore, appear less-suitable for contexts that call for a rigid and prescriptive approach.

8.1.1. The process of identifying the right opportunities was especially important for CBPs that relied on enthusiastic and talented local messengers. Finding the right spokesperson entailed local networking to find the right local messenger(s); until the right person or entity was brought into the program, outreach and messaging could flounder. On multiple occasions and often unsolicited, successful administrators reinforced the need to use a *mix* of program strategies and marketing tactics, echoing common practice in multi-touch marketing campaigns that some utilities already use. Administrators' common refrain when asked to provide advice was that, in the end, "there is no silver bullet" for successful community-based outreach.

9. **Communities have multiple priorities, and energy efficiency is only one of them. Working to meet communities' broader needs has helped CBPs gain traction.** In addition to CBP savings and participation goals, participating communities also want to meet their own goals. CBP participation complements some of them—such as municipal emissions reductions or fair housing provisions—but may compete against others—like focusing on renewable energy installation targets, providing "flashier" upgrades like electric vehicle charging stations, or supporting non-energy upgrades like public library renovations. Community performance bonuses designed to incentivize CBP participation are more attractive to municipal leaders if provided in a way that allows recipients flexibility in spending the awards towards their own energy or non-energy goals.

10. **Community-based social marketing principles have had a role in shaping CBP marketing plans and marketing messages.** Situating CBP participation as an individual action that supports collective goals is founded in social science. This framing serves to simultaneously increase CBP savings, motivate municipal leader buy-in, and motivate potential participants from the standpoints of helping neighbors, gaining an environmentally friendly image, feeling good about helping the environment, and fulfilling a civic duty. The principle is to ensure potential participants see their decision to participate as one with direct consequences for their local community at large. For example, a community can advertise the CBP as for a way to fund library retrofits. This type of marketing can also work for larger-scale programs (e.g., counties or bigger regions) if PAs ensure regional messaging templates can be adapted locally, so that citizens can still identify with the program as a neighborhood effort.

11. **There is not much quantitative evidence that explains why community strategies have been variably effective across contexts. Having reviewed evaluations of 25+ programs, our view is that the strict measurement requirements set by many utility commissions miss the opportunity to measure long-term savings and non-energy benefits.** EM&V frameworks have not encouraged the type of program design or evaluation methods that adequately capture CBP benefits and enable an empirical study of tactic effectiveness. Common lore among program administrators is that community partnerships are not as cost-effective as top-down programs because they garner only marginally-more participation (e.g., 70 audits when an existing program would have achieved 65) yet need significantly more effort to implement. While this does result in lower cost-effectiveness for some programs, not all programs had been evaluated in ways that fully captured program benefits, thus tipping the balance. Speaking with administrators confirmed that few CBPs were designed or tracked in ways that would facilitate marginal savings analyses or a study of longer-term outcomes. A full accounting of program benefits would include both the short-term marginal gains in participation and savings during the program year, as well as longer-term or spillover savings produced indirectly via fostering positive community experiences with deeper and more tailored outreach, and non-resource benefits.

## Considerations

Holistically, the CBP effectiveness study points to several overarching recommendations to help foster excitement and engagement from local partners and implement a successful CBP.

- Clear, community-focused communication is a central driver of CBP success (Findings 1, 3, 4 and 10). **Consider building CBPs that involve clear and consistent communication with local partners.** Local partners, especially municipalities, have a lot of issues competing for their time and resources. To help keep energy efficiency as a top issue, administrators can provide regular technical assistance and programmatic support. These discussions offer an easy "in" to keep lines of communication open with community leaders and make program participation more approachable and less daunting. Additionally, administrators can provide official structure to clarify expectations—such as developing a contract, partnership agreement, or a Memorandum of Understanding with community partners.

- While barriers to energy efficiency still exist, communities may have little bandwidth to participate in an energy efficiency program (Findings 2, 4, 7, 8 and 9). **Consider designing inclusive programs that offer communities support in reaching their own energy and non-energy goals**. This begins with a needs assessment to understand the local community's values and priorities. Once identified, the program can design or adapt implementation and incentives to align program offerings with community needs, thereby making the program more attractive. One option is to offer community performance bonuses structured in a way that motivates municipal, non-profit, and/or citizen buy-in. Another is to provide technical and other assistance to build local capacity. Finally, programs may also want to draw on community-based social marketing principles in communicating the program's value to the community, framing individual participation in context of to social, family, and civic environment.

- Findings 2, 4, 8, and 10 highlight the need for tailoring CBP engagement strategies and marketing messaging to the specific target population. **Because tailoring engagement and marketing to target populations can take some trial-and-error, consider being flexible with program design, participant engagement strategies, and marketing.** More important than any specific program design strategy or marketing tactic, CBPs are most successful when they find and leverage the right opportunities to connect with community members. Taking a learning-by-doing approach for each community does call for more boots-on-the-ground and requires upfront planning to right-size program administration and implementation (e.g., staffing up with AmeriCorps volunteers or a full-time staffer, setting up plans for growing the program slowly to avoid running into constraints).

- Still, once successful systems are identified, administrators may be able to deploy efficiencies of scale by standardizing some elements across programs (Findings 5 and 10). **Administrators can consider using an "umbrella" program design to standardize successful elements that will achieve cost savings and ease the transfer of knowledge across time and communities.** An umbrella design formalizes and standardizes aspects of the CBP development, implementation, and evaluation. Rather than reinventing the wheel for each community in a PA service area, standardizing common elements of CBPs and developing broad processes and workflows enables PAs to leverage their experiences across their service territory and over time to improve the process of creating and implementing a CBP. Umbrella designs should also include a central planning and tracking system to catalogue the use of different outreach tactics provided to different customers over the years, as this will better enable cross-cutting evaluation. Such a data collection and tracking approach should be fully set up before marketing and enrollments begin. This clarifies community expectations, allows for real-time course corrections starting at day one, and provides participant-level data for short-term evaluation as well as charting the CBP's evolution over time. Overall, according to implementers of both smaller regional efforts within the Northeast and large multi-county efforts in California, the umbrella design provides an optimal mix of formality and flexibility. To assist in this exercise, we have included a proposed CBP classification system in Section 4.1 below. Administrators and evaluators can use this classification to

determine which best-practices are sensitive to context and applicable to their CBP. When transferring findings across studies, we suggest that evaluators consider, at minimum, similarities and differences between their program and past programs in terms of program origins (mandates/regulatory environment), the mix of ratepayer and other funder resources used to support a program (e.g., federal, NGO, municipal),

- Together, Findings 5, 6, and 7 suggest that while CBPs tend to produce many non-energy benefits that participating organizations value, not all of the CBPs that we reviewed adequately tracked and reported on non-energy benefits. **Consider program implementation methods that provide data to rigorously capture non-energy and/or long-term outcomes,** such as spillover, longer-term savings, and benefits associated with structural changes in the way utilities and communities interact with respect to energy efficiency. Appropriately implementing and tracking activities can remedy some of the uncertainty about whether a CBP has truly contributed to increased savings relative to a mass-market program. The data can be used for real-time course corrections as well as evaluation. Standardized customer-, participant- and activity-specific tracking systems would be helpful for evaluating all variants of the CBP design, including stand-alone programs and those implemented as marketing add-ons. Additional process measurements to assess these benefits include but are not limited to tracking participant diversity, tracking participation rates among harder-to-reach segments, and comparing these and other metrics across participating and non-participating communities (e.g., awareness, engagement, participation, savings).

- Current evaluation methods do not fully capture non-energy or longer-term benefits (Findings 6 and 11), which may provide a skewed or incomplete picture of CBP tactic cost-effectiveness. **Fully answering questions of CBP viability and tactic effectiveness calls for evaluation methods that better facilitate attribution analysis, explore long-term outcomes, and attempt to better capture non-energy benefits.** Some of the remaining evaluation gaps are tied to the general challenges of measuring non-energy benefits, energy savings from behavioral changes, or benefits that take some time to accrue. Although non-resource benefits were some of the most-often-noted values of CBPs, not all regulatory commissions count these types of outcomes when tallying program benefits and costs. New evaluation methods (or regulatory-approved evaluation methods applied to different types of programs) may be needed to capture CBP value. Consider looking to evaluation techniques for programs that face similar measurement challenges as CBPs, including behavioral programs, codes and standards initiatives, and retrospective market transformation evaluations. Those types of offerings also have a multi-year pathway to energy savings, must tackle questions of behavioral persistence, and measurement challenges associated with attributing energy savings to a change in the structure/function of a marketplace. As a result, these programs go beyond participant surveys and annual savings analysis to also: develop indicators of long-term outcomes, formalize a logic model that shows how a training intervention leads to changes in energy use in the short-, medium- and long-term, collect systematic data to look for evidence of participant and non-participant spillover, track participant, non-participant, and market actor outcomes over multiple years, and other approaches. Where multiple lines of evidence are providing conflicting results, evaluators can triangulate savings estimates and attribution though reviewing the correspondence across a combination of evaluation techniques, such as stakeholder interviews, participant surveys, matched comparison groups and when possible experimental designs. These approaches are relatively untested for CBPs but may better represent the range and magnitude of CBP impacts

- Study results point to several areas of future research, including the long-term participation and energy-saving impacts of CBPs. The results also suggest there is a need for a formalized framework of CBP activities, outcomes, costs, and benefits that will establish a common terminology for CBP evaluations moving forward. **We suggest that the PAs consider additional studies that explore long-**

**term savings from selected Massachusetts CBPs using a difference-in-differences research framework.**

# 2. Phase 1 Synopsis

The remainder of this summary provides a synopsis of our research methods, discusses key findings about the value of community-based tactics in context of ratepayer-funded energy efficiency, and provides recommendations for additional research in Phase 2 of this study and elsewhere.

## 2.1 Methods

We used two methods in this study: a community-based program literature review and in-depth interviews with a sample of CBP stakeholders. We designed the literature review to gain broad insights about CBP design, implementation, and outcomes. Next, we completed in-depth interviews with ten selected CBP administrators to further explore community barriers to energy efficiency, CBP origins, and lessons-learned by the CBP administrators. All research was completed between June 2016 and April 2017.

### 2.1.1 Literature Review

We searched for CBPs by reviewing the energy efficiency program evaluation literature, including evaluation reports, program implementation plans, informal summary materials (e.g., fact sheets and websites), published literature, and white papers. We reviewed materials provided by the Massachusetts PAs and completed keyword-based web searches of conference proceedings, state public utility commissions, energy efficiency industry groups and others. The review identified 25 programs meeting our selection criteria. Given our initial focus on Massachusetts programs, the review included an emphasis on New England programs. Review methods tended to identify programs based in other regions that were larger and longer-running and less-often represented highly local and/or shorter-lived initiatives. After completing the literature search, we determined whether programs met the majority of our selection criteria, and catalogued those programs that met most or all of our selection criteria in an Excel database.[7] Appendix A presents the Excel database where we catalogued reported programs, including: administrator, origins, funding source(s), integration with ratepayer-funded energy efficiency portfolios, customer type, target outcome, program design and implementation, community partners, success relative to stated goals, and others. In addition, Appendix B provides a brief description of each CBP, which includes a list of key stakeholders, goals, and outcomes.

### 2.1.2 In-Depth Interviews

We conducted In-Depth Interviews (IDIs) to supplement the CBP literature review. These interviews were designed to not only provide additional perspective on the effectiveness of different CBP design elements identified through the literature, but also to inform our understanding of specific program elements found to be particularly impactful. Interviews confirmed program design elements reported in program documentation, elicited administrator-rated significance of participation barriers identified in the literature review, explored the rationale and context for the program, discussed the relative effectiveness of program activities, discussed the added-value of community-based elements relative to traditional residential offerings, and gathered input about lessons learned and suggestions for future research. All interviews were conducted between February 2017 and April 2017, and were audio taped and transcribed.

[7] We set aside several programs run by non-profits operating in the community-based energy efficiency space, but which generally fell outside of this review's definition. This includes programs from Wisconsin Energy Conservation Corporation (WECC), the California Center for Sustainable Energy (CCSE), OneChange, Action Research, and others.

Out of the 25 CBPs[8] included in literature review, we selected a purposive sample of 15 CBPs which represent a variety of program designs, participant engagement strategies, outcomes, and jurisdictions. In addition, we considered the availability of secondary resources such as EM&V reports and prioritized CBPs for which the availability of secondary resource was limited. We conducted IDIs with twelve representatives from the entities most knowledgeable about ten programs' historical decision-making, design, and evolution over time. Interviewees represented electric and gas utility PAs (6), ratepayer-funded non-utility PAs (2), and independent organizations who led CBPs (2). Geographically, these programs were in California (2), Connecticut (2), Massachusetts (4), and Vermont (2). All interviews were conducted between February 2017 and April 2017, and were audio taped and transcribed for qualitative data analysis in NVivo.

## 2.2 Results

### 2.2.1 Community Based Programs and their Main Features

The programs included in our study represent a wide range of program designs and tactics. They are, for example, provided in a variety of geographic locations, are serving several types of customers, and are focused on a diversity of goals. The programs also demonstrate that PAs and CBOs have collaborated in myriad ways—from true partnerships to more limited collaboration, in which either the PA or the CBO has a discrete role in limited aspects of the program. Figure 1 is on the next page and summarizes the 25 identified ratepayer-supported CBPs and their customer segments served, promoted end uses, and high-level design attributes. These programs were implemented in a range of geographies: 40% were implemented in Massachusetts (10) and the remaining 60% were implemented throughout the United States representing Connecticut (3), Washington (3), California (2), Oregon (2), Vermont (2), Kansas (1), New Jersey (1), and Rhode Island (1). Given the geographic concentration of reviewed programs in New England, we recommend taking policy, market, and energy usage attributes into account when interpreting this study's results.

In addition to their geographic dispersion, the 25 CBPs varied widely across administrators in terms of their origins, program design, and implementation strategies. Below, we discuss variations in origins, administration and funding, target customers, program design strategies, and community-based marketing approaches. Section 4, below, lists program attributes in detail, and Appendix A provides detailed descriptions of each.

#### Program Origins, Administration, and Funding

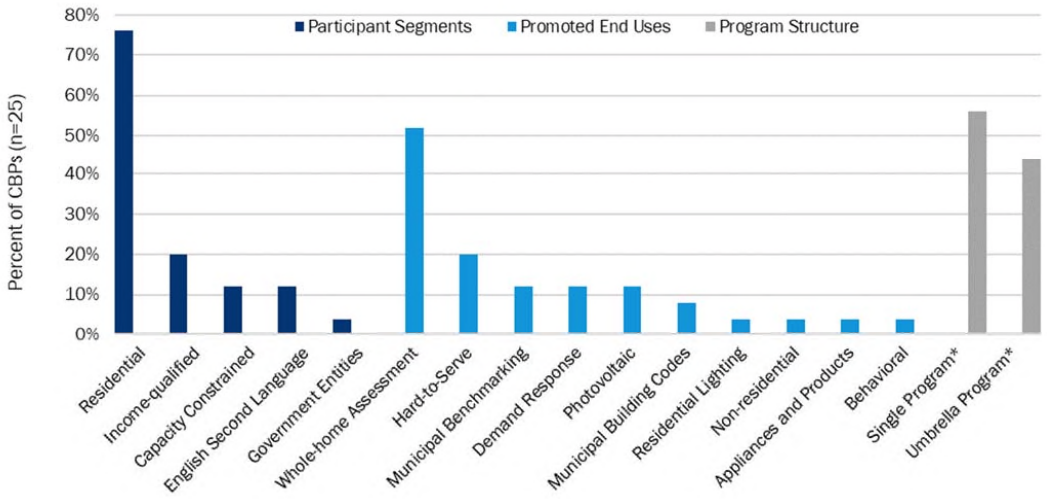
Although often evaluated in context of their energy savings or capacity to enhance marketing and outreach, CBPs originate in a broad variety of contexts. Programs have sprung from a need to meet a regulatory mandate, a stakeholder's desire to capitalize on one-time funding, a utility's interest in creating community goodwill, a community's interest in working with a utility, an interest in reaching hard-to-serve customers, and others.

For instance, the Oregon Legislature passed the Energy Efficiency and Sustainable Technology Act (EEAST) in 2009, which directed the Energy Trust of Oregon to initiate and evaluate pilots in investor-owned utility (IOU) service territories with the goal of providing easy-to-use energy efficiency financing for residential and businesses customers. The Clean Energy Works Portland (CEWP) pilot satisfied the EEAST Act requirements—although CEWP predated the passage of the Act, highlighting the often-intertwined nature of social and

[8] Although we identified 27 different CBPs originally, during the course of the study we made the determination it was appropriate to combine Efficiency Neighborhoods+ Initiative with the Cape Light Compact EN+ and combine the New Bedford CMI with New Bedford Energy Now!, and therefore report a final program count of n=25.

community movements and the creation of public policy. In terms of the special funding opportunities, a number of the CBPs grew out of one-time grant funding from the U.S. Department of Energy's Energy Efficiency and Conservation Block Grant (EECBG) as funded by the 2009 American Recovery and Reinvestment Act (ARRA).[9] For example, the Washington State legislature directed Washington State University to develop the Community Energy Efficiency Pilot (CEEP) with DOE EECBG funds as a way to identify and fund pilot projects that could provide "community-wide urban residential and commercial energy efficiency upgrades."

**Figure 1. Participant, End Use, and Program Design Attributes of Included CBPs**




Note: Unless where indicated with (*), programs were classified by multiple variables.

CBPs leveraged existing programs to various extents, ranging from not at all (e.g., developing an entirely new offering) to extensive (e.g., starting with an existing multifamily program and adding community-based approaches). The design choice seems tied to administrator goals. Unsurprisingly, those whose main goal was to boost participation in an existing program leveraged the existing program's structures (PG&E's Local Government Partnerships and others). Programs involving contests and competition (e.g., Kansas's Take Charge Challenge), or which community partners initiated (e.g. NWWVT's HEAT Squad), tended to create a more novel administrative and delivery structure.

In speaking with administrators, we found that not all CBPs are treated as stand-alone programs. Specifically, some administrators—particularly in Massachusetts—consider their CBPs as part of portfolio-wide marketing efforts. These CBPs-as-marketing-tactics still involve working closely with local stakeholders (mayors, nonprofits, citizens) but focus solely on customizing marketing efforts to channel local participation in existing

[9] The EECBG program was part of the 2009 American Recovery and Reinvestment Act, and provided funding for local governments, states, and territories to fund a range of energy efficiency and renewable energy projects. The DOE Better Buildings Neighborhood program was also used to distribute both EECBG and State Energy Program funds through a competitive selection process.

programs. In Massachusetts, at least, these marketing CBPs are not subject to formal program evaluation standards. Thus, the review uncovered a diversity of ways that CBPs are planned, implemented, and evaluated.

While all reviewed CBPs were built on an existing ratepayer-funded energy efficiency program by design of the review, utility PAs did not lead all of the efforts. The reviewed CBPs included utility-driven efforts in which the administrator developed the program framework with relatively little community input (44%), as well as more-collaborative efforts in which the administrator and community were both involved in planning (40%), or, less often, community-driven initiatives in which a CBO developed the framework and then sought utility partnership (16%). Further, while all reviewed CBPs leveraged some amount of ratepayer funding (100%),[10] it is largely due to the influx of federal capital following the great recession that such a breadth of program strategies, engagement tactics, and program evaluations are available to us to learn from today. Notably, 48% of programs received federal funding, such as from the U.S. DOE EECBG program. Additional program funding included local taxpayer funds (32%), private grant support (24%), or funding or in-kind resources from universities (12%).

### Target Customer Populations

Traditionally, PAs have offered efficiency programs to all eligible customers, aiming to achieve participation territory-wide. Of the 25 CBPs we reviewed, many were delivered to the general population (72%), although others catered to the moderate-income sector (28%), high-potential savers (28%), non-native English speakers (20%), single-family or multi-family housing (16%), or renters (8%).[11] Some programs catering to specific groups delivered the offering to any customer living in a geographic region with a high density of target participants. For example, demand-reduction CBPs often focused on towns containing constrained circuits (NSTAR's Marshfield Energy Challenge) or neighborhoods defined specifically by circuit geography (National Grid Rhode Island's System Reliability Procurement Pilot). Geographic clustering can also minimize "search costs" associated with recruiting participants from hard-to-serve customer segments such as moderate-income households who do not meet low-income program eligibility criteria but may still have trouble accessing market-rate programs (Clark PUD's Community Energy Efficiency Program, Efficient Neighborhoods+) or non-English-speaking households (Boston's Community Mobilization Initiatives, or "CMIs"). Among the income-qualified CBPs, the approach of providing the same tailored design (e.g., waiving income history requirements) to all members of a community is thought to be effective because it avoids placing a stigma around income that could pose a barrier to participation. One administrator advised that CBPs add value because the program can highlight several programs for a community, but present them within a holistic framework that allows customers to self-select into the most appropriate offering for their needs. The administrator noted, "*We found that if you go into a community and you say, 'Who's limited income? Who's unemployed?'* [it doesn't work, because] *... customers don't want to be identified that way. They'd rather just note the suite of programs that exist, and self-identify or go through the processes that get them enrolled into what is best for them*." On the other hand, programs that promote comprehensive home upgrades like weatherization may target the program to customers able to meet a minimum savings threshold (e.g., Clean Energy Works Portland's pilot program was designed to achieve 10% savings per home, and screened customers based on energy use).

[10] Even programs which did not receive ratepayer funds directly leveraged existing PA incentives. We treated the use of ratepayer funding as a separate attribute than program origins (utility-driven, CBO-driven, and partnership); funding sources are a separate statistic than program origins.

[11] Totals do not sum to 100% because some administrators used some CBPs to reach multiple segments.

The CBPs we reviewed are split in terms of their program service area: 30% focus on a single municipality, 22% operate at the entire service area, and 30% are available state-wide. Remaining programs are run at the level of a county, a multi-town region, or for specific neighborhoods within a town. Most programs still entail local implementation at a municipal scale or smaller (89%). Across all programs analyzed, slightly more than half (56%) are independent, single programs focused on a specific community, and just less than one-half (44%) are umbrella programs, where a programmatic infrastructure is provided at a higher level and can be applied with different levels of tailoring to different populations for local implementation. Massachusetts programs differ greatly from non-Massachusetts programs in this last respect, with 70% of the Massachusetts programs we reviewed relying on a single program design (compared to 47% of non-Massachusetts programs) and only 30% are umbrella programs (compared to 53% of non-Massachusetts programs).

## Program Design and Marketing Tactics

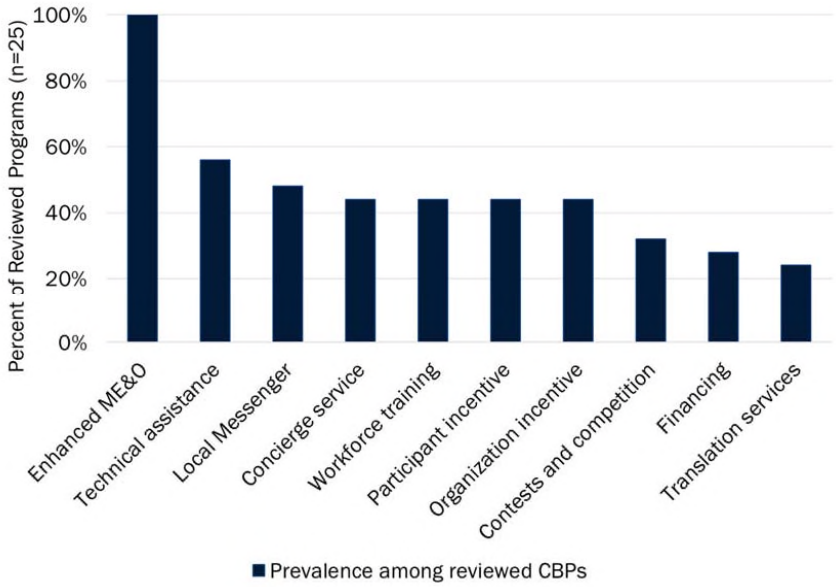
CBPs intend to add value over traditional ratepayer-funded energy efficiency programs by using community expertise and attributes to help overcome key barriers to customer participation in energy efficiency programs. Compared to programs in which either a utility or the community works in isolation, community partnerships enable both the PA and the community to offer more comprehensive customer services than would otherwise be possible (Carmalt Justus & Schulte, 2010). Based on the literature review, we identified seven key barriers and ten main program tactics deployed by CBPs. The key barriers are: lack of awareness, underdeveloped markets for clean energy services, lack of customer trust in the utility, lack of excitement about energy efficiency programs, issues with complex program design, high cost of energy efficiency upgrades and difficulty in locating hard to serve customers. The tactics are: enhanced marketing, education and outreach (ME&O),[12] technical assistance for community partners to support outreach and implementation, concierge service for customers to support enrollment and participation, trainings and workforce development for contractors, participant incentives, community incentives, local messengers to incite local spirit, contests and competition, financing, and translation services. Reviewed CBPs used a mean of four of these ten community tactics (range: 1 to 9).

### Literature Review

All reviewed programs used some form of community-enhanced marketing and outreach, but select the tactics to match the perceived barriers to program participation. Aside from enhanced marketing, no individual tactic is present in more than 60% of all programs, evidencing the varied program contexts of each CBP (Figure 2). For example, enhanced participant incentives tend to be used by programs focused on serving medium-oncome customers (e.g. Project Energy Savings (Clark PUD) or Efficient Neighborhoods+) or are promoting expensive measures (e.g. Solarize), while concierge service tends to be used by programs focused on small businesses (e.g. EE2020) or promoting time-intensive participation processes like home energy assessments (e.g. Renew Boston or CEWP). In addition, inter-town contests can only be leveraged in programs available to multiple towns at one time (e.g., KS Take Charge Challenge, CT N2N, NWWVT HEAT Squad).

[12] Enhanced marketing, for purposes of this review, means marketing that leverages local geography (e.g., sending marketing materials to customers in demand-constrained areas), community institutions (e.g., using municipal government letterhead or partnering with a local non-profit, placing messages inside water bills; tabling at town events), and/or local community interactions (e.g., local messengers).

**Figure 2. Customer and Community Engagement Tactics Used by CBPs**




Additionally, as shown in Figure 3, evaluations report on a particular tactic's effectiveness in about 20% to 80% of programs where the tactic is being used. Financing, workforce training, and enhanced marketing are the most-frequently evaluated tactics. In situations where tactics have been evaluated, evaluators and administrators have found most tactics to be variably successful (
Figure 4). Workforce trainings, additional participant incentives, local messengers, enhanced marketing, technical assistance for communities, and motivational contests were effective community engagement tactics. Tactics less-frequently found to be effective included financing, concierge services, incentives for CBOs, and translation.

Figure 3. Customer and Community Engagements Tactics Evaluated

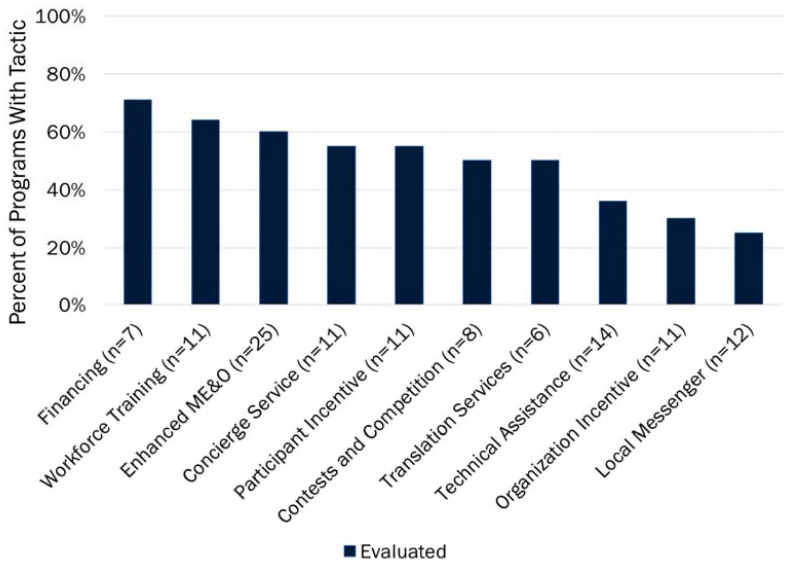
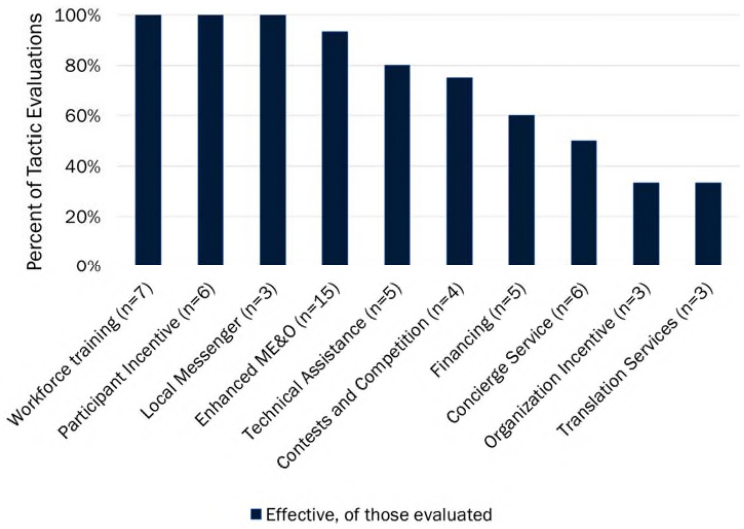



Figure 4. Customer and Community Engagements Tactics Found to be Successful



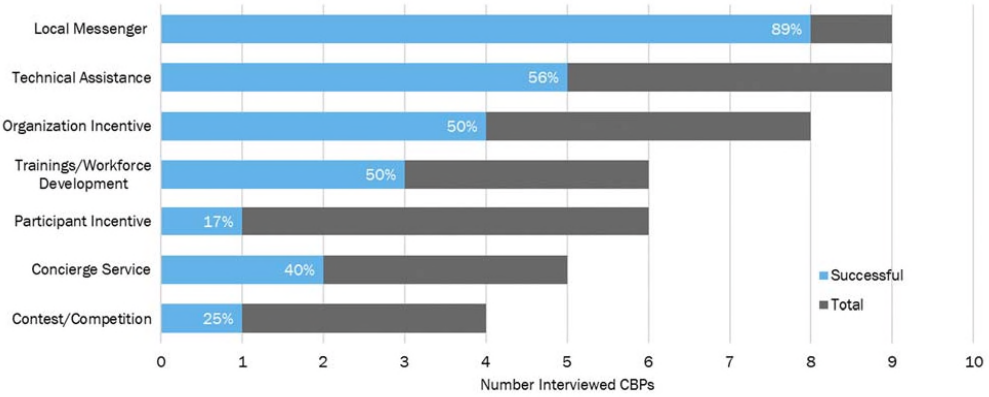
Note: This is the share of programs using a strategy and that formally evaluated the strategy's effectiveness, in the sense of using an EM&V report to present evidence that the strategy was effective, ineffective, or had uncertain effectiveness.

### In-Depth Interviews

The in-depth interviews revealed similar findings. Among our pool of interviewees, local messengers emerged as the key program marketing tactic (9 of 10). Local messengers could be either individuals (often previous participants or important local figures such as mayors) or organizations who act as a trusted source of information for spreading information on program participation. Uncertainty about the potential benefits of home upgrades may leave customers reluctant to invest the time and resources needed to participate in energy efficiency programs, despite advertisements proclaiming the benefits of participation. According to respondents, customers that hear about the benefits of participation first-hand from known and trusted compatriots may be more receptive to information about the benefits of home upgrades, thereby readjusting their internal cost-benefit calculations and forming stronger expectations about the net value of participation. As one respondent notes: *"I think it's less about the tactics and more about how you do it because what you're really looking for is who is that trusted advisor in the community and getting them [to], you know, tell the story and to encourage their friends and neighbors to do it. [That] is what's powerful."*

Besides local messengers, respondents reported that the most successful CBP strategies have been technical and programmatic assistance, organizational incentives, and workforce development. Most commonly, respondents discussed the importance of providing technical and programmatic support to local partners (5 of 9). The kind of support ranges from true technical support (e.g., setting up and using EPA Portfolio Manager), to basic energy efficiency trainings and marketing support. Regardless of the content or purpose of the communication, program representatives stated that direct and frequent communication with community partners helps to increase the community partner's willingness and capacity to engage with both the program specifically, as well as indirectly helping to increase the community partner's interest in communicating with their constituents about energy efficiency issues more generally. One respondent highlighted that many competing interests vie for local officials' limited time and resources, while another explained why choosing to engage with a PA may be costlier or more time consuming for a community partner than alternative undertakings would be. Exemplifying these accounts, one respondent stated: *"[T]owns have a variety of things that are important to them, and energy efficiency is not the most exciting topic. So you need to engage early and often. You need to stay on top of that relationship."*

**Figure 5. Program Strategy Prevalence Among Respondents' CBPs and Respondent-Rated Relative Success**




### Similarities and Differences Between Literature Review and In-Depth Interviews

Literature review and in-depth interview findings are moderately well-aligned in terms of their implications about tactic effectiveness (Table 3). The literature review and in-depth interviews both indicate the most successful tactic a CBP can use is a local messenger. In addition, results of both research activities indicate a general agreement that concierge services and organizational incentives have been moderately successful. Literature review and administrator interviews begin to diverge with respect to the effectiveness of technical assistance; although there is some directional agreement, the literature review offered stronger evidence of effectiveness (80%, or 4 of 5 programs in which the tactic was evaluated) than the in-depth interviews (56%, or 5 of 9 programs which used the tactic). Technical assistance was the second highest-rated tactic by interview respondents from the in-depth interviews. The literature review and in-depth interviews differ more noticeably in their conclusions regarding the effectiveness of increased customer incentives, workforce development, and contests and competitions. While these three tactics were found to be quite effective in the literature, respondents report they are much less impactful. Overall, the comparison exercise provides directional findings that local messengers tend to be consistently effective, that concierge services and organizational incentives are generally thought to be moderately successful, and that there is mixed evidence on other tactics (technical assistance, increased customer incentives, workforce development, and contests and competitions).

Readers should avoid placing too much weight on the similarities and discrepancies across the two lines of research, given the small number of observations in each method. Additionally, the in-depth interviews were developed and conducted as a means to further investigate and refine the general themes surrounding CBP lessons-learned, rather than to gain a representative comparison of stakeholders' views to the secondary literature. For example, we completed just six in-depth interviews with respondents that used increased participant incentives and only four with CBPs representatives that used contests or competitions. Additionally, we also prioritized interviewing stakeholders of CBPs for which we lacked sufficient third-party evaluations, therefore systematically emphasizing different CBPs than are covered in the effectiveness literature (e.g.,

Figure 4).

**Table 3. Tactic Effectiveness as Reported in the Literature Review and In-Depth Interviews**

| Tactic | Literature Review | | | In-Depth Interviews |
|---|---|---|---|---|
| | Prevalence among reviewed CBPs | Programs in which tactic was evaluated[a] | ... and found effective | |
| Local Messenger | 13 | 23% | **100%** | **89%** |
| Technical Assistance | 15 | 33% | 80% | 56% |
| Trainings/ Workforce Development | 12 | 58% | 100% | 50% |
| Participant Incentive | 12 | 50% | 100% | 17% |
| Concierge Service | 11 | 55% | **50%** | **40%** |
| Organization Incentive | 11 | 27% | **33%** | **50%** |
| Contests and Competition | 8 | 50% | 75% | 25% |
| Enhanced ME&O | 25 | 60% | 93% | Not asked |
| Financing | 7 | 71% | 60% | Not asked |
| Translation Services | 7 | 43% | 33% | Not asked |

### 2.2.2 How Does the Community-Based Design Benefit Program Administrators?

Program representatives discussed a variety of benefits of CBPs, which generally included co-branding, developing relationships, leveraging resources, and increasing program reach. Respondents most frequently cited benefits coming from community co-branding (8 of 10), in which PA- or utility-branded marketing materials are modified to also include local government or local organization branding. Administrators reported that co-branded materials and outreach strategies help position the program as vetted by trusted local institutions (e.g., the mayor's office) and relevant to the customer's daily life, but also backed by the technical and financial know-how of the customer's utility. Almost as common as co-branding, respondents cited benefits associated building relationships with customers and community partners (7 of 10). In addition to supporting the CBP's program goals, key stakeholder relationships established during the CBP have, in some cases, provided a kick-off point to future new or innovative energy efficiency offerings. More than one-half of respondents (7 of 10) discussed leveraging a local partner's funding (e.g., ARRA funds or other funds) or volunteers (for in-person outreach and mail stuffers). Six of ten respondents discussed the ways in which CBPs increased their program's reach. Often PAs believe the CBP, through outreach and implementation strategies that are designed to focus on the community, brought customers into the program that otherwise would not have participated.

Perhaps surprisingly given that CBPs promote products and services that save energy or reduce demand, only a few respondents specifically mentioned increased program savings as a main CBP benefit. Only three of ten respondents explicitly mentioned having seen increased savings or participation, relative to a counterfactual, because of their CBPs. Note that, during interviews, administrators did not always focus on methods used to make this type of assessment but instead tended to speak in terms of general program "lift."

### 2.2.3 How Effective has the Community-Based Design Been?

Overall, the literature review and in-depth interview findings suggest that five criteria mark the CBP design's value and viability (Table 4).

**Table 4. Community-Based Program Success Metrics Indicating Program Viability and Value**

| Indicator of Design Viability and Value | Description |
|---|---|
| Program savings goal achievement | Programs have historically tracked total achievements like customer participation, energy savings, and goal realization, but also should be set up to tie these achievements to program outputs/outcomes (e.g., participant tracking per event, mailers sent, or enrollment via CBP's specific website). (*Short-term metric*) |
| Customer reach, awareness, actions | Some CBPs tracked changes in participation, measure mix and savings per participant, or hard-to-reach population participation. Fewer evaluations examined changes in community engagement relative to a territory-wide program. (*Short-term metric*) |
| Process outcomes | CBPs tend to be innovative designs. For PAs that are just beginning to pilot their first CBPs, success metrics may also include process signals, such as evidence that the program worked as it was designed to do (e.g., proof of concept). Areas to explore would include the extent to which the PA and community based organizations worked well together, that tracking systems capture relevant information and met community needs (e.g., benchmarking), or that observed activities and outcomes are consistent with a community-based theory of change (*Short-, medium- or long- term metric*) |
| Community capacity/ structural change in the utility-community interface | While not explored/documented consistently across CBP evaluations, administrators reported higher-level benefits including: increased community capacity, administrator's improved understanding of customer needs, improved administrator-community relations, and spillover benefits like readiness to participate in future programs. (*Medium- or long- term metric*) |
| Program longevity | Program longevity or evolution to a fully-funded/full-scale program, expansion to additional towns, adding to or refining features of a basic design, etc. show that CBPs are valuable and may have a longer-term place in the administrator's portfolio. (*Long-term metric*) |

Interviewed administrators expressed concerns about how to measure the more intangible among the benefits in Table 4, expressing some consternation that the biggest CBP benefits – community capacity and goodwill—are even harder to measure than incremental changes in participation or savings. CBPs may boost local goodwill, trust, and other outcomes secondary to energy saving/demand reduction goals, but few CBPs have tracked these outcomes in a way that establishes a link between program outputs and non-resource outcomes. Rather, evaluation methods for these longer-term structural changes are under-developed, and we found that results are generally discussed anecdotally rather than via a formal research design. As one administrator noted, the utility has "*a sense of goodwill that's been created with participation or partnering with these communities, but I don't know if there is any type of measuring stick for that [type of outcome].*"

Respondents recalled that they have faced measurement challenges within the traditional evaluation framework because the framework focuses on a specific, and typically relatively short, timeframe. Some of the evaluation gap appears tied to the general challenges of measuring non-energy benefits, energy savings from behavioral changes, or benefits that take some time to accrue. Namely, CBP evaluation has been a challenge in the absence of data needed to tie indirect impacts to program activity, issues developing the right baseline in a complex market, and timing issues (benefits that accrue years after costs). Another part of the

challenge appears tied to capturing behavioral or institutional spillover.[13] Finally, others struggled to attribute savings to community activities because programs were run as experimental designs.

Still, there is some direct and indirect evidence that CBPs can boost savings where traditional programs fall short. Just over half (52%) of CBPs indicated some type of marginal savings or participation analysis occurred (13 of 25), although this includes both simple historical participation analyses as well as more robust, quasi-experimental estimation methods. If suitable comparison groups (and data) existed, some evaluations completed matched comparisons between participating and non-participating towns to estimate the share of savings attributable to the overall CBP intervention (7 of 25). Good examples included Efficient Neighborhoods+, Rhode Island SRP, WMS, and CEWP/CEWO.[14]

Where completed, evaluation methods studying tactic effectiveness tended to rely on post-program participant surveys (e.g., marketing recall or motivations to participate in the program), process interviews with program administrators, and triangulation.[15] Many evaluations surveyed program participants (12 of 25) to determine marketing recall rates, which was occasionally supplemented with general population surveys to indicate program attribution (4 of 25). Other evaluations conducted in-depth interviews with program staff or other market actors to inform process recommendations (8 of 25). In addition, almost one-quarter of programs conducted other kinds of analysis, such as a depth of savings analysis or an investigation of conversion rates over time (7 of 25). Finally, some evaluations triangulated multiple sources of information to draw conclusions about probable drivers of program success.[16]

Altogether, these comments suggest that the main benefits of CBPs are not measured and credited to these endeavors. Some administrators noted that CBPs do not often appear cost-effective within a regulatory framework focused only on savings, as with the one who noted that, "*...if your goal is numbers [of participants or savings]—I don't think community based outreach is the way to go. If your goal is building a long-term relationship with less-measurable outcomes then I think that there is a case to be made about how it can really benefit the community*." Tracking participation rates and customer awareness over time —and in addition, CBO or partner satisfaction over time— would enable CBPs to demonstrate these benefits more

[13] For example, one administrator noted that participating community had hired a sustainability coordinator based on their experiences with the CBP. This outcome is indirect to the CBP's energy-saving goals, but accrued over the longer-term and may produce spillover savings.

[14] All three evaluations show a positive net impact due to CBP intervention. For example, the 2014 Rhode Island SRP study estimated an incremental participation rate of 53% based on a comparison of participation in the target population to that of nearby communities and prior program years. This incremental participation rate was one component of the overall "take rate," which also includes a marketing attribution rate determined through participant recall surveys. This results in an estimated incremental peak load reduction of 32.9 kW. In addition, the Efficient Neighborhoods+ evaluation estimated that program resulted in incremental savings of 68,787 kWh and 7,835 therms, representing an increase of 39% and 55%, respectively, over what the standard Home Energy Services program would have otherwise produced.

[15] The NWWVT Heat Squad evaluation asked participants to rate the influence of different factors on their decision to participate, including Energy Advisors. The Marshfield Energy challenge evaluation asked participants to indicate how they learned about the program; results showed that participants more frequently learned about the program from friends and family compared to non-participants who were aware of the program, suggesting trusted messengers boosted conversion rates.

[16] The Efficient Neighborhoods+ evaluation could not determine what share of the initiative's success was due to increased marketing versus enhanced incentives. Still, participant survey results showed that cost was a major barrier to making energy efficiency improvements, and cross-community comparisons showed that towns offering increased incentives had a higher assessment-to-project conversion rate. Together, the evaluators suggested that the enhanced incentives may have made a difference.

rigorously. More broadly speaking, to adequately represent the true value of CBPs as a program, it may be that evaluators can consider applying evaluation methods used to address other programs, such as market effects studies, codes and standards efforts, or social marketing.

## 2.3 Findings

Our review captured 25 CBPs, among which we documented a great diversity of goals, approaches, activities, and outcomes. Synthesizing the literature review and in-depth interviews supports several original hypotheses about CBPs, highlights new understanding about why results have been variable, and illuminates areas for future research. Key findings and areas for future work are discussed in the following paragraphs.

### What is the breadth of CBP designs and attributes?

- **CBPs usually deploy a multi-touch approach to overcome barriers to energy efficiency, commonly drawing on community institutions and attributes to better connect with customers.** CBPs generally offer multi-touch outreach and use a holistic strategy to work around multiple barriers to energy efficiency. CBPs that we reviewed have, for example, worked on barriers related to cost, customer awareness, municipal capacity, customer trust, a lack of excitement or follow-through, and the general challenge of connecting with customer segments that have historically not participated in energy efficiency offerings. While "traditional" ratepayer-funded energy efficiency programs also address these barriers, CBPs tend to emphasize overcoming non-monetary barriers in particular. Moreover, the CBP framework often explicitly treats community institutions as trusted implementation partners. While a utility may be able to implement some of the community-based strategies without a community partner, results from the process evaluations that we reviewed suggest that the approaches are more likely to come "alive" in the eyes of the customer when community-based organizations are involved.

- **The CBP design is not a one-size-fits-all program design, but relies on local customization to stakeholders' (e.g., utility and community) wants and needs**. The community-based design is a customizable approach to achieving program savings that allows administrators to better leverage local flavor in working through their constituents' unique barriers to energy efficiency. Some administrators, for example, may need strategies to bring basic efficiency offerings to customers who do not speak English, while others may have different needs, like building excitement in a rural community for a complex weatherization offering. CBP customization also extends more broadly to program structure. For one, some are set up to enhance existing energy efficiency programs, while others are set up as new and stand-alone programs. Additionally, administrators can choose to either work to boost capacity where communities are struggling, or to be more selective in choosing only the most capable community partners. By way of these examples, it should be clear that most administrators can use the community-based framework because it is so customizable, but each will need to make it their own by selecting different tactics. In selecting the best approach, a PA should consider their policy environment, community readiness to serve as an active partner in program delivery, and the primary (energy savings) and ancillary (goodwill, etc.) goals.

### What community engagement strategies have been relatively most effective?

- **Grassroots local messengers were the most commonly praised customer-focused outreach strategy.** Many programs recruited local messengers to spread program information, including a mix of citizens and/or local organizations. Key messengers were past participants, important local figures like mayors, and trusted local non-profits like youth groups. In concept, using trusted messengers means that potential participants are more receptive to marketing compared to mass-market outreach. For

example, uncertainty about the potential benefits of home upgrades may leave customers reluctant to invest the time and resources needed to participate in energy efficiency programs, despite advertisements proclaiming the benefits of participation. According to interviewed administrators, customers that heard about the benefits of participation first-hand from known and trusted compatriots seemed to be more receptive to it.

- **Effective community engagement designs often layer technical and programmatic support for the community on top of customer outreach.** The kind of support provided ranges from basic energy efficiency trainings and marketing support to true technical support (e.g., program staff helping municipal officials set up and use U.S. EPA's Portfolio Manager). Regardless of the content or purpose of the communication, PAs found that direct and frequent communication with community based organizations can increase an organization's willingness and capacity to partner with the PA. This support enables the organization's effectiveness in serving as a link between the program and community constituents. In addition, administrators said that these structured, regular communications were an effective design tactic because they indirectly strengthen the community partner's interest in, and ability to, communicate with constituents about energy efficiency issues after the program has ended.

- **CBPs are not often structured in a manner that facilitates the comparative evaluation of program design strategies and marketing tactics.** Evaluations studying CBP tactic effectiveness tend to rely on post-program participant surveys, process interviews with program administrators, and triangulation. As with other types of energy efficiency programs, evaluators commonly surveyed CBP participants post-participation to determine rates of marketing recall and factors motivating participation. Evaluators less-frequently completed experimental or quasi-experimental analyses to estimate marginal increases in program participation, or explored program attribution to determine what, specifically, about the CBP drove marginal increases in participation relative to other influences or compared to another program type. As a result, we found that the CBP evaluation literature offers sparse material for evaluating the relative effectiveness of program design strategies.

- **As energy-reduction programs, CBPs have been evaluated in terms of their direct outputs (participation and savings). Notably, the programs also benefit community capacity, goodwill, and indirect energy savings.** CBP success can be classified in terms of five dimensions, including: (1) program savings goal achievement; (2) customer reach, awareness, and actions; (3) implementation process; (4) community capacity or a structural change in the utility-community interface, and (5) program longevity. Despite the original intent of a CBP to reduce energy in the short term, administrators noted that community capacity and goodwill were some of the most notable benefits from their CBPs. While not explored/documented consistently across CBP evaluations, administrators reported higher-level benefits including: increased community capacity, the administrator's improved understanding of customer needs, improved administrator-community relations, and spillover or longer-term benefits like readiness to participate in future programs. Structural and long-term outcomes were generally discussed anecdotally rather than via a formal research design. This seems to be because few CBPs have tracked these outcomes in a way that enables evaluators to establish a link between program outputs, non-resource outcomes in the short term, and indirect savings in the long term.

- **CBP benefits may ultimately depend on "the eye of the beholder."** In EM&V frameworks mandated by many regulatory commissions, the focus is on achieving a set energy savings target within budget, and doing so cost-effectively. CBPs inherently require added costs (e.g., customization) yet their added benefits either may be relatively small or may be hard to measure in the short term. Hard-to-measure benefits include enhanced community goodwill towards utilities and community capacity (with associated spillover savings), neighborhood ties, health benefits, environmental justice benefits, and

others. Not all EM&V frameworks allow administrators to capture non-energy benefits. In contrast, from the community view, those hard-to-measure benefits may be the primary success metrics. In at least one case, regulatory frameworks count non-energy outcomes in equal measure to energy savings (i.e., Sustainable Jersey, and its capacity for community building). Many utilities, however, perceive that there are plenty of other, possibly less-costly, ways to build community relationships.

### What explains why community strategies have been variably effective across contexts?

- **It is often necessary to let CBPs evolve and grow so that the PA identifies the right mix of elements for their utility and community.** Interviewed administrators repeatedly noted that CBPs have been most successful when they took the time to find and leverage the right opportunities in a community. In terms of how to find these opportunities, administrators of longer-running CBPs counted on "learning by doing" and noted that finding the right approach took time and a commitment to sticking with a program while initial challenges were being worked out. CBPs, therefore, appear less-suitable for contexts that call for a rigid and prescriptive approach.

  The process of identifying the right opportunities was especially important for CBPs that relied on enthusiastic and talented local messengers. Finding the right spokesperson entailed local networking to find the right local messenger(s); until the right person or entity was brought into the program, outreach and messaging could flounder. On multiple occasions and often unsolicited, successful administrators reinforced the need to use a *mix* of program strategies and marketing tactics, echoing common practice in multi-touch marketing campaigns that some utilities already use. Administrators' common refrain when asked to provide advice was that, in the end, "there is no silver bullet" for successful community-based outreach.

- **Communities have multiple priorities, and energy efficiency is only one of them. Working to meet communities' broader needs has helped CBPs gain traction.** In addition to CBP savings and participation goals, participating communities also want to meet their own goals. CBP participation complements some of them—such as municipal emissions reductions or fair housing provisions—but may compete against others—like focusing on renewable energy installation targets, providing "flashier" upgrades like electric vehicle charging stations, or supporting noon-energy upgrades like public library renovations. Community performance bonuses designed to incentivize CBP participation are more attractive to municipal leaders if provided in a way that allows recipients flexibility in spending the awards towards their own energy or non-energy goals.

- **Community-based social marketing principles have had a role in shaping CBP marketing plans and marketing messages.** Situating CBP participation as an individual action that supports collective goals is founded in social science. This framing serves to simultaneously increase CBP savings, motivate municipal leader buy-in, and motivate potential participants from the standpoints of helping neighbors, gaining an environmentally friendly image, feeling good about helping the environment, and fulfilling a civic duty. The principle is to ensure potential participants see their decision to participate as one with direct consequences for their local community at large. For example, a community can advertise the CBP as for a way to fund library retrofits. This type of marketing can also work for larger-scale programs (e.g., counties or bigger regions) if PAs ensure regional messaging templates can be adapted locally, so that citizens can still identify with the program as a neighborhood effort.

- **There is not much quantitative evidence that explains why community strategies have been variably effective across contexts. Having reviewed evaluations of 25+ programs, our view is that the strict measurement requirements set by many utility commissions miss the opportunity to measure long-term savings and non-energy benefits.** EM&V frameworks have not encouraged the type of program

design or evaluation methods that adequately capture CBP benefits and enable an empirical study of tactic effectiveness. Common lore among program administrators is that community partnerships are not as cost-effective as top-down programs because they garner only marginally-more participation (e.g., 70 audits when an existing program would have achieved 65) yet need significantly more effort to implement. While this does result in lower cost-effectiveness for some programs, not all programs had been evaluated in ways that fully captured program benefits, thus tipping the balance. Speaking with administrators confirmed that few CBPs were designed or tracked in ways that would facilitate marginal savings analyses or a study of longer-term outcomes. A full accounting of program benefits would include both the short-term marginal gains in participation and savings during the program year, as well as longer-term or spillover savings produced indirectly via fostering positive community experiences with deeper and more tailored outreach, and non-resource benefits.

## 2.4 Recommendations

Holistically, the CBP effectiveness study points to several overarching recommendations to help foster excitement and engagement from local partners and implement a successful CBP. Because each research objective refined of our understanding of how CBPs around the country have been designed and implemented, we provide recommendations based on the complete body of work, reflecting how the research evolved over the course of this project.

- **Build CBPs that involve consistent communication with local partners.** Local partners, especially municipalities, have a lot of issues competing for their time and resources. To help keep energy efficiency as a top issue, administrators can provide regular technical assistance and programmatic support. These discussions offer an easy "in" to keep lines of communication open with community leaders and make program participation more approachable and less daunting. Additionally, administrators can provide official structure to clarify expectations—such as developing a contract, partnership agreement, or a Memorandum of Understanding with community partners.

- **Design inclusive programs that offer communities support in reaching their own energy and non-energy goals**. This begins with a needs assessment to understand the local community's values and priorities. Once identified, the program can design or adapt implementation and incentives to align program offerings with community needs, thereby making the program more attractive. One option is to offer community performance bonuses structured in a way that motivates municipal, non-profit, and/or citizen buy-in. Another is to provide technical and other assistance to build local capacity. Finally, programs may also want to draw on community-based social marketing principles in communicating the program's value to the community, framing individual participation in context of to social, family, and civic environment.

- **Be flexible with program design, participant engagement strategies, and marketing…** More important than any specific program design strategy or marketing tactic, CBPs are most successful when they find and leverage the right opportunities to connect with community members. Taking a learning-by-doing approach for each community does call for more boots-on-the-ground and requires upfront planning to right-size program administration and implementation (e.g., staffing up with AmeriCorps volunteers or a full-time staffer, setting up plans for growing the program slowly to avoid running into constraints).

- **… but standardize what you can.** An umbrella program design formalizes and standardizes aspects of the CBP development, implementation, and evaluation. Rather than reinventing the wheel for each community in a PA service area, standardizing common elements of CBPs and developing broad processes and workflows enables PAs to leverage their experiences across their service territory and

over time to improve the process of creating and implementing a CBP. Umbrella designs should also include a central planning and tracking system to catalogue the use of different outreach tactics provided to different customers over the years, as this will better enable cross-cutting evaluation. Such a data collection and tracking approach should be fully set up before marketing and enrollments begin. This clarifies community expectations, allows for real-time course corrections starting at day one, provides participant-level data for short-term evaluation as well as charting the CBP's evolution over time. Overall, according to implementers of both smaller regional efforts within the Northeast and large multi-county efforts in California, the umbrella design provides an optimal mix of formality and flexibility.

- **Consider program implementation methods that provide data to rigorously capture non-energy and/or long-term outcomes,** such as spillover, longer-term savings, and benefits associated with structural changes in the way utilities and communities interact with respect to energy efficiency. Appropriately implementing and tracking activities can remedy some of the uncertainty about whether a CBP has truly contributed to increased savings relative to a mass-market program. The data can be used for real-time course corrections as well as evaluation. Standardized customer-, participant- and activity-specific tracking systems would be helpful for evaluating all variants of the CBP design, including stand-alone programs and those implemented as marketing add-ons. Additional process measurements to assess these benefits include but are not limited to tracking participant diversity, tracking participation rates among harder-to-reach segments, and comparing these and other metrics across participating and non-participating communities (e.g., awareness, engagement, participation, savings).

- **Fully answering questions of CBP viability and tactic effectiveness calls for evaluation methods that better facilitate attribution analysis**, explore long-term outcomes, and attempt to better capture non-energy benefits. Some of the remaining evaluation gaps are tied to the general challenges of measuring non-energy benefits, energy savings from behavioral changes, or benefits that take some time to accrue. Although non-resource benefits were some of the most-often-noted values of CBPs, not all regulatory commissions count these types of outcomes when tallying program benefits and costs. New evaluation methods (or regulatory-approved evaluation methods applied to different types of programs) may be needed to capture CBP value. Initial suggestions for capturing the longer-term or harder-to-measure outcomes include those used in behavioral programs, codes and standards initiatives, and retrospective market transformation evaluations. Those types of offerings face similar measurement challenges as CBPs, due to their multi-year pathway to energy savings, questions of persistence, and measurement challenges.

# 3. Detailed Program Administrator Feedback

## 3.1 Introduction

This section summarizes results of stakeholder and expert in-depth interviews that Opinion Dynamics completed to supplement a literature review of community-based energy efficiency programs (CBPs). These interviews were designed to not only provide additional perspective on the effectiveness of different CBP design elements identified through the literature, but also to inform our understanding of specific program elements found to be particularly impactful. Semi-structured in-depth interviews included the following:

- Confirmed program design elements identified in the literature search (e.g., stakeholder roles and goals, program activities),
- Elicited administrator-rated significance of participation barriers identified in the literature review,
- Explored the rationale and context for developing each program, as this type of context was not always apparent from the evaluation literature,
- Discussed the relative effectiveness of program activities and discussed the broader added-value of community-based elements relative to traditional residential offerings, and
- Gathered input about lessons learned over multiple years of program implementation as and suggestions for future research.

Because interviewees may have potentially needed some time to refresh on the program (i.e., if it ended some years ago) we scheduled calls in advance and provided an abbreviated list of discussion topics to respondents prior to each call. All interviews were conducted between February 2017 and April 2017, and were audio taped and transcribed for qualitative data analysis in NVivo.

Out of the 25 CBPs included in Phase 1 literature review, we selected a purposive sample of 15 CBPs which represent a variety of program designs, participant engagement strategies, outcomes, and jurisdictions. In addition, we considered the availability of secondary resources such as EM&V reports and prioritized CBPs for which the availability of secondary resource was limited. This sample was further divided into a list of ten primary CBPs to contact and a list of five alternative CBPs. After exhausting the primary sample, we had not yet achieved our target of ten interviews, so we substituted alternative CBPs until we reached ten completed interviews.[17] We conducted in-depth interviews with twelve representatives from the entities most knowledgeable about these ten programs' historical decision-making, design, and evolution over time. Interviewees covered four states (MA, CA, VT, CT), and represented electric and gas utility program administrators (PAs) (6 of 10), ratepayer-funded non-utility PAs (2 of 10), and independent organizations who led CBPs (2 of 10). Table 5 provides interview dispositions and resulting response rate, calculated as the number of completed interviews out of the sample frame.

[17] Since we completed enough interviews from the primary sample we did not need to attempt to interview all five CBPs from the list of alternatives.

**Table 5. CBP Administrator Interview Dispositions and Response Rate**

| Participation | Value |
|---|---|
| Total Population | 27 |
| Sample Frame | 15 |
| Completed | 10 |
| No Response | 2 |
| Never Available | 2 |
| Not Contacted | 1 |
| Response Rate | 67% |

## 3.2 Findings

This section presents interview results organized by several themes: the benefits of CBPs to administrators, respondents' main challenges in implementing CBPs, best practices for CBPs based on respondents' multiple years of program experience, respondents' perceptions about the significance of barriers to energy efficiency that the literature suggests residential customers continue to face, and results of discussions about how to best measure benefits of CBPs.

### Participant Barriers

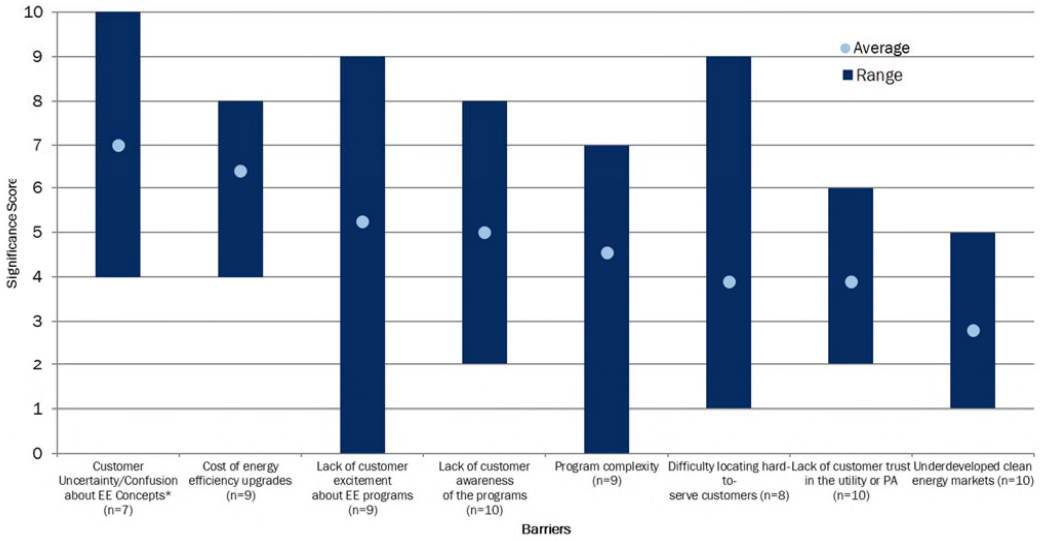
During the interviews, we asked a structured series of questions about residential customers' barriers to energy efficiency. These questions were designed to ground-truth the significance of eight barriers (see Figure 6) discussed in the CBP evaluation literature more broadly; i.e., in the review, we found that some groups have felt CBPs can overcome specific barriers to energy efficiency (MIT Energy Efficiency Practicum). Thus, we asked respondents to rate each potential barrier on a scale from zero to ten, where zero represents "not at all a barrier" and ten represents "a significant barrier" to participation in energy efficiency programs in their jurisdiction.

Responses from the CBP-administrators suggest that the most-significant barriers to residential energy efficiency program participation are: customer uncertainty about the benefits of energy efficiency, customer cost of efficiency upgrades, and lack of customer excitement about energy efficiency programs. Figure 6 below provides the minimum, maximum, and average response for each barrier. The highest-rated barrier, "Customer uncertainty and confusion surrounding energy efficiency and the potential benefits it can provide," was often recoded from open-ended responses. One respondent articulated the heart of the issue:

> "I think the fundamental understanding of energy efficiency and how it relates to one's situation [...]. I think that's still a pretty big barrier. Every time I meet with a new mayor, like if you have a change of guard in a town with the elected officials, you have to sit down and have them go through [understanding energy efficiency basics] again, and have them understand that again."

The relatively narrow range of ratings provided for customer cost barriers suggests that the relative cost of efficient (versus inefficient) products remains a consistent barrier across many jurisdictions in the northeast and western United States. On the other hand, although lack of customer excitement about energy efficiency was, on average, perceived as a moderate barrier (mean: 5.25), the wide range of ratings (min: 0, max: 9) suggests heterogeneity across jurisdictions. Further, and somewhat surprisingly given respondents' emphasis about the benefits of co-branding and the importance of local messengers, respondents said that customers' lack of customer trust in the PA is a relatively insignificant barrier compared to other options.

**Figure 6. Program Administrator-Rated Significance of Participant Barriers to Energy Efficiency**




* Recoded from open-ended 'other' responses.

## Benefits of CBPs

Program representatives discussed a variety of benefits of CBPs, which generally included co-branding, developing relationships, leveraging resources, and increasing program reach. This section discusses each benefit in turn.

Respondents most frequently cited benefits coming from community co-branding (8 of 10), in which PA- or utility-branded marketing materials are modified to also include local government or local organization branding. Administrators reported that co-branded materials and outreach strategies help position the program as vetted by trusted local institutions (e.g., the mayor's office) and relevant to the customer's daily life, but also backed by the technical and financial know-how of the customer's utility. Respondents discussed several methods to co-brand materials, including using both PA and local insignia on program marketing (e.g., websites or flyers could present the city or county insignia), sending mailers on town or county letterhead, or enclosing energy efficiency PA marketing materials inside other types of utility bills (e.g., water or sewer). According to respondents, co-branding has been effective in establishing the CBP as a PA-community partnership, and allows all organizations involved to leverage the trust and buy-in customers have in each partner. One respondent stated:

> "So I think it's helpful for a customer to see that … its utility is working with the city government or working with … a trusted organization to deliver a service. [I]t helps the customer specifically think of the program administrator in a different way than they maybe have in the past."

Almost as common as co-branding, respondents cited benefits associated building relationships with customers and community partners (7 of 10). In addition to supporting the CBP's program goals, key stakeholder relationships established during the CBP have, in some cases, provided a kick-off point to future new or innovative energy efficiency offerings. Positive relationships established with local leaders and

heightened awareness about the PA's energy efficiency offerings among community members provides longer-term benefits akin to program spillover. While only four respondents discussed the broader benefits of relationship building, because this style of broad-based community engagement is often not contained to the world of energy efficiency it is clear it has the potential for improving general customer satisfaction outside of energy efficiency programs.

More than one-half of respondents (7 of 10) discussed leveraging a local partner's funding (e.g., ARRA funds or other funds) or volunteers (for in-person outreach and mail stuffers). As one respondent articulated:

> "I think even from the utility perspective there was just the same desire of figuring out how to leverage each other's relationships and funding in order to further the goals of [the program]."

Six of ten respondents discussed the ways in which CBPs increased their program's reach. Often PAs believe the CBP, through outreach and implementation strategies that are designed to focus on the community, brought customers into the program that otherwise would not have participated. As we identified in the literature review, in some cases, administrators have used community outreach to reach a specific hard-to-reach demographic segment within the population, customers living in specific geographic areas, and/or the general population of customers. One respondent who implements a CBP designed to boost participation among the general population discussed how community outreach benefits their program relative to a top-down marketing approach:

> "I think it adds a layer of credibility when you partner with somebody local. It increases the boots on the ground, the energy gospel in the community. … The [implementation] team won't be able to get out there, the program administrators can't get out there. So [community messaging is] sort of an extension of us, of the programs, but it's also with a familiar face that people understand and relate to, and are interested in supporting."

Perhaps surprisingly given that CBPs promote products and services that save energy or reduce demand, only a few respondents specifically mentioned increased program savings as a main CBP benefit. Only three of ten respondents explicitly mentioned having seen increased savings or participation, relative to a counterfactual, because of their CBPs. Note that, during interviews, administrators did not always focus on methods used to make this type of assessment but instead tended to speak in terms of general program "lift." One respondent even directly stated that they do *not* see savings as a main benefit of CBPs. As this administrator put it:

> "If your goal is numbers, I don't think community based outreach is the way to go. If your goal is building a long-term relationship with less-measurable outcomes then I think that there is a case to be made about how it can really benefit the community."

Still, there is some indirect evidence that CBPs can boost savings where traditional programs fall short. Instead of discussing savings benefits directly, most respondents discussed program savings more tangentially. Respondents, for example, commented on participation-related benefits that underpin program savings, such as community tactics that help to increase program reach (e.g., connecting with types of customers who otherwise might not participate). While increased or broader participation taps into savings from a new customer segment, respondents often couched increased participation not in terms of deeper program savings, but in terms of awareness, equitability, customer satisfaction, and non-energy benefits. Some respondents also implied that CBPs increase savings primarily over the long term, e.g., co-branding with community partners provides a means to increase savings down the line by building customer satisfaction and community openness to PA energy efficiency offerings. Interestingly, after having discussed CBP evaluation methods with respondents later in interviews, the lack of discussions about CBP-attributable savings may — at least in part — stem from administrators' and evaluators' difficulties in measuring CBP outcomes relative to

traditional programs. Based on measurement challenges in the traditional EM&V framework mandated by many regulatory bodies, it is still unclear if participation and savings are significant benefits of implementing a CBP.

### Challenges of CBPs

We also asked respondents to discuss the major challenges they face, or faced, implementing a CBP. We discussed both specific hurdles PAs faced (and how they overcame these hurdles) as well as challenges associated with CBPs in general. Where applicable, we also asked respondents to comment on challenges relative to a traditional program delivery model. Much of these discussions served as the basis for our examination of best practices, which we describe below.

Most frequently, program representatives (7 of 10) said that community partners' unwillingness or inability to engage with the CBP was the most significant implementation challenge.[18] These challenges were placed into context of the envisaged CBP implementation strategy; e.g., local representatives' lack of pre-existing energy efficiency knowledge may hamper programs that employ a local governance structure; communities without technical staff to complete municipal benchmarking struggle to meet program checkpoints if the program was originally designed without much technical support. As a result, administrators have had to invest more time and resources to implement their CBP, relative to both a more traditional program and marketing delivery model, and to their initial expectations about what it would take to run a successful CBP. When considered as a cost that produces questionable energy savings benefits (see above), some administrators noted that this lack of technical expertise added administrator investment has been difficult to justify from a cost-effectiveness standpoint.

In contrast, some CBP administrators have embraced these challenges as an investment in building future energy efficiency capacity. As a counter-point to the perceived cost burden of working with communities, some CBPs are designed specifically to work with lower-capacity communities and have built program structures to explicitly help to increase local capacity to serve as energy efficiency and renewables leaders. A BayREN administrator noted that community capacity building is a main justification for their program and that while they "…have a lot of small counties in the Bay area that were unable to participate in energy efficiency prior to BayREN due to bandwidth or budget and not having the expertise in energy efficiency and through BayREN, we've really been able to mentor those counties."

While the level and nature of PA involvement depends on the specifics of the program and the community partner, the consensus among administrators is this style of engagement is more cost-intensive than traditional marketing or program implementation. Respondents indicated the one-on-one communications with community partners, providing ad-hoc support, and providing technical assistance can be very time and resource intensive. In describing the nature of administrator time commitments, one respondent noted that their program needed a dedicated staff person to effectively implement the program's envisioned level of community support:

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> "It is very time consuming to put a program like this in place, because you are working with different [community partners] and there's a lot of requests that come through in questions, … and having that dedicated resource also … helps because you have to go and explain the program to some of the [community partners]."

Interviews also revealed that, as with residential energy efficiency program designs that use trade allies or contractors, part of the increased costs of CBPs come from a two-layer outreach approach that not only entails grassroots outreach to customers, but also entails enhanced support to train community implementation partners on the localized outreach approaches. In some cases, this approach was developed over time (e.g., learning-by-doing), while in others, the two-layer approach was intentional. Respondents described these activities as follows:

> "It's like we're trying to motivate two different levels of folks here. We're trying to motivate the individuals to take action and we're trying to motivate the communities to get their individuals in their communities to take action, right, so how do you engage community groups, volunteers, what do you provide?"

> "[This individual was] the concierge for the homeowners but honestly like three-quarters of their time was really spent with contractors, helping them do a good job by their customers, running their business within our program."

> "The towns were great at doing the outreach, they were great at signing the pledge. If you followed up with them on benchmarking, their eyes glazed over. … So we developed a technical assistance program [for the towns]."

Either directly or indirectly, many respondents who had used the two-layer approach mentioned that training volunteers and implementation contractors on energy efficiency and sales and marketing, respectively, had been particularly time consuming and thus costly. An administrator, whose program involved training the community leaders who would be delivering community member outreach, noted that the training-the-trainer approach was very cost intensive. Reflecting on the relative costs and benefits of this customized outreach strategy, they noted:

> "I think it [the trainings] made the difference in the—in the outreach that was being done. Whoever is providing the outreach has to have the knowledge about what they're talking about. But once again, did the benefit outweigh the cost? I'm not sure, but if you were going to use non-profit organizations for community based or outreach, you have to train them [because they may not have the content knowledge ahead of time]."

## Best Practices of CBPs

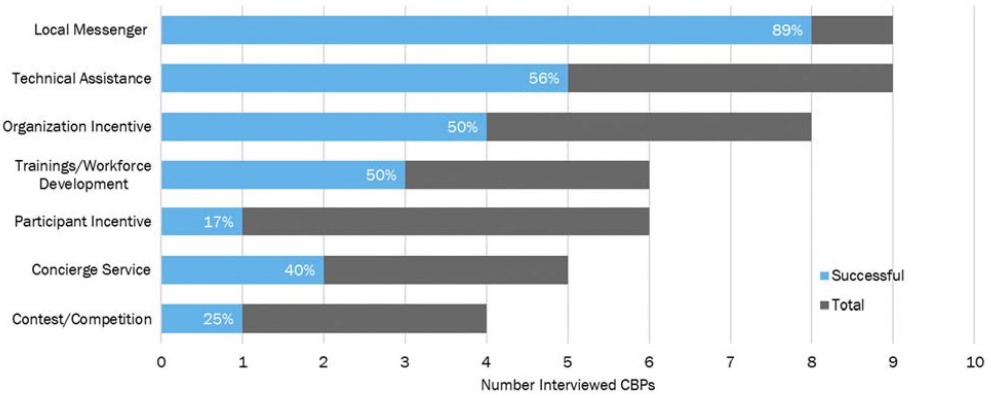
During our conversations with administrators, we uncovered best practices for the design, implementation, and evaluation of CBPs. While some programs followed a formal course in testing new strategies over time, others reported that their best practice recommendations grew out of a more organic evolution over time reflecting a learn-by-doing mindset. This section describes results about best practices.

### Program Design Strategies

We specifically inquired about successful and unsuccessful program strategies in each interview, although due to time constraints we were not able to systematically cover each strategy that each CBP employed. In addition, discussing specific challenges encountered while implementing a CBP (and learning about PA's

subsequent reactions to these challenges), naturally produced insights regarding successful and not-so-successful CBP strategies. Comparing anecdotes across interviews produced findings about the relative effectiveness of the most-common strategies. Figure 5 above shows the number of interviewed administrators who employed each program strategy in their CBP, and demonstrates the percent of respondents who found the strategy was successful.

**Figure 7. Program Strategy Prevalence Among Respondents' CBPs and Respondent-Rated Relative Success**




Leaving aside marketing tactics (which are discussed below), respondents reported that the most successful CBP strategies have been technical and programmatic assistance, organizational incentives, and workforce development. Most commonly, respondents discussed the importance of providing technical and programmatic support to local partners (5 of 9). The kind of support ranges from true technical support (e.g., setting up and using EPA Portfolio Manager), to basic energy efficiency trainings and marketing support. Regardless of the content or purpose of the communication, program representatives stated that direct and frequent communication with community partners helps to increase the community partner's willingness and capacity to engage with both the program specifically, as well as indirectly helping to increase the community partner's interest in communicating with their constituents about energy efficiency issues more generally. One respondent highlighted that many competing interests vie for local officials' limited time and resources, while another explained why choosing to engage with a PA may be costlier or more time consuming for a community partner than alternative undertakings would be. Exemplifying these accounts, respondents stated:

> "[T]owns have a variety of things that are important to them, and energy efficiency is not the most exciting topic. So you need to engage early and often. You need to stay on top of that relationship."

> "Some of the towns really don't have much experience in the marketing side, so it's a big educational kind of session too of just showing them what they need to do and getting them up to speed. So just being able to kind of provide that one on one attention to the towns … [is] what you need to … have an effective program."

Four respondents believe providing an incentive or prize to community partners is an effective strategy, representing half of the programs which did so (4 of 8).[19] Often the prize money was tied to non-energy related community projects, such as library renovations. Respondents indicate this approach was effective because it helps reframe the personal decision to participate in an energy efficiency program as part of a community effort to help improve the town. As one respondent stated:

> "[The prize money] went to the town hall or the town library or something that you know the town members use and they felt good about, 'I'm doing this to support my town,' so a sense of community where I think that really got people engaged."

Half of the program representatives who relied on training contractors indicated it was one of the most successful strategies in their CBP (3 of 6). Notably, PG&E's Local Government Partnerships employ contractor-driven outreach to effectively serve communities throughout their large service area, and this local marketing and implementation approach constitutes the basis for their small business program. More generally, CBPs offering contractor training employed a range of different contractor workforce development strategies, with program representatives who employed this strategy more often finding that they needed to provide contractors sales training, as opposed to technical training. Thus, important precursors to successful energy efficiency programs of any kind, and in particular those which put community marketing in the hands of contractors, are to (1) provide contractors proper training, sales, and project management support, and (2) provide an incentive structure that aligns contractors' goals with the program's. A CBP which builds on an existing ratepayer-funded energy efficiency delivery apparatus needs solid foundation to be successful. In service areas—or parts of service areas—that have yet to benefit from the reach of trade ally-based programs, CBPs may be a good way to start building that network. As one respondent highlighted:

> "[T]he contractor network [is] the linchpin to all of this … in my mind [an ineffective contractor market is] the biggest barrier that's out there."

In addition, respondents stressed that perhaps more importantly than any specific CBP strategy, it was vital to be flexible, especially in the early stages of CBP implementation. All ten respondents indicated their CBPs underwent changes during implementation, and the majority (6 of 10) discussed updating program design and tactics on an ongoing basis to match the needs of each community. PAs felt this flexibility was key to running a successful CBP for two reasons. The first is that administrators must be open to adapting a program based on what they learn from experience. Respondents cited the importance of collecting data and other feedback in a timely fashion to inform strategic decision making on a monthly (or more frequent) basis. As one respondent noted:

> "You got to do the community asset mapping and you've got to do the campaign planning and you've got to manage it and you've got to adjust on the fly based on what's working and what's not working."

In programs that we classified as "umbrella programs,"[20] program administrators catalyzed the local tailoring of programs by leveraging best practices gained over time from multiple program incarnations. Four administrators–two of which administer umbrella-style programs– sourced local best-practices from their community partners during check-in calls with community partners. Over time, some administrators started conducting these calls as a single group call with a cohort of communities, instead of conducting multiple

[19] One respondent indicated this was an ineffective strategy and a poor motivator of community participation

[20] We define "umbrella programs" as ones which developed a core program infrastructure and applied it with relatively little programmatic tailoring across multiple communities.

individual calls. According to the respondents, the group method allows for a faster dissemination of new ideas and best practices while reducing the necessity of one-on-one interactions between PA and any single community group, saving administrative time and resources. This idea helped contribute to some respondents' belief that economies of scale help lower the marginal cost of CBP engagement as their umbrella programs expanded (3 of 5). One respondent characterized this dynamic as:

> "So I think that it is just important that there is continuous communication and guidance perhaps from the lead [implementer] about different efforts to not lose either the local or the regional flavor. And I think a lot of it is live and learn. We thought that, like for example, radio buys across the region would be effective and they would go outside of [our area, but], it didn't work well. But we didn't necessarily know that … until we did it. So some of it is live and learn, but I think that reconciling the community or regional program was local and limitation and is key and that should be done through meetings and checking in and that type of thing."

### Program Marketing Tactics

Among our pool of interviewees, local messengers emerged as the key program marketing tactic (9 of 10). Local messengers could be either individuals (often previous participants or important local figures such as mayors) or organizations who act as a trusted source of information for spreading information on program participation. Uncertainty about the potential benefits of home upgrades (see below) may leave customers reluctant to invest the time and resources needed to participate in energy efficiency programs, despite advertisements proclaiming the benefits of participation. According to respondents, customers that hear about the benefits of participation first-hand from known and trusted compatriots may be more receptive to information about the benefits of home upgrades, thereby readjusting their internal cost-benefit calculations and forming stronger expectations about the net value of participation. As one respondent notes:

> "I think it's less about the tactics and more about how you do it because what you're really looking for is who is that trusted advisor in the community and getting them [to], you know, tell the story and to encourage their friends and neighbors to do it. [That] is what's powerful."

Over half of respondents cited tabling and events as successful marketing strategies (6 of 10). Respondents believe the strengths of tabling and events as marketing tactics lie in the one-to-many communication strategy, and interacting with potential participants face-to-face. Further, as one respondent discussed (see below), since participation in an energy efficiency program may involve a substantial investment on the customer's part, it is beneficial to discuss the program benefits and participation process face-to-face. Several respondents did note, however, that leveraging existing events is key to event-based marketing success. Leveraging existing events allows the implementer to capitalize on the larger crowds drawn to a community event compared to lower attendance at a standalone energy efficiency event. One respondent noted that while tabling is good for raising awareness because it allows administrators to reach many people at once, it may not pay off in terms of inducing deeper savings. Illustrating sentiments about community event marketing, respondents said:

> "I found that if you have events that are already going on in a town, going on within the community, and you piggyback on them and get involved with that, that you will have better success at reaching a larger population within a community [compared to a CBP-only event]."

> "I [think] it's just personal facetime, one on one, people talking to each other. That's how you get people to move forward with [whole-home retrofit projects]. We're not talking about trying to encourage people to buy an LED; we're trying to say go spend $7 grand… [and] you're trying to convince them."

Echoing statements about the value of CBP co-branding, half of respondents (5 of 10) have found mail from an important town figure or organization to be a particularly effective marketing tactic (such as a letter from a mayor encouraging participation, materials printed on a county letterhead, or outreach delivered by a respected community organization like a church or youth group). Similarly, many (4 of 10) respondents believe bill stuffers are among the most cost-effective marketing strategies, delivering the biggest "bang for the buck" in terms of increased participation per dollar spent. In addition to utility bills, several respondents suggest including bill stuffers in tax or water bills, since, as one respondent put it, "[t]hey get to the decision maker."

Respondents also frequently noted (5 of 10) that, like the level of tailoring needed across towns to adjust specific engagement tactics, it is important for a CBP to adjust marketing messages to each community. Locally tailored messaging is a key component of the "umbrella programs" included in our interviews (4 of 5). Especially for "umbrella programs" where the program may attempt to cover a whole service territory or state by working with a rotating group of towns over time, PAs highlighted that adapting community specific marketing messages helped the program re-position itself as a community-specific offering at each new town. As one respondent highlighted:

> "We're centralizing how we're implementing programs, and taking advantage of economies of scale across large regions, but we're still making these programs fell like they're part of the community and that they were designed by the community."

In terms of how to cost-effectively implement local tailoring, several respondents offered suggestions. These included suggestions about marketing plans and budgets:

> "Some things are just more effective on the local level. [But since our program's marketing is designed with a regional message] we will order the same swag, that that will come out of the regional marketing budget or we will have a template for collateral or for case studies that is the same, but then is tailored locally."

> "So our goal for community outreach is not just to say, 'we're going to just come out there with one program, energy efficiency is great for you,' but we will dive into what the specifics are and target our message based on who are audience is. So if we go to a community and we know it's a distressed community, and funding is not necessarily available, then we will present the programs that suit their needs."

Not all respondents offered comments about *un*successful marketing tactics, but of those who did, all mentioned that person-to-person canvassing (5 of 5) like door-to-door knocking was a particularly costly strategy. As a result, these respondents felt that the canvassing did not generate as much savings as hoped, and in some cases noted that they did not plan to employ it in the future. Typical of that broader sentiment, one respondent noted:

> "Yep, that's a tricky one actually because there is no silver bullet and it takes all the different avenues. But I know some that don't work and I would never do again, door to door I would never do…"

### Community Partner Capacity

A central theme about CBP effectiveness that arose from our interviews relates to the importance of institutional capacity of local partners. The ability and willingness of local partners to consistently work with PA staff, follow program guidelines, and commit time or resources to the CBP was raised by respondents during discussions of CBP costs, CBP benefits, and CBP best practices. As discussed above, the inability or

unwillingness of community partners to consistently engage with PAs is a common challenge to implementing a CBP.

Through discussions with respondents, two sometimes-overlapping strategies emerged as potential solutions to this issue. The first is strategically targeting the program towards entities which have signaled the ability and willingness to engage with the PA, which appears to require less effort on the administrator to bring communities up to speed (6 of 10). The second strategy is tailoring the partner participation process to better match the abilities and expected level of engagement from local partners by increasing the administrative or technical burden shouldered by the PA (3 of 10).[21] Respondents tended to settle on these strategies based on their own experiences implementing their respective CBPs.

In response to the limited capacity of local partners, administrators recalled learning from experience and starting to target their offerings towards entities which had credibly signaled an ability and willingness to participate. As one respondent stated:

> "We're much, much more realistic in how we even have initial conversations. And we are very comfortable in a pleasant polite way walking away from folks and saying, 'that's ok, it's not a good fit'."

Illustrating the alternative response of changing program implementation to meet community needs, one administrator had initiated a CBP but soon realized the technical burden the program placed on their community partners was too high. This administrator noted:

> "The first time we started this type of program we realized even though we were [providing program support and direction], it still was too much work on [the community partner]. So, we built out our technical team even further."

Respondents also offered ideas about what types of community entities make for successful PA-community partnerships. Although interviewed administrators did often work with local trade allies, non-profits, and motivated individual citizens, almost all (8 of 10) program representatives we interviewed collaborated with municipalities or regional governmental organizations as a part of their CBP. Interpreting administrators' experiences, administrators seem to have found that governments offer greater organizational infrastructure and bureaucratic experience than community organizations do. Collaborating with government entities allows the program access to local energy efficiency staff (if available), local government financial staff, community organizers, and a variety of existing relationships and personnel. In addition, municipalities have a dedicated interest in all their citizens, which can be important when implementing a broad, inclusive CBP across a jurisdiction.

### Best Practice Recommendations

Overall, PAs provide several overarching recommendations to help foster excitement and engagement from local partners and implement a successful CBP:

- Consistent communication with local partners is very important. Local partners, especially municipalities, have a lot of issues competing for their time and resources, and it is important to both

[21] Literature review results suggest that this strategy of building up administrator resources to continue to invest in communities with lower initial self-sufficiency may be an explicit focus of some CBPs, such as those with sustainability capacity-building goals or an interest in supporting underserved communities

keep energy efficiency on the forefront of their discussions and assist in making program participation more approachable and less daunting. In addition to technical assistance and programmatic support, contracts, partnership agreements, or Memorandum of Understanding provide an added incentive for active participation.

- Design inclusive programs that offer communities support in reaching their own energy and non-energy goals. In addition to savings and participation goals, communities are also likely to care about meeting their own carbon reduction goals, renewable energy installation targets, or municipal upgrades that are "flashier" than energy efficiency, like installing electric vehicle charging stations. Providing performance-based financial support to communities serves to simultaneously increase CBP savings, motivate municipal buy-in, and reframe individual community members' decision to participate from a personal choice to a sense of duty to support a group effort that benefits the whole community.
- Be flexible with program design, participant engagement strategies, and marketing. While respondents did provide insight on specific program design and marketing strategy successes, they also repeatedly noted that CBPs are most successful when they find and leverage the right community-specific opportunity, be it an influential local messenger, a marketing message that particularly resonates with constituents, or an engagement strategy well-suited for the community, or, perhaps most likely, all three. Respondents of longer-running CBPs also noted that finding the right approach for a given town or region can take time and a commitment to sticking with a program while initial challenges are being worked out. On multiple occasions, often unsolicited, respondents shared the same advice regarding program strategies and marketing tactics: in the end, "there is no silver bullet."

### Measuring Benefits

When discussing the energy benefits derived from implementing CBPs, most respondents indicated they track total participation or savings metrics, such as the total number of installations or projects in each community (6 of 10). Notably, four out of ten respondents discussed the difficulties in properly estimating energy savings and then attributing them to the specific interventions of their CBP. Among respondents who did attempt to measure incremental savings, they typically used a straightforward comparison to historic participation or savings, extrapolating historical metrics to develop a counterfactual. In line with this approach, some administrators noted that they track CBP outcomes as if the CBP is a marketing tactic, not a program. The marketing evaluation mindset reflects sentiments that there is no "silver bullet," acknowledging that it may take multiple nudges to inspire participation, and that, for example, it takes multiple efforts to bring a customer from awareness to participation. Complicating the matter, not all CBPs noted that they had set up program-tracking databases in a way that would facilitate attributing a specific customer's participation to specific marketing or outreach materials.[22] One respondent explained the inherent difficulties in estimating attribution as:

> "[W]e're looking at participation for [the] overall town…so it's really hard to… say that…out of these 100 participants, this percent was [due to] this community program."

[22] Exceptions include programs that set up specific phone numbers for customers to call based on community marketing or detailed databases of customer interactions and participant management.

These simpler program-tracking and impact estimation approaches have been the industry standard for marketing campaigns, but contrast with the more robust quasi-experimental estimation methods that some CBPs have started to build into program design and evaluation (per the literature review).

In addition, almost all respondents mentioned the non-energy benefits their CBPs produce (9 of 10), most of which are discussed above. When asked how to measure the value added of the community-based program design relative to traditional program design, PAs mentioned "customer satisfaction" or "credibility" and provided little insight as to how these benefits are tracked or quantified. Some respondents noted the importance of tracking non-energy metrics or conducting process evaluations, for regulatory purposes or to provide ongoing program design support. One respondent noted:

> "With each initiative that our local partners are working in, I mean climate planning is a big one, but there's a lot of others, like promoting reach codes, doing water-energy nexus type work. All those have deliverables, and we track timelines."

Three respondents also explicitly discuss the reality of how, and whether to, quantify energy or non-energy benefits in a regulated environment. As a part of a regulated industry, ratepayer-funded energy efficiency programs are commonly bound by cost-effectiveness regulations which prescribe specific methods and models by which a PA's portfolio of programs is to be evaluated. According to some administrators, the existing EM&V frameworks do not provide an easy way to capture non-energy benefits. One respondent said:

> "[N]on-resource benefits [are] where we feel that [the CBP] provide[s] a lot of value, but because of the utilities commission and how things are measured, that's lost, so that's a very hot topic."

Additionally, some administrators expressed concerns that CBPs can produce structural changes that take more than one year to develop, or can produce benefits that only indirectly provide energy savings, both of which are typically challenging to assess with a traditional evaluation framework examining a specific, and typically relatively short, timeframe.[23] More unique benefits of CBPs may not be adequately represented in traditional evaluations. Suggesting that, as a result, CBPs may not appear cost-effective within a regulatory framework focused only on savings, one administrator noted that:

> "I think that your direct measurable benefits are very difficult to see. … here in Massachusetts we work in very large numbers sometimes when it comes to number of customers served and number of units of energy saved and I don't think it's really easy to quantify how a direct investment in dollars relates to [CBP] outcomes. And we have to measure outcomes because we do need to justify the expenses in our regulated industry"

Although non-resource benefits (e.g., local sustainability capacity, image benefits for an administrator) were some of the most-often-noted values of CBPs, not all regulatory commissions count these types of outcomes when tallying program benefits and costs. Further, administrator responses suggest that CBPs' most-touted benefits are also the hardest-to-measure benefits given the current program-tracking and evaluation practices.

[23] For example, one administrator noted that a participating community had hired a sustainability coordinator based on their experiences with the CBP. This outcome is indirect to the CBP's energy-saving goals, but accrued over the longer-term and may produce spillover savings.

# 4. Selected Highlights from the Literature Review

Based on our review we included 25 CBPs operating in 10 states (Table 4). Below the table we provide a classification system that we developed for an IEPEC paper based on this work, as well as highlights of the literature review discussing common barriers to energy efficiency that CBPs have addressed through community outreach.

**Table 6. Participant, End Use, and Program Design Attributes of Included CBPs**

| State | Program Name (Program Administrator)[a] | Program Attributes | | |
|---|---|---|---|---|
| | | Participants[b] | End Use[c] | Design[d] |
| CA | Local Government Partnerships (4 CA IOUs) | R | CS, HTS, NR | U |
| CA | Regional Energy Network Programs (2 CA RENs) | R, G, IQ, ESL | WH, HTS | U |
| CT | CT Clean Energy Communities (Eversource) | R | CS,M | U |
| CT | Neighbor 2 Neighbor Energy Challenge (CT N2N; CT Green Bank) | R | WH, PV | O |
| CT | Solarize CT (CT Green Bank) | R | PV | U |
| KS | Take Charge Challenge (4 KS utilities) | R | General | U |
| MA | Renew Boston Residential (Eversource, National Grid) | R | General | O |
| MA | Boston Community Mobilization Initiatives (NSTAR, National Grid) | IQ, ESL | HTS, WH | U |
| MA | Efficient Neighborhoods+ (4 MA PAs) | IQ | HTS, WH | O |
| MA | Energy Efficiency 2020 (Serrafix; 4 MA PAs) | R, C&I | NR | O |
| MA | Fall River Energy contest (4 MA PAs) | R | WH | O |
| MA | Marshfield Energy Challenge (NSTAR) | CC | DR | O |
| MA | Community Initiatives (National Grid) | R | WH, L, A | U |
| MA | New Bedford Community Mobilization Initiative/ New Bedford Energy Now (NSTAR) | IQ, ESL, R | HTS, WH | O |
| MA | Community Energy Challenge (NSTAR) | R | WH | U |
| MA | Western Mass Saves Challenge (WMECo) | R | PV, X | O |
| VT | Vermont Home Energy Challenge (Efficiency VT) | R | WH, M | U |
| VT | NeighborWorks® H.E.A.T. Squad (NWWVT) | R | WH, M | O |
| NJ | Sustainable Jersey (NJ BPU; College of New Jersey) | R | General | U |
| OR | Clean Energy Works Oregon (CEWO)/ Enhabit (ETO, Enhabit) | R | WH | O |
| OR | Clean Energy Works Portland (CEWP) (ETO, local utilities) | R | WH | O |
| RI | System Reliability Procurement Pilot: EnergyWise (National Grid) | CC | DR | O |
| WA | Project Energy Savings (Clark PUD) | IQ | HTS, WH | O |
| WA | Energy Efficient Communities (PSE) | R | General | U |
| WA | RePower (Bainbridge, Bremerton, Kitsap) (PSE) | CC | DR | O |

a: For brevity, the main electric and/or gas utilities and non-utility program administrators are listed. Many programs involve additional entities including community-based organizations (CBOs), non-ratepayer funders, and/or regulatory bodies.
b: Participants—R: residential general population. CC: customers in capacity constrained areas. ESL: customers speaking English as a second language. G: government entities. IQ: income-qualified residential.
c: End uses—General: promotes all available residential programs. A: appliances and products. M: municipal benchmarking or upgrades. DR: demand response. HTS: hard-to-serve customer segments including income-qualified, multifamily and others. L: residential lighting. CS: municipal building codes and standards. NR: non-residential. PV: solar photovoltaic. WH: whole-home assessments/upgrades/performance/weatherization. X: behavioral change.
d: Design— O: one-off program limited to specific communities. U: umbrella design offered with customization by community.

## 4.1 CBP Design Classification System

In compiling 25 CBPs, exploring the relative effectiveness of community-based tactics, and assessing their value to PAs and the community, we recognized the need for a classification system to organize the breadth of program designs, with attention to understanding how administrators conceptualize community-based elements relative to any existing mass-marketed energy efficiency programs. Unlike some standard energy efficiency offerings that administrators implement with relatively little variation from state to state,[24] CBPs vary widely across administrators in terms of implementation strategy.[25]

Table 7, on the next page, presents a classification system that organizes programs based on 12 design elements. The classification system shows the range of operating contexts (e.g., resources and constraints) and program design choices administrators have made. Many programs' attributes fall somewhere in the middle of the range endpoints.

Administrators and evaluators can use this classification to determine which best-practices are sensitive to context and applicable to their CBP. When transferring findings across studies, we suggest that evaluators consider, at minimum, similarities and differences between their program and past programs in terms of program origins (mandates/regulatory environment), the mix of ratepayer and other funder resources used to support a program (e.g., federal, NGO, municipal), basic program structure (nature of utility-community partnership, measures, delivery; i.e., program ties and design) and program goals (savings, target participants, non-resource, other). Additionally, evaluators should consider whether the CBP is working with communities that have an intrinsically-high level of bandwidth and preparedness, or whether the program was designed to build capacity where there was none before.

[24] For example, upstream lighting programs, multifamily direct install, Home Performance with Energy Star, and other designs are planned, implemented, and evaluated in relatively similar fashion from state-to-state.

[25] An exception is made for programs which have evolved from prior iterations over time, e.g., programs that evolved from ARRA-funded trials may retain some elements as it evolves.

**Table 7. A Proposed Community Based Program Classification System**

| Program Element | Range | |
|---|---|---|
| Origins | Regulatory mandate | Voluntary |
| Administration | EE administrator only | Community only |
| Funders | Ratepayer only | Federal/state/municipal/private |
| Goals | Non-specific<br>(*e.g., enhanced relationships, community capacity-building, participation "lift"*) | Specific<br>(*e.g., # new energy efficiency jobs, kWh/kW savings*) |
| Portfolio position | CBP is a cross-cutting marketing activity promoting existing programs | CBP is an original (new) stand-alone program |
| Design | Umbrella program offered to multiple communities with no customization | Program developed for and customized to one specific community |
| Customer type | Non-specific/general population | Specific customer segment(s) |
| Participation goal(s) | Customer-level measures<br>*(e.g., home audit)* | Community-level measures<br>*(% participation; municipal retrofits)* |
| Geographic scale | U.S. Census block | Utility territory |
| Program messenger | Administrator materials only | Community materials only |
| Non-resource/ non-energy benefits | Incidental to resource/energy goals, but not tracked or claimed | Part of formal goals (see above) and tracked |
| Longevity | Limited engagement (e.g., 1 program year) | Extended/multi-year partnership process |

## 4.2 Using CBPs to Overcome Barriers to Energy Efficiency

CBPs add value over traditional programs by using community expertise to help overcome key barriers to customer participation in energy efficiency programs. Compared to programs in which either a utility or the community works in isolation, community partnerships enable both the PA and the community to offer more comprehensive customer services then would otherwise be possible (Carmalt Justus & Schulte, 2010).

A tactic is successful if it helps to overcome the specific problem it was deployed to address. Since a tactic is chosen to address a context-specific problem, it was difficult to compare the relative change in program outcomes garnered from using one tactic versus another. Moreover, few of the evaluation reports we reviewed commented on the relative effectiveness of all the tactics used in the CBP (as would be common in any program evaluation, evaluators focused on the most pressing issues for the program year). As part of the literature review, we built on work by the MIT Community Energy Efficiency Practicum (2009) to develop a matrix of barriers and solutions (Table 8). The matrix shows the most common barriers that the reviewed CBPs were trying to address and lists the solutions CBPs most frequently used to overcome each barrier. Below the table, we describe the barriers and solutions in more detail, providing examples about what seems to have worked well about particular tactics.

**Table 8. Barriers to Energy Efficiency Uptake and CBP Solutions**

| Barrier to Overcome | Solutions |
|---|---|
| Lack of Awareness | ■ Enhanced Marketing and Outreach<br>■ Local Messengers |
| Undeveloped Markets for Clean Energy Services or the Green Industry | ■ Training and Workforce Development<br>■ Technical Assistance to Community Partners |
| Lack of Customer Trust in Utility | ■ Local Messengers |
| Lack of Excitement about Energy Efficiency Programs | ■ Contests and Competitions<br>■ Enhanced Marketing and Outreach<br>■ Incentives for Collaborating Organizations<br>■ Local Messengers |
| Issues with Complex Program Designs<br>*Lack of Customer Commitment, Low Contractor Conversion Rates (from Lead to Sale)* | ■ Concierge Service<br>■ Contests and Competitions<br>■ Incentives for Collaborating Organizations<br>■ Local Messengers<br>■ Technical Assistance to Community Partners |
| Costs of Energy Efficiency Upgrades | ■ Financing<br>■ Modified Participant Incentive Structure |
| Difficulty Locating Hard to Serve Customers | ■ Community Targeting<br>■ Technical Assistance to Community Partners |

## Lack of Awareness

Despite program administrators' efforts, some customers may not be aware that energy efficiency programs exist, may not be aware of the potential benefits programs offer, and may not understand how to take advantage of the programs. Some customer segments are hard to reach due to language barriers. Moreover, among participants who are aware of programs, some may not have a clear understanding about program costs and benefits, and thus potential participants need to invest time into learning about the PA's programs. CBPs attempting to overcome barriers tied to awareness employ a higher volume of marketing campaigns, add marketing tactics not generally employed on a larger scale, and vary the outreach approaches to better meet the informational needs and preferences of their customers.

### Example Solutions

**Enhanced Marketing and Outreach.** All the programs we reviewed included increased marketing and outreach as a strategy to increase participation, yet the strategies employed were diverse and in response to different perceived barriers. Tactics ranged from media blitzes in specific communities without active collaborating organizations (PSE Energy Efficient Communities) to community led outreach (CT N2N) to utility-community partnerships (Sustainable Jersey, CT Clean Energy Communities). While highly personalized marketing (e.g., door-to-door canvassing) and program implementation (e.g., concierge services) are typical CBP strategies, they do tend to be relatively expensive to implement because they are labor intensive (Energy Trust of Oregon, 2014; Opinion Dynamics Corporation, 2013a, 2015b). Moreover, there is mixed evidence that such approaches effectively "lift" participation or increase savings relative to less labor-intensive strategies (Energy Trust of Oregon, 2010, 2014; Jones & Vine, 2015; Opinion Dynamics Corporation, 2010, 2014a).

- Case Studies: EN+ is one of several programs that employed door-to-door-outreach. EN+ found that participants had learned about the program through a variety of the channels used in the program, but that in-person outreach (door-to-door), phone calls, and word of mouth marketing from trusted sources

were effective outreach strategies. Overall, the EN+ evaluation found that a multi-touch campaign could be an effective way of helping customers along the journey to participation. In other examples, RePower and PSE Efficient Communities marketed their programs at community events and presentations, such as homeowners' association meetings, business groups, and local economic development association meetings.

### Undeveloped Markets for Clean Energy Services or the Green Industry

While participants frequently cite out-of-pocket expense as barrier to participating in energy upgrade programs (Arbor Consulting Partners, 2011; Goodman Research Group, 2012; Opinion Dynamics Corporation, 2010, 2014a), evidence suggests that overcoming non-financial barriers is an equally or more impactful strategy (MIT Community Energy Efficiency Practicum, 2009; Opinion Dynamics Corporation, 2010). For example, a PA may feel that weatherization program participation lags among non-English speaking households because few qualified contractors speak non-English languages (e.g., Massachusetts CMIs), or because community partners do not yet have the capacity to implement a program as designed. A well-trained contractor market that includes members of the target community contributes to expected savings, reduces the potential for mistrust between contractors and participants, and may benefit market transformation goals. In addition, it is common for a CBP to incorporate broader social goals related to the creation of good-paying green jobs, especially since job creation and retention was a priority of the American Recovery and Reinvestment Act.

#### Example Solutions

**Training and Workforce Development**. The type and extent of trainings varies across CBPs. Examples included structured contracts and use of certifications in the CEWP program to volunteer trainings within the Vermont Home Energy Challenge. Some CBPs, such as those that focus on driving community-level engagement, provide training to community-based organizations; we discuss these types of trainings under "Technical Assistance to Community Partners."

- Case Studies: Most of the Massachusetts PAs' experience with training and workforce development comes from the Massachusetts Community Mobilization Initiatives. These initiatives—held in four cities–placed a substantial focus on addressing workforce development barriers by providing contractor training in the native language of local ethnic groups (Arbor Consulting Partners, 2011; P.O.W.E.R Project, 2011b). The programs were deemed particularly valuable at the time of the programs, which ran during an economic downturn. Another example of training programs includes those that provide early-career opportunities in energy efficiency. Outreach for the Connecticut Neighbor-to-Neighbor Energy Challenge was performed by AmeriCorps recent college graduates and focused on professional development and providing work experience (Donnelly, 2014).

**Technical Assistance to Community Partners.** Technical assistance included municipal or individual benchmarking, data collection assistance, and ongoing support of municipal/organizational staff. Among programs that provide technical assistance to community organizations or contractors, evaluations have found that the assistance is an asset (ACEEE, 2011; Conservation Services Group, 2014; Jones & Vine, 2015). There is some overlap in programs that provide technical assistance and those which provide rewards to collaborating organizations; some of these programs treat the technical support as part of their outreach and implementation strategy (NSTAR, 2012; PG&E, 2013; Sustainable Jersey, 2015; The Connecticut Light and Power Company, The United Illuminating Company, The Yankee Gas Services Company, Connecticut Natural Gas Corporation, & Southern Connecticut Gas Company, 2015; Town, n.d.).

- Case Studies: Several programs providing technical assistance include the Sustainable Jersey, CT Clean Energy Communities, and the California Local Government Partnership programs. These programs

leverage the ability of a local municipality or collaborating organization to galvanize community support for energy related issues. Community-based program outreach is conducted through participating municipalities and non-profits, with organizational and programmatic support from the PA. In turn, the PA offered the participating municipalities and non-profits programmatic and technical support in the form of technical assistance implementing their program roles, grants to complete additional clean energy activities, and public recognition for meeting tailored energy-related goals.

### Lack of Customer Trust in Utility

Some customers do not believe that utility-sponsored programs can benefit them, or that utility-sponsored programs are not for people like themselves. Other customers may associate utilities with attitudes of distrust and frustration given negative perceptions associated with high energy costs or other experiences. Leveraging the positive image and existing connections of community partners like advocacy groups (Arbor Consulting Partners, 2011), municipal government (Conservation Services Group, 2014), and universities (Washington State University Energy Program, 2013) has been shown to reduce participation barriers related to trust for the sponsoring entity. In this tactic, a CBP may differ from the PA's core offering primarily by delivering the same marketing message through "trusted messengers."

#### Example Solutions

**Local Messengers.** This tactic leverages entities with established positive relationships in the community and deploys the groups or individuals to be the face of the program. For example, the Massachusetts CMIs leveraged community advocacy groups already well-known and trusted in the target community. By using the advocacy groups as the "customer facing" contact point, the program was better able to deliver its message as well as answer customer concerns along the way. Local messengers should be able to speak the language of target customers, be it in their native language (e.g., in-language support provided in the Massachusetts CMIs) as well as in a place-based vernacular suitable to the general population. This latter option was emphasized during focus groups conducted for Washington's Community Energy Efficiency Program, where evaluators found that "people want to see people like themselves as spokespersons," (Washington State University Energy Program, 2013). Using elected officials as program figureheads can also boost residents' sense of trust in a program.

- Case Studies: The Solarize Connecticut program, like many Solarize programs across the country, relies heavily on local solar ambassadors to recruit participants. Now in its sixth phase, the Solarize Connecticut campaign combines limited-time discounted solar photovoltaic (PV) installations with aggressive grassroots marketing and outreach. Implemented by the Connecticut Green Bank, the program selects municipalities from a pool of applicants who in turn enter into a contract with a single PV installer to provide group discounts on PV, with per-customer discounts based on the total number of planned installations in the community. The program recruits community members to sign on as local program ambassadors who take responsibility for a community-wide outreach campaign. By reducing the marketing and outreach costs of PV contractors, providing targeted messaging delivered by trusted local solar ambassadors, decreasing the cost of solar installations, and emphasizing the limited-time nature of the campaigns, Solarize draws on several behavioral economics principles.

### Lack of Excitement about Energy Efficiency Programs

For certain customers, energy efficiency may not rank highly on the customer's list of priorities. In cases where utilities and communities find there is room to bolster interest and participation beyond a program's routine marketing and outreach efforts, CBPs have attempted to generate excitement about participation through

more targeted marketing messaging, the addition of local messengers, and running community competitions to foster excitement about, and engagement with, energy efficiency programs and issues (Jones & Vine, 2015).

Strategies designed to boost customer interest may try to boost customer benefits associated with program participation, especially those beyond energy savings (e.g., comfort, pro-environmental sentiments, community pride, and others). In the Rhode Island SRP and Marshfield Energy Challenge programs, for example, messaging tactics focused on the community and social benefits of participation, appealing to customers' sense of altruism and town pride.

Community-based organizations are a particularly strong asset for addressing this barrier, as local organizations' creative tactics and leadership roles have proven integral to generating interest and participation at the community level (Lawrence Berkeley National Lab, 2010a; PG&E, 2013; Sustainable Jersey, 2015; The Connecticut Light and Power Company et al., 2015). Because of the large role that community partners shoulder in terms of boosting local engagement and excitement, some PAs recognized that community leaders themselves may appreciate incentives or support in delivering the program, including technical assistance if being asked to shoulder a large implementation burden (e.g., as would be the case for contests, competition, and local data-sharing).

### Example Solutions

**Contests and Competition.** Competitions boost interest through the power of leading by example and behavioral approaches (social norms, goal setting, collaboration, and feedback). Energy efficiency competitions are usually conducted within towns, or across towns, and some make use of online leaderboards, web-portals, or dashboards. About one-third of the programs we reviewed employed contests or competitions to increase participation, although the tactic is more common outside Massachusetts. These programs also provided incentives or awards to partner CBOs. Three of the programs offering incentives for CBOs tied the rewards to a community's relative success (Western Mass Save Challenge, KS Take Charge Challenge, and VT Home Energy Challenge). For example, CT Clean Energy Communities provides "Bright Ideas Grants" to towns based on a point system that encourages municipal and community energy efficiency. Overall, programs that tested competitions and social norms approaches found that customer satisfaction from achieving a goal tended to drive CBP participation to a greater extent than the financial incentives available for energy efficiency upgrades (e.g., Jones & Vine, 2015; Lawrence Berkeley National Lab, 2010a).

- Case Studies: The Kansas Take Charge Challenge relied on both local messengers within towns (green teams of about 50 people per town were involved) and on friendly competition between towns. Program leaders provided a prize to the top two towns per challenge, and provided a $25,000 EECBG to each town from the Kansas Energy Office. This approach was more successful than expected, which led to a continuation and expansion of the program for another year.

**Incentives for Collaborating Organizations**. About one-third of programs provided an incentive or reward to a collaborating organization or municipality. In all the programs we reviewed, at least a portion of the financial support provided to local governments or community organizations was contingent upon achievement of savings or participation goals.

### Issues with Complex Program Designs

Even after overcoming barriers related to customer awareness and interest, some programs may be facing a lack of customer follow-through, particularly in multi-step weatherization programs. Relatively low conversion rates from awareness to lead generation to audit to participation can evidence one of several barriers to program participation, such as low commitment among customers, poor screening by program staff or

implementers, and the general challenge that contractors face in converting leads to completed projects in a complex program design. A lack of customer commitment can arise from several factors, including the non-monetary costs of participation, like the "hassle cost" of navigating complex and unfamiliar processes. Thus, strategies to address low commitment usually entail concierge assistance to guide a participant through the many steps, providing positive encouragement and serving as a technical resource.

#### Example Solutions

**Concierge Service.** Administrators provided concierge services, participant energy advisors, or similar assistance approaches in just over one-third (41%) of programs. Concierges and energy advisors typically act as a primary point of contact or technical advisor for customers, and are available to customers throughout the participation process. Some programs use implementation contractors for concierges, whereas others use community organization staff and volunteers. Some programs have found that the concierge is critical to success. For example, the NeighborWorks H.E.A.T. Squad program was a one-county pilot that provided a successful concierge service to customers completing home energy audits and Home Performance with ENERGY STAR upgrades. When the program was expanded by another organization to a statewide offering (the Vermont Home Energy Challenge), the new implementers removed the concierge service. After the expanded program failed to realize increased savings over its' smaller predecessor, evaluators believed that the deep level of customer service had been critical to the small program's success in helping customers navigate the complicated whole-home retrofit process (Gamble, 2014; Jones & Vine, 2015).

- Case Studies: The EE2020 programs, four Massachusetts CMIs, CEWP/CEWO and Connecticut Neighbor 2 Neighbor Challenge provided some form of participant concierge service. Like the Vermont program examples above, the CMIs found that good customer service was critical to providing a positive customer experience with the concierge offering. In the Clean Energy Works Portland (CEWP) program, employees of the implementation contractor CSG served as advisors, whereas community organization staff filled this role for the Neighbor to Neighbor Challenge in Connecticut and in the Chinatown and Chelsea CMIs (ACEEE, 2011; Donnelly, 2014; Opinion Dynamics Corporation, 2012).

### Costs of Energy Efficiency Upgrades

Several CBPs identified the upfront cost of efficiency upgrades as a barrier in their planning documents. Even with rebates and discounts at the point of sale, lower- or middle-income customers may not be able to afford energy efficient upgrades through existing PA programs.

#### Example Solutions

**Modified Participant Incentive Structure; Financing**. Programs which provided an increased participant incentive relative to the existing utility-led program generally targeted the incentive towards medium-income participants, either through participant or community screening, or as a bonus for achieving deeper savings, such as installing multiple or specific measures. For example, the EN+ program evaluation found that, "costs are a major barrier to making energy efficiency improvements [but that] the EN+ communities had a higher assessment to project conversion rate than the comparison communities suggesting the enhanced incentives may have made a difference." (Opinion Dynamics Corporation, 2014a). Moreover, some programs provided new financing options to help overcome additional barriers. Many of the programs offering increased incentives or financing leveraged EECBG funds to provide these additional cost-offsets to medium-income participants. Note, that using EECBG funds is not an option for current or future CBPs as the EECBG program has ended.

- Case Studies: Clean Energy Works Oregon/Enhabit provided On-Bill Financing. RePower Kitsap County used EECBG grant funding to develop a $350,000 revolving loan program that PAs established in partnership with the local credit union (Kitsap Credit Union). The loan program provides special financing terms for energy efficiency projects. Note, this approach may not be as successful in all areas; at least in the context of Massachusetts and Connecticut, the existing ratepayer funded program offered financing already, although on-bill repayment is not an option. This caution highlights the importance of context when comparing CBP strategies across the country.

### Difficulty Locating Hard to Serve Customers

Simply having a customer target in mind may not be enough to ensure CBP success. For those programs focusing on bringing energy efficiency opportunities to HTR/HTS customers, delivery challenges center on the difficulty in developing a cost-effective way to locate customers, encourage participation, and provide the targeted services. Additionally, techniques to screen individual customers for CBP eligibility may add new barriers to participation, due to stigma of participating in an income-qualified program, or the added burden of time spent completing application materials. The EN+ Core program purposefully avoided using income eligibility screening for this reason, and the Massachusetts CMIs identified historic discrimination and undocumented status as barriers to encouraging HTR/HTS customers to participate in utility-sponsored programs that involved home visits.

#### Example Solutions

**Community Targeting.** Targeting approaches decrease search costs of finding, educating, and supporting eligible participants, and help manage expectations about probable savings from a program. In the "barriers/solutions" framework, some programs offer the program to only those communities that are facing particularly steep barriers to energy efficiency program participation. Several CBPs that successfully increased program savings used community-level screenings to identify areas where they would be marketing largely to eligible residents (Energy Trust of Oregon, 2014; Opinion Dynamics Corporation, 2014a) while others recommended using the strategy in the future (Arbor Consulting Partners, 2011; Opinion Dynamics Corporation, 2012, 2013a). Commonly, CBPs select communities using community organizations' local knowledge, or more aggregate demographic analysis with Census Data or proprietary datasets.

- Case Studies: In Massachusetts, the Efficient Neighborhoods+ initiative selected "microtargeted" communities (by the census block group) based on relatively low rates of prior participation, but high proportions of residents meeting program eligibility criteria like average income; then, the program did not screen participants during their application phase (Opinion Dynamics Corporation, 2014a). In contrast, the CLC EN+ screened individual participants rather than communities because all communities in the service area had widely-varying incomes. However, evaluators felt more evidence was needed to determine whether community-level targeting could be cost-effective at full scale (Opinion Dynamics Corporation, 2014a).

# Appendix A. Attachments

## Community-Based Program Definition Memo

CBP Definition Memo FINAL 2017-0

## Program Matrix

Matrix of Programs_FINAL.xlsx

## Full Literature Review Report

MA PA XC_CBP Literature Review FII

# Appendix B. Full Descriptions of Reviewed Programs

**Table 9. Overview of Each Identified Community Based Program**

| Program Description |
|---|
| **Local Government Partnerships (CA)**<br>■ Years implemented: 2008-ongoing<br>■ Key Stakeholders: Local Government Partnerships (LGPs) are partnerships between one or more of the four California Investor-Owned Utilities (IOUs) and local governments (LGs) to promote energy efficiency. LGPs are designed to support local governments in strategic planning to set and work towards long-range energy goals for their communities. For example, PG&E runs its LGPs through the Energy Watch umbrella program (e.g., Fresno Energy Watch, Valley Innovative Energy Watch).<br>■ Goals: Savings are projected per LGP.<br>■ Program Description: LGPs are available to local governments or organizations within an IOU's service territory. There are five categories of funded activities: (1) adopting reach codes, (2) supporting energy code compliance enforcement, (3) leading by example by reducing energy use in local government facilities, (4) supporting innovative programs, and (5) building expertise within local governments and communities. Activities may include Energy or Climate Action Plans (EAPs or CAPs), benchmarking of public or community buildings, advancement of energy efficiency reach codes for buildings, and trainings to increase awareness of and support for building code compliance and greenhouse gas (GHG) reduction efforts.<br>■ Outcomes: Based on an evaluation of all IOUs' strategic planning activities from 2010-2014, evaluators found that, "The IOUs are providing technical assistance aligned with mitigating the barriers encountered for completing Strategic Plan Projects. However, some LGP Implementers indicated that they were not able to procure the specific type of support that they sought for their projects. LGP Implementers are highly satisfied with the IOU administration overall and they felt that the level of communication was very good. They were less satisfied, however, with the Strategic Plan Project funding processes (specifically the transparency of the effort) and the IOUs' ability to help with capacity building. LGP Implementers also mentioned problems and delays with data transfer." As of this report, LGPs are an ongoing program offering.<br>■ References: (Opinion Dynamics Corporation and Itron, 2016; PG&E, 2013, 2016) |
| **Regional Energy Networks (CA)**<br>■ Years implemented: 2012 - Ongoing<br>■ Key Stakeholders: Bay Area Regional Energy Network (BayRen) stakeholders include PG&E, Association of Bay Area Governments and County governments. Southern California Regional Energy Network (SoCalRen) stakeholders include SCE/SCG, LA County, private consulting firms, UCLA, and municipal governments.<br>■ Goals: Savings are projected per partnership (savings from PG&E incentive programs broadly).<br>■ Program Description: The California RENs are directly legislatively-enabled program administrators who operate energy efficiency programs with ratepayer funds independently from California IOUs. For example, BayREN implements its own programs and partners with PG&E on others, and BayRen focuses on local marketing, outreach, education, and grassroots program implementation. Due to the unique structure of the RENs, compared to other CBPs, we provide additional detail on the RENs in an appendix following this table.<br>■ Outcomes: Overall, evaluators are finding that the RENs demonstrate value in addition to the IOUs and are effective in their work, although process analysis suggested that the RENs can focus on more-consistently collecting, tracking, and analyzing data.<br>■ References: (BayREN, 2014; Itron, 2016; Meis, 2012; Opinion Dynamics Corporation, 2016; SoCalREN, 2014) |
| **Clean Energy Communities (CT)**<br>■ Years implemented: 2012-ongoing<br>■ Key Stakeholders: Eversource, Southern Connecticut Gas, Connecticut Natural Gas, CT Department of Energy and Environment Protection, Connecticut Green Bank, Connecticut Energy Efficiency Fund. Partners also include the municipal leadership in each of 141 participating towns (e.g., mayor, first selectman, or town manager), boards of education and local energy committees. |

*Selected Highlights from the Literature Review*

| Program Description |
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| ■ Goals: Each town sets own goal; but at minimum, commits to a nonbinding pledge to reduce energy consumption in municipal buildings (by 20% in 2018) and voluntarily purchase renewable energy for municipal buildings (20% of building use by 2018).<br>■ Program Description: Utilities engaged with municipal leaders, environmental groups, businesses, and other community groups to assist municipalities in setting and achieving energy efficiency and clean energy goals. Municipal governments commit to a nonbinding pledge to reduce energy consumption in municipal buildings (by 20% in 2018) and voluntarily purchase renewable energy for municipal buildings (20% of building use by 2018). By achieving pledge goals or substituting energy-saving or renewable energy actions, town earns points that can be exchanged for grant money for energy efficiency ("Bright Ideas Grants" of $5k to $15k) or clean energy systems. Examples of towns' substitute actions are streamlining renewable energy system permitting, opting in to C-PACE financing program, conducting targeted outreach campaigns promoting existing incentive programs like Solarize Connecticut, and others.<br>■ Level of Partnership: Communities create a municipal action plan, starting with benchmarking. Eversource and United Illuminating provide free technical assistance and periodic training/guidance. Towns can use an online dashboard to track progress.<br>■ Outcomes: Since 2012, enrolled 141 towns. Per sponsors, outcomes also include "…the distribution of multiple Bright Idea Grant rewards to municipalities, a streamlined online participation tracking database, and multiple examples of successful community-wide events and marketing campaigns that have engaged businesses, residents, and municipalities in energy programs. Due to the Clean Energy Communities program's outreach, participation in Energy Efficiency Fund programs, such as HES and SBEA has increased. The Companies will continue to promote the Clean Energy Communities program to the remaining unsigned towns and cities throughout 2016-2018" (p. 417). Plans of the 2016-2018 program include targeting "sub-communities within existing Clean Energy Communities (commercial entities, the business community, houses of worship, non-profits, small businesses, and universities)." The program will also introduce community success tiers (Bronze, Silver, Gold, Sustainable Energy Community). Although evaluators failed to find a consistent statistical relationship between program outreach and HES participation, the program was effective at leveraging community engagement and program participants praised the utility-provided technical assistance.<br>■ References: (NMR Group, 2016; The Connecticut Light and Power Company et al., 2015)<br>■ Program website: http://www.energizect.com/ |
| **Neighbor 2 Neighbor Energy Challenge (CT)**<br>■ Years implemented: 2010-2012<br>■ Key Stakeholders: N2N (consortium of 14 communities and program partners), Eversource, CT EE fund administrator (CEEF), and CT Green Bank.<br>■ Funding: 2010 DOE BetterBuildings Neighborhood Program grant ($4.2 million)<br>■ Goals: Engage 10 percent of households in each community and reduce participants' energy usage by 20 percent<br>■ Program Description: A community challenge among 14 small towns led by a N2N to increase uptake in the Connecticut Home Energy Solutions (CT HES), Home Performance with Energy Star (HPwES) and PV programs through community engagement and marketing, local partner incentives, and participant concierge services. A subset of CT HES-program contractors responded to an RFQ and agreed to commit to additional levels of marketing, customer service, and data requirements. Towns competed for points to select rewards from a catalog of energy efficient prizes. Local organizations, called community partners, received $25 per completed CT HES visit, and prizes for community groups within communities (tested two iterations, one in which the top three community groups in each community won a prize but the overall winner won the grand prize, and another where community groups received a set dollar amount for each upgrade.)<br>■ Outcomes: Evaluation report found that "The inherent challenges in the HES assessment program during the program period, such as that contractors and customers were not incented to complete upgrades, caused N2N to shift marketing and outreach resources from driving demand to the HES assessment programs and instead acquiring customers straight to upgrades." Per DOE information, "A related state organization, the Clean Energy Finance and Investment Authority, has created four new residential financing products and will incorporate the community-based social marketing approaches learned through N2N staff to promote these offerings to homeowners. A new nonprofit organization, Empower Efficiency, will advise other nonprofits, state and municipal organizations, and utility companies on how to market residential efficiency programs to customers based on the |

| Program Description |
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| lessons learned through N2N. The Clean Water Fund, a working partner of N2N, is using lessons learned through N2N to pilot a solar outreach campaign with another organization."<br>■ References: (Donnelly, 2014; Livingston, Home, & Donnelly, 2012) |
| **Solarize CT (CT)**<br>■ Years implemented: May 2012 – Ongoing (in phases)<br>■ Key Stakeholders: CT Green Bank, SmartPower, Municipalities<br>■ Connecticut Description: Beginning in May 2012 the CT Green Bank in conjunction with a non-profit marketing firm SmartPower began implementation of a Solarize-style solar program in four CT towns. The Solarize model employs four different strategies: 1) community led outreach and marketing, 2) community energy leaders 3) group discounts on solar installations through use of competitively contracted single installer and 4) limited time frame. In each phase of Solarize CT, the CT Green Bank and SmartPower recruit and select participating communities, who then select a single PV installer through a competitive bidding process. Then, solar ambassadors lead grassroots efforts to recruit community members to install PV through community-based outreach methods. Participants benefit from a single source aggregation of available incentives as well as a group discount based on the number of contracts signed. Each phase last from 12 to 20 weeks.<br>■ Outcomes: Evaluators estimate the program induced 27 additional solar installations on average per municipality through round 4, representing approximately a 100 percent increase over the counterfactual. In addition, evaluators found evidence that while the group discount was effective, it is likely that other elements of the Solarize program were more important in driving installations.<br>■ References: (Gillingham, Bollinger, & Staver, 2015; Hausman & Condee, 2014; Soundview et al., 2016) |
| **New Bedford Community Mobilization Initiative (MA)**<br>■ Years implemented: 2010-2011<br>■ Key Stakeholders: Utility (NSTAR), community non-profit (Marion Institute), City of New Bedford, implementer (CSG), and other community labor / environmental groups collaborated.<br>■ Goals: Weatherize 50 homes, 4 multifamily projects, and 25 small business projects via increased participation in the Mass Save Home Energy Services (MA HES) and Small Business Direct Install (SBDI) programs. Advance green job creation.<br>■ Program Description: City-led effort in coordination with the Marion Institute's Green Jobs/Green Economy initiative with support from NSTAR. NSTAR and CSG, in addition to delivering the existing MA HES and SBDI programs provided program and installation training, respectively.<br>■ Outcomes: Completed 288 assessments, weatherized 18 homes, completed weatherization or lighting installations in 3 multifamily buildings, and completed 25 lighting upgrades to small businesses. Transitioned and expanded into New Bedford Energy Now!, which is discussed in a separate entry below.<br>■ References: (Arbor Consulting Partners, 2011; Opinion Dynamics Corporation, 2012; P.O.W.E.R Project, 2011a) |
| **Lynn Community Mobilization Initiative (MA)**<br>■ Years implemented: 2011<br>■ Key Stakeholders: 2 utilities (NSTAR, National Grid), non-profit (Green Justice Coalition), City of Lynn, implementer (CSG), and community groups.<br>■ Goals: Weatherize 50 homes, 4 multifamily projects<br>■ Program Description: Partnership to increase participation in the Mass Save Home Energy Services (MA HES) program and create local energy efficiency jobs.<br>■ Outcomes: The Lynn CMI completed 40 assessments and no weatherization projects in 2011.<br>■ References: (Opinion Dynamics Corporation, 2011, 2012) |
| **Chelsea Community Mobilization Initiative (MA)**<br>■ Years implemented: 2011<br>■ Key Stakeholders: 2 utilities (NSTAR, National Grid), non-profit (Green Justice Coalition), City of Chelsea implementer (CSG), and community groups.<br>■ Goals: Weatherize 50 homes, 4 multifamily projects<br>■ Program Description: Partnership to increase participation in the Mass Save Home Energy Services (MA HES) program and create local energy efficiency jobs. Outreach led by the Chelsea Collaborative. |

| Program Description |
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| ■ Outcomes: The Chelsea CMI completed 88 assessments, 8 weatherization projects, 12 multifamily assessments, and 8 multifamily electric projects in 2011.<br>■ References: (Arbor Consulting Partners, 2011; Opinion Dynamics Corporation, 2012) |
| **Chinatown Community Mobilization Initiative (MA)**<br>■ Years implemented: 2011<br>■ Key Stakeholders: 2 utilities (NSTAR, National Grid), non-profit (Green Justice Coalition), City of Boston, implementer (NSL) and community groups.<br>■ Goals: Weatherize 50 homes, 4 multifamily projects<br>■ Program Description: Partnership to increase participation in the Mass Save Home Energy Services (MA HES) program and create local energy efficiency jobs. Outreach led by the Chinese Progressive Association.<br>■ Outcomes: A total of 51 weatherization jobs were sourced through the CPA and the program served four multifamily buildings.<br>■ References: (Arbor Consulting Partners, 2011; Opinion Dynamics Corporation, 2012) |
| **Cape Light Compact's Efficient Neighborhoods+® (EN+) Initiative (MA)**<br>■ Years implemented: 2013-2014<br>■ Key Stakeholders: Massachusetts Program Administrators<br>■ Goals and Results: Generally, to "lift" participation in the Mass Save Home Energy Services (MA HES) whole-home program in the CLC service area, relative to baseline. The initiative conducted 251 energy assessments and completed 105 projects among EN+ eligible customers.<br>■ Program Description: Like the statewide EN+ below, this was an enhanced version of the MA HES program targeted towards "hard to reach" customers. Unlike the statewide EN+, CLC's model targeted and offered increased incentives to HES-eligible customers with incomes between 61% and 100% of the state median income. The program required income verification to be eligible for increased incentives, which was warranted in CLC's service territory where there is often a large disparity in income levels with some households having much higher incomes than others.<br>■ Key Findings: The evaluation found a general lift in HES participation, conversion rates, kWh and therm savings during the EN+ period relative to achievements within a similar time during the previous two years. For EN+ Core, CLC EN+, and Fall River Energy Contest – Despite a variety of marketing and outreach efforts, awareness and knowledge can impede participation. Sources of program awareness varied but overall results suggest that in-person outreach (door-to-door), phone calls, and word of mouth marketing from trusted sources are effective outreach strategies, and that an overall multi-touch campaign could be an effective way of helping customers along the journey to participation.<br>■ Outcomes: Evaluators found the initiative completed 251 energy assessment and saved 247,675 kWh over this period. Due to the design in the initiative, it could not be determined how much of these savings represent incremental savings.<br>■ References: (Opinion Dynamics Corporation, 2014a) |
| **EE2020 (Powering Pittsfield; Northampton Leading the Way) (MA)**<br>■ Years implemented: 2011-2013<br>■ Key Stakeholders: Utility (National Grid, WMECo, Berkshire, Columbia Gas), vendor (Center for EcoTechnology), municipality (Pittsfield/Northampton), and municipalities' consultant (Serrafix). Serrafix led the initiative.<br>■ Goals: Residential goals unknown<br>■ Program Description: The "EE2020" initiative included programs in two Western Massachusetts towns: Powering Pittsfield and Northampton Leading the Way. The EE2020 initiative "[set] out to test whether mayors and city leaders could play meaningful roles in encouraging businesses and residents to take advantage of existing efficiency programs." The program tested interventions including "concierge service," providing PACE financing, municipal financing options, peer-to-peer learning networks for municipal leaders and other stakeholders, and data targeting with property assessor's data to identify promising households and landlords. Delivery leveraged existing relationships with community leaders and business networks. Developed recommendations for future municipalities, indicating that "leading by example" – retrofitting town buildings and then encouraging residents to do the same- could help boost participation. |

| Program Description |
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| ■ Outcomes: Evaluators found that both initiatives achieved about one-third of their respective savings goals and no increase in achieving deeper savings projects. Neither initiative achieved their respective set of goals or deeper savings. The initiative highlighted the importance of CBP planning, goal-setting, community selection, stakeholder engagement, and the efficacy of the existing utility-administered program a CBP is intended to build on. Process outcomes included<br>■ References: (Opinion Dynamics Corporation, 2013a; Serrafix, 2009) |
| **Efficient Neighborhoods+® (EN+) Initiative (MA)**<br>■ Years implemented: 2013-2014 (Second round July 7th to December 31st of 2014)<br>■ Key Stakeholders: Massachusetts Program Administrators, local governments, implementation vendors and community organizations<br>■ Goals: Neither EN+ Core nor CLC's EN+ initiative set specific goals. PAs were looking to see if the initiatives increased participation in MA HES program among the target communities (and more specifically among target customer segments). In total, the EN+ Core program targeted 12,000 residential customers.<br>■ Program Description: A statewide program that targeted customers with household incomes between 61% and 100% of the state median living in single-family or 2-4 unit homes. The initiative also targeted rental properties. PAs delivered the program with "microtargeting" a selection of neighborhoods within communities (by the census block group) with high concentrations of potential participants. Offered increased incentives to all HES-eligible community members in the microtargeted areas, and PAs increased the local marketing presence (sometimes including the use of community-based marketing) using a mix of tactics that was customized by towns.<br>■ Outcomes: Increased participation in and savings from the HES program relative to a control group. Specifically, a difference-in-differences statistical model found that the CBP achieved savings beyond that of the baseline energy efficiency programs, and process evaluations found that the overall awareness level in the EN+ communities was higher than in the comparison communities that did not participate in the program. Customer surveys found that the biggest remaining barrier to participation was the cost of energy efficiency improvements, along with a lack of time, age of their home, and availability of efficient products. A second round of the initiative was expanded to additional towns the following year.<br>■ References: (Opinion Dynamics Corporation, 2014a) |
| **Fall River Energy Contest (MA)**<br>■ Years implemented: 2013<br>■ Key Stakeholders: Massachusetts Program Administrators, community groups and schools<br>■ Goals: 202 participants, 27,452 therms and 59,255 kWh through the MA HES program.<br>■ Program Description: Program was part of the Massachusetts EN+ initiative but distinct from the "core" and CLC elements. Competition between different neighborhoods of Fall River to accrue the most savings through existing MA HES and Low-Income programs, to win a $5,000 prize.<br>■ Marketing and Outreach: Program did not modify incentive structures and instead relied heavily on community-based marketing and outreach (e.g., school events, community fair). Total marketing comprised approximately 24% of the contest costs, which is a larger share than the baseline MA HES program spends on marketing (5%).<br>■ Outcomes: The initiative surpassed its participation and electric savings goals and did not meet its gas savings goal. Specifically, the program completed 212 energy assessments and completed 33 projects resulting in over 175 MWH and 14,000 therms in energy savings. In addition, 62 Low Income program eligible customers were identified and channeled into a related Low-Income program. A difference-in-difference analysis found that 3% of energy assessments and 33% of completed projects can be attributed to the initiative, beyond the standard MA HES program.<br>■ References: (Opinion Dynamics Corporation, 2014a) |
| **Marshfield Energy Challenge (MA)**<br>■ Years Implemented: 2008- 2009<br>■ Key Stakeholders: Co-sponsored by NSTAR and Massachusetts Technology Collaborative (now the Mass Clean Energy Center). Local stakeholders included the Marshfield Energy Committee (municipal committee appointed by board of selectmen) and local ambassadors to sell the program and solicit community feedback.<br>■ Goals: This program is somewhat unique among other programs described in this review, as the program's goals pertain to managing capacity constraints via energy efficiency, demand reduction, and solar PV installations. |

*Selected Highlights from the Literature Review*

| Program Description |
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| Participation goals were 1,200 residential participants, 10 businesses; demand savings of 2MW (375 kW from residential); PV installations on 30 homes and 500 direct-load control thermostats<br>■ Program Description: A one-town program designed, "...to create community awareness and local commitment to making Marshfield a greener, more energy efficient town" (Lawrence Berkeley National Lab, 2010b). The program was designed to achieve peak load reductions using a suite of techniques including energy efficiency, load response and renewable energy (solar PV). The program offered free energy assessments (provided low-cost measures), incentives for energy- efficient appliances and air sealing, and smart thermostats capable of demand response. The program was open to all residents in the town, but marketing focused on residents on a congested circuit. Messaging about energy efficiency promoted property value benefits because Marshfield is an affluent town.<br>■ Outcomes: Most program participants were customers living on the congested circuit, consistent with objectives. About 90% of homeowners who received energy assessments (n=1,300) installed at least one energy efficient measure. A comparison of measure installation with a neighboring town in 2006 and 2009 (pre- and post-program) suggest the program had a significant effect on the number of energy efficiency installations in Marshfield.<br>■ References: (Lawrence Berkeley National Lab, 2010b; Opinion Dynamics Corporation, 2010) |
| **National Grid Community Initiative (MA)**<br>■ Years implemented: 2014-Ongoing<br>■ Key Stakeholders: National Grid contracted with local governments and community organizations to deliver marketing and outreach with the goal of increasing participation in the MA HES and Lighting and Products programs<br>■ Goals: tiered goals set for each municipality and agreed to in a contract<br>■ Program Description: NGRID partners with local municipalities and community organizations, sign contracts outlining tiered incentive structure based on savings and other key performance indicators (audits/number of measures) to increase participation in MA HES and Lighting and Products programs. NGRID provides basic initial training, monthly calls, and other support, while community provides marketing material.<br>■ Outcomes: In 2014, all participating town met their assessment goals, four out of five met air sealing goals, and four out of five met insulation installation goals. National Grid awarded over $115,600 to participating communities in 2014. 2015 four out of five participating town met their assessment, air sealing, and insulation goals.<br>■ References: (Grid, 2012, 2015; National Grid, 2012, 2014) |
| **New Bedford Energy Now! (MA)**<br>■ Years implemented: 2011-ongoing<br>■ Key Stakeholders: Municipality (New Bedford), implementation contractor (Next Step Living), non-profits (Marion Institute, POWER group) and community groups (youth groups, churches, etc.). The program runs as part of the city's Energy Department.<br>■ Goals: Weatherize 5,000 residential or commercial units by 2015<br>■ Program Description: A scaled-up, 5-year version of the "New Bedford CMI." The program is an umbrella program including New Bedford Challenge Now, New Bedford Efficiency Now, and New Bedford Solar Now.<br>■ Outcomes: From Fall 2011 through Summer 2012 the program completed 214 audits and 55 weatherization projects.<br>■ References: (P.O.W.E.R Project, 2011a) |
| **NSTAR Community Outreach Grant (MA)**<br>■ Years implemented: 2010-2013<br>■ Key Stakeholders: NSTAR, local governments, and community organizations<br>■ Goals: tiered goals set for each municipality/organization<br>■ Program Description: NSTAR partners with local municipalities and community organizations, sign contracts outlining tiered incentive structure based on savings and other key performance indicators (audits/number of measures) to increase participation in HES. Local partners then develop and implement marketing and outreach campaigns earn rewards based on actual savings. |

| Program Description |
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| ■ Outcomes: From Fall 2010 through the end of 2013, a total of 4,520 audits, 700 air sealing projects, and 1,014 insulation projects were completed through the program.<br>■ References: (NSTAR, 2010, 2012) |
| **Western Mass Saves Challenge (MA)**<br>■ Years implemented: 2011<br>■ Key Stakeholders: Utility (WMECo), outreach contractor (SmartPower), web portal contractor (Efficiency 2.0)<br>■ Goals: Engage 5,000 customers, provide online reports to 25,000 customers designed to drive online engagement. Per town savings targets of 3%;<br>■ Program Description: This was an opt-in program that used a mix of behavioral strategies and community-based outreach. WMECo partnered with non-profit to deliver community-based marketing and web portal savings tracking. Towns were competing for 1kW PV (solar panels) and individuals were ranked on scoreboards and competed for individual rewards (e.g., discounts at online retailers).<br>■ Marketing and Outreach: Multi-channel marketing including online marketing, press, direct mail, targeted emails, "advanced web experience" including online community pages and leader boards, local community teams, social diffusion, and trusted messengers ("refer a friend"), contests and prizes.<br>■ Outcomes: Several of the novel marketing channels were successful. Overall, the utility (WMECo) felt that the online channel was cost-effective and scalable. For one, the trusted messenger outreach channel ("refer a friend") recruited 20% of online customers. WMECo also reported that the number of reward points offered was the largest factor in converting customers from direct mail to engagement. Evaluators found the program saved between 2% and 3% of electricity usage per household, and that "highly engaged" participants saved between 5.5% and 5.7% of their baseline energy use.<br>■ References: (Jones & Vine, 2015; Opinion Dynamics Corporation, 2013b; Western Massachusetts Electric Co., 2011) |
| **Renew Boston (MA)**<br>■ Years implemented: 2009-ongoing<br>■ Key Stakeholders: 2 utilities (Eversource, National Grid), City of Boston Mayor's Office, existing EE Programs (Mass Save), non-profit (Mass Energy Consumers Alliance, ABCD Boston), contractors (Next Step Living)<br>■ Goals: General "lift" to boost energy efficiency and alternative energy for residents and businesses in the City of Boston. Specific targets to weatherize 15,000 households/year through 2017; Involve 150,000 households by 2020, 430M kWh/4.5M therm savings by 2012; create energy efficiency services and jobs<br>■ Funding: City of Boston's EECBG, Foundations (Barr Foundation, Chorus Foundation, The Boston Foundation), Utilities<br>■ Program Description: City led initiative to increase participation in the existing Mass Save programs through strong partnerships with utilities and community. Leveraged EECBG funds to provide increased incentives in 2010 through 2012 to medium-income participants. Program planning and implantation fully integrated between City of Boston and Mass Save<br>■ Outcomes: Two phases: Pilot/ "1.0" ($200k from City served 169 residences); "2.0" ($2m from EECBG served 1,750 residences; $500k from City served an additional 510 residences; $1m served 700 small businesses; $1.1m served 6 low-income multifamily buildings). The program contractor firm (Next Step Living) reports that EECBG program funding was key to its growth from 25 employees in 2009 to over 400 employees in 2013.<br>■ References: (City of Boston, 2013; Goodman Research Group, 2012; Opinion Dynamics Corporation, 2012) |
| **Take Charge Challenge (KS)**<br>■ Years implemented: 2009-2012<br>■ Key Stakeholders: Sponsored by a regional non-profit, the Climate and Energy Project (CEP), and co-funded with utilities (KCP&L, Midwest Energy, Inc, Wester Energy, and Kansas Power Pool). CEP and utilities worked together to pick participating towns (mix of urban/rural, small/large). At kickoff, program staff met with local leaders to recruit ~50-person teams in each town. The teams met about once a month during the competition. Town leadership teams (e.g., from Chamber of Commerce, schools, retailers) promoted program and "played up" the competition; town teams were purposefully used as the "face" of the program instead of CEP.<br>■ Funding: Pilot funding totaled $170k, plus in-kind time and resources from participating towns |

*Selected Highlights from the Literature Review*

| Program Description |
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| ■ Goals: Save energy though conservation and retrofits (both utility sponsored and otherwise). Towns were evaluated based on relative kWh savings, savings from prescriptive measures, and persistence via behavioral change, weatherization program participation, and utility-sponsored rebate programs and home assessments.<br>■ Program Description: Coordinated by Climate and Energy Project, towns would participate in the statewide home upgrade program (Efficiency Kansas, developed by the Kansas Energy Office with ARRA funds) and compete against other towns in terms of most energy savings and the most installed measures. Pilot was an energy use reduction competition between towns, designed to "prove that energy efficiency can lead to significant energy use reductions in every part of Kansas and under any utility structure (investor-owned, municipal-owned, or co-op)."<br>■ Marketing and Community Engagement Notes: Messaging focused on energy savings, cost savings, and competition (i.e., community spirit). Included town dashboard to track savings, which was visible to public, but felt word-of-mouth/ peer-to-peer communications were critical. CEP offered financial prizes for the two winning towns, but felt that the competitive/spirited aspects "really drove" the program's success, and that using Leadership teams as "credible messengers [to deliver] credible messages" was key to success. In its first year, the competition ran between 6 towns. In the second year, 16 towns competed. Key elements of the program include the use of competition and community leader buy-in.<br>■ Outcomes: Estimated 10% of participating towns attended one or more events. The winning town reduced electric usage by 5.5% relative to its control town. The program resulted in 112 assessments and 300 households signed up to participate in WAP (Lawrence Berkeley National Lab, 2010a).<br>■ References: (Lawrence Berkeley National Lab, 2010a) |
| **Vermont Home Energy Challenge (VT)**<br>■ Years implemented: 2013<br>■ Key Stakeholders: A partnership between the VT Program Administrator (Efficiency Vermont) and local organizations (Vermont Energy and Climate Action Network) and local governments<br>■ Goals: 3 percent participation by community<br>■ Program Description: Competition between 79 towns to increase participation in Efficiency Vermont's Home Performance with ENERGY STAR. The community in each of the 6 districts with the highest percentage of participants win $10,000 to support EE in municipal buildings and other community-level projects. Used pledge cards to increase participant follow through.<br>■ Outcomes: Efficiency Vermont determined there was a slight increase in the proportion of projects in participating towns as compared to previous years, although results varied significantly across towns. Evaluators made these comparisons using simple trend analysis.<br>■ References: (Jones & Vine, 2015; Markowitz, 2014) |
| **NeighborWorks® of Western Vermont H.E.A.T. Squad (VT)**<br>■ Years implemented: 2007-2009 (V-Saver period), 2010 – 2013 (Better Buildings Grant period), 2013- Ongoing<br>■ Key Stakeholders: NeighborWorks® of Western Vermont, Efficiency Vermont, Green Mountain Power, and local governments<br>■ Goals: 1000 thermal retrofits in homes in Rutland County, VT<br>■ Program Description: The H.E.A.T. squad program was created by NeighborWorks® of Western Vermont (a nonprofit housing organization) with a DOE Better Buildings Neighborhoods grant to provide outreach, education, concierge service, and accessible financing to homeowners for energy efficiency upgrades. The program leveraged incentives provided by Efficiency Vermont to reduce the upfront cost to participants while implementing targeted, community-based marketing and education campaigns for both consumers and contractors. The program also ran competitions among participating towns as well as contractors to increase the number pf participants and contractor conversion rates, respectively.<br>■ Outcomes: An independent evaluation found the program induced participant lift above the statewide Home Performance with ENERGY STAR program implemented by Efficiency Vermont and was cost-effective as a standalone initiative. In addition, the program was expanded with a state grant to four additional counties in 2013.<br>■ References: (Gamble, 2014; NeighborWorks of Wester Vermont, 2014; NeighborWorks of Western Vermont, 2012; The Cadmus Group, 2012) |

*Selected Highlights from the Literature Review*

| Program Description |
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| **Sustainable Jersey (NJ)**<br>■ Years implemented: 2009-ongoing<br>■ Key Stakeholders: New Jersey Board of Public Utilities, New Jersey Office of Clean Energy, and other stakeholders founded Sustainable Jersey. NJ BPU continues to fund program development and implementation, the Sustainability Institute at the College of New Jersey helps staff and manage the program. The state offices, municipalities, and schools across the state partner to provide energy efficiency, renewable energy, and other services to municipal buildings and community members in pursuit of sustainability.<br>■ Goals: Goals set for individual municipalities and schools in terms of generally "increasing" the adoption of energy efficiency, increasing participation in the NJ Clean Energy Programs (e.g., direct install programs, ENERGY STAR programs, and others), and increasing use of renewables like solar. As of the 2016 filing, 75% of municipalities participate in the program.<br>■ Program Description: Sustainable Jersey is nonprofit organization that provides tools, training, and financial incentives to support communities (particularly, municipalities and school districts) as they pursue sustainability programs and Sustainable Jersey certification. Sustainable Jersey helps create a Green Team within each participating organization to serve as the main point of contact. Organizations are rewarded for both primary actions, which typically are directly aligned with NJ Clean Energy Program (the state energy efficiency brand) goals, as well as secondary actions, which are more indirectly associated with reductions in energy usage, such as energy leadership recognition programs.<br>■ Outcomes: As of 2016, 441 municipalities are part of the program, 205 of which have achieved certification. Over the 2011-2014 period, participating municipalities have completed 513 primary energy actions that were approved for certification.<br>■ References: (Sustainable Jersey, 2015) |
| **Clean Energy Works Oregon (CEWO)/Enhabit (OR)**<br>■ Years implemented: 2010-ongoing<br>■ Key Stakeholders: The lead non-profit (Enhabit) partners with the Energy Trust of Oregon to deliver incentives, and with other non-profits (Craft3) to deliver green financing.<br>■ Program Description: This program is an expansion of the Clean Energy Works Portland (CEWP) program, after CEWP ended. In contrast to CEWP, CEWO operated across Oregon, made possible with DOE BBNP grant of $20 million in June 2010 and then funded by a program per home upgrade fee and $10 million from Oregon Legislature in March 2014. Fully integrated as a Home Performance program path. CEWO was then was re-branded as Enhabit, which is a now a stand-alone non-profit organization that works outside of Oregon as well as in the state.<br>■ Outcomes: The program has continued as a path of the ETO's Home Performance program, using Enhabit, a non-profit, to secure funding for financing energy efficiency upgrades. The ETO found the program increased participation relative to a comparison group in 2011.<br>■ References:(Cadmus, 2011; Department of Energy, 2015; Energy Trust of Oregon, 2014) |
| **Clean Energy Works Portland (CEWP) (OR)**<br>■ Years implemented: 2009-2011 (Pilot)<br>■ Key Stakeholders: Energy Trust of Oregon, government (local and county), local utilities, local and national community organizations (Enterprise Cascadia, Green For All) implemented this legislatively required pilot.<br>■ Goals: Weatherize 500 homes by Fall 2010, reduce energy usage by 10-30 percent in participating households<br>■ Program Description: Public-private partnership was designed to increase participation in and savings from the Home Performance program administered by ETO by providing concierge service to participants as well as on-bill financing. In addition, participants were screened based on both participation criteria (credit score) and potential savings (high-energy usage intensity and savings potential). Incorporated a strong jobs component, requiring contractor certification and agreement to wage and job-quality requirements laid out in the Community Workforce Agreement. Satisfied EEAST Act passed by Oregon Legislature.<br>■ Outcomes: At the end of the pilot, the program transitioned to Clean Energy Works Oregon with support of a DOE competitive Better Buildings Neighborhood grant. The program met its goal of serving 500 Portland area homes and the ETO found the program generated savings relative to a comparison group in 2010.<br>■ References: (ACEEE, 2011; Cadmus, 2011; Research Into Action, 2010) |

*Selected Highlights from the Literature Review*

| Program Description |
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| **System Reliability Pilot (SRP) (RI)**<br>■ Years Implemented: 2012-ongoing<br>■ Key Stakeholders: National Grid<br>■ Goals: Reduce demand on congested substations through direct load control at selected homes and increased adoption of energy efficiency. SRP uses enhanced marketing and outreach to enroll additional participants in select statewide energy efficiency programs (EnergyWise and Small Business Direct Install), the DemandLink DSM program, and SRP-specific energy efficiency offerings (like the window air conditioner rebates or recycling).<br>■ Program Description: This is a component of the RI System Reliability Procurement Pilot which focuses on energy efficiency and demand response on Tiverton, RI and Little Compton, RI, which focuses specifically on customers residing within a constrained substation feeder. The energy efficiency portion focuses on increasing participation in the existing EnergyWise home audit program. The pilot uses targeted marketing which emphasizes the importance of energy efficiency and demand response for the community and delivers messaging through a variety of channels including community events, newsletters, and outbound telemarketing.<br>■ Outcomes: From 2012 through 2014 the program completed 625 EnergyWise audits on the congested substation compared to a target of 650. In addition, evaluators found the program induced a 53% incremental participation rate in the pilot area over a comparison town in the same period.<br>■ References: (Opinion Dynamics Corporation, 2014b, 2014c, 2015a) |
| **Project Energy Savings (WA)**<br>■ Years implemented: 2009-2012<br>■ Key Stakeholders: Clark Public Utility District (Utility), Local government (City of Vancouver, Clark County), and community organizations collaborated to provide energy efficiency services to underserved populations<br>■ Goals: increase program penetration to moderate-income participants<br>■ Program Description: Clark PUD partnership with Vancouver, Clark County, community groups to market/outreach to medium income residents/small business. Used existing Clark PUD incentives augmented by other funding sources.<br>■ Outcomes: The program served 300 residential assessments, over 200 residential retrofits, 7 small business retrofits, and 9 commercial lighting retrofits.<br>■ References: (Schueler, 2013; Washington State University, 2012) |
| **Energy Efficient Communities (WA)**<br>■ Key Stakeholders: Puget Sound Energy<br>■ Goals: Increase participation in PSE programs through community outreach or media blitzes<br>■ Program Description: Outreach team within PSE that focuses on promoting residential and commercial programs through partnerships with local organizations or direct-to-customer marketing, depending on the program and community. Methods include presentations to community groups, door-to-door outreach, direct mail, staffing at community events.<br>■ Outcomes: In 2015, PSE Energy Efficient Communities gave over 50 presentations to community groups and conducted in person outreach with 60 hospitality businesses on Whidbey Island, and conducted direst-to-customer outreach for the HomePrint™ program in 10 targeted neighborhoods.<br>■ References: (Puget Sound Energy, 2015, 2016) |
| **RePower (Bainbridge, Bremerton, Kitsap County) (WA)**<br>■ Years Implemented: 2010-2014<br>■ Key Stakeholders: Puget Sound Energy, Local government (Cities of Bremerton and Bainbridge Island, Kitsap County), community organizations, and implementation vendor (CSG). Per the final evaluation report, "The Washington State Department of Commerce partnered with Washington State University (WSU) Energy Program to supplement and extend existing utility incentives offered by Puget Sound Energy (PSE) and Cascade Natural Gas and to offer energy efficiency finance options through the Kitsap Credit Union and Puget Sound Cooperative Credit Union (PSCCU)." In Bremerton, the PSE existing utility HomePrint assessment was used, with a $90 incentive, community events, community marketing programming. Repower Kitsap, an initially separate financing program, was funded by a SEP grant through WA Department of Commerce. All three initiatives aligned through the process. |

*Selected Highlights from the Literature Review*

| Program Description |
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| ■ Goals: 5,000 assessments, 2,000 upgrades, create 65 direct jobs, 252 indirect jobs, save 15 percent energy in each home<br>■ Program Description: Originally a partnership between Bainbridge Island and Puget Sound Energy with the goal of reducing demand on the capacity strained island, the RePower brand was later expanded to Bremerton and Kitsap County. The three overlapping RePower pilot programs merged in January 2014. Designed to overcome barriers related to an untrained contractor network, a weak economy, and overlapping utility service areas that made incentive programs overly complex. Built on existing utility incentives and provided homeowners with low- to no-cost energy assessments, low-cost financing from local credit unions, kick-started a trade ally network and provided trade ally and real estate appraiser/sales professionals on energy performance ratings to build a market for energy-improved homes.<br>■ Marketing and Community Engagement Notes: Used a "locally branded" approach. Final report found that, "The Cities of Bainbridge Island and Bremerton were key delivery partners: … formal calls to action, event notices, and direct-mail letters sent by the City accomplished the greatest response rates. Mailing program materials via official city post resulted in program confidence, lend validity, and galvanized action on behalf of the residents" (Conservation Services Group, 2014)<br>■ Findings: Multiple pilots of the same program structure provide a comparative analysis that shows why the specific messaging, rebate structure, and other program offerings need to be tailored to resonate with homeowners and stakeholders in each community (e.g., income, renters, community history/motives); moreover, this intel should be collected up-front. Reported that a clear community-wide "call to action" boosted neighbor-to-neighbor momentum in Bainbridge, whereas Bremerton did not have an impending goal and momentum was lower.<br>■ Outcomes: Although the program did not meet its goal related to energy assessments or home retrofits, it did meet many other goals including demand reductions of 2 MW to avoid the need for a new substation and enroll 700 homes with demand response systems.<br>■ References: (Cadmus, 2014; 2014) |

# Appendix C. References

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SC 1-35

Request:

Referring to Chapter 6, how does National Grid plan to encourage bundling of weatherization with heat pumps to maximize energy and cost savings?

Response:

Please refer to the Company's response to Division 5-17, a copy of which is provided as Attachment SC 1-35 for ease of reference. Leveraging the lessons learned through the energy efficiency and SolarWise programs, the Company does not plan to require bundling of weatherization, but instead plans to pursue outreach strategies to encourage such bundling. For example, the Company plans to prioritize outreach to customers who have completed weatherization through the EnergyWise Program.

Prepared by or under the supervision of: Mackay Miller

The Narragansett Electric Company
d/b/a National Grid
RIPUC Docket No. 4780
Responses to Division's Fifth Set of Data Requests
Issued January 25, 2018

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Division 5-17

Request:

What additional targeting and segmentation approaches will you use to tier incentives and prioritize Equipment Incentive Program offerings to customers that are in most need or most likely to make the investment? Have you considered whether a customer that is interested in an electric vehicle may also be interested in a heat pump?

Response:

The Company is considering a wide range of targeting and segmentation approaches to implement the program. For example, one attractive option for targeting is to identify delivered-fuel customers who have participated in an EnergyWise Home Energy Assessment. Attractive options for pairing include, among other things, weatherization, electric vehicles, solar PV systems, electric energy efficiency, demand response, and storage. This diverse cross-section of distributed energy resource technologies bolsters the case for incentivizing the Company through the Power Sector Transformation effort to coordinate innovative customer offerings.

(This response is identical to the Company's response to Division 16-17 in Docket No. 4770.)

Prepared by or under the supervision of: Mackay Miller

SC 1-36

Request:

Would customers be able to finance through Heat Loan, accessed through the Energy Wise Program?

Response:

At present, the Company does not currently offer the Heat Loan program for these measures. As empirical data on the performance of heat pump technologies grows, the inclusion of heat pumps in public, private, or hybrid financing programs will become more feasible. Also, please refer to the Company's response to Division 5-13, a copy of which is provided as Attachment SC 1-36 for ease of reference.

Prepared by or under the supervision of: Mackay Miller

The Narragansett Electric Company
d/b/a National Grid
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Division 5-13

Request:

Schedule PST-1, Chapter 6 – Electric Heat, page 11 of 15 states, "For market-rate customers, incentive levels will be approximately 20% of the all-in cost of heating capacity".

a. What are the participant costs by measure for market-rate customers?
b. Will market-rate customers be able to finance these costs?
c. If so, which financing mechanisms are available to these customers?

Response:

a. As stated in Schedule PST-1, Chapter 6 – Electric Heat, page 11 of 15 (Bates Page 131, PST Book 1 of 3), precise incentive levels will be harmonized with the Energy Efficiency Program, and both will be adjusted periodically to reflect prevailing market prices for heat pump technology and installation costs. For the Electric Heat Initiative cost effectiveness test, the incentive amounts and corresponding participant costs, by measure type, are as follows:

| Measure | Total measure cost | Incentive | Participant cost | Participant share | Incentive share |
|---|---|---|---|---|---|
| **ASHP 3 ton** | $9,600 | $1,500 | $8,100 | 84% | 16% |
| **ASHP 5 ton** | $16,905 | $2,500 | $14,405 | 85% | 15% |
| **GSHP Horizontal Loop 4 ton** | $31,953 | $3,000 | $28,953 | 91% | 9% |

b. The Company has not performed a comprehensive survey of financing options available to Customers for heat pump installation. The 2017 RI Renewable Thermal Market Development Strategy (See Attachment DIV 5-11) identifies lack of financing options as one of the key market barriers to the growth of the renewable thermal market.

c. See the response to part (b), above. While the Company does not currently offer the Heat Loan program for these measures, as empirical data on the performance of heat pump technologies grows, the inclusion of heat pumps in public, private, or hybrid financing programs will become more feasible.

(This response is identical to the Company's response to Division 16-13 in Docket No. 4770.)

Prepared by or under the supervision of: Mackay Miller