Rhode Island Power Sector Transformation

Beneficial Electrification Principles and Recommendations

October 13, 1017

DRAFT FOR STAKEHOLDER COMMENT

Introduction

Rhode Island recognizes that its electric sector is undergoing significant changes.[1] Due to the interplay of technology innovation, public policy, and market forces, the nation's electric grid is getting cleaner and more distributed, and customers are consuming, saving, and producing energy in many new ways.

"Beneficial electrification" is one of the significant changes underway. It is a term that describes the electrification of end-uses, like light-duty transportation and space and water heating, in order to reduce costs and greenhouse gas and other air emissions of these products that historically have been powered by fossil fuels.

Beneficial electrification offers promising ways to manage demand and to avoid unnecessary stress on the system that could increase costs and air emissions. With the growth of intermittent resources (e.g., wind and solar), balancing grid systems is a very different task today than in the past. Grid operators recognize that managing demand through a combination of policies, pricing options, and program offerings can make the system more flexible and lower its overall costs. Electrification of both transportation and heating could allow the shifting of load in time, and would thereby meet the growing need for flexible resources to better manage the grid and help integrate renewable energy.

Beneficial electrification is possible due to significant increases in the efficiency of end-use equipment (e.g., heat pumps and batteries), technological advances in other sectors (e.g., electric vehicles), and declining electric sector emission rates. The opportunity exists to reduce electric sector emissions and electric system costs while lowering individual Rhode Islanders' energy burden. Electrification is also an emerging business opportunity for utilities to allow entities, in some cases including the utility itself, to develop new and innovative services for customers.

For these reasons and given Rhode Island state policy, it is appropriate to consider proposals from electric distribution utilities to advance the adoption of beneficial electrification. Such electrification proposals for Rhode Island must demonstrate that they will produce the aforementioned and other net benefits,[2] and that they are consistent with relevant state policy goals. To ensure this outcome, utility proposals should incorporate these goals, and proponents should be prepared to demonstrate how proposals will help meet them.

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[1] The Public Utilities Commission opened Docket No. 4600 to address issues related to the changing electric distribution system (*see* www.ripuc.org/eventsactions/docket/4600page.html). The Office of Energy Resources, the Energy Efficiency and Resource Management Council, the Distributed Generation Board, and National Grid convened a working group known as the Systems Integration Rhode Island or SIRI, to make recommendations on important issues related to developing Rhode Island's future electric grid, and to achieve the state's policy goals related to modernizing the energy sector. *See* www.energy.ri.gov/electric-gas/future-grid/systems-integration-ri.php. Additionally, Governor Gina Raimondo has asked state agencies to address a wide range of issues developing on the system, which was a direct cause of the work presented in this document. *See* www.ripuc.ri.gov/utilityinfo/electric/GridMod_ltr.pdf.

[2] Costs and benefits are defined by the Rhode Island Benefit Cost Framework and Test adopted for application to energy efficiency program review in the PUC's Standards for Least Cost Procurement in Docket No. 4684 and for broader program assessment in Docket No. 4600.

Fortunately, we expect there are many different program designs that would achieve net benefits and further state policy goals. While different in scope and design, all proposals should adhere to some basic principles. Since successful electrification depends on innovation and market transformation, state policies and the utility's role will need to allow for experimentation, be adaptive, and co-evolve with technologies and markets. Program goals must be clearly articulated, and each program design element must be clearly tied to program goals. To this end, proposals should be designed with appropriate metrics to demonstrate progress and to enable mid-course corrections if necessary. Furthermore, any electrification program proposal should provide a platform for technology innovation, meaning that it should establish equipment performance objectives such as improving system flexibility and visibility, rather than specifying particular technologies.

This draft whitepaper outlines important goals and basic principles the Draft Project Team, comprising Public Utilities Commission (PUC) staff, Division of Public Utilities and Carriers (DPUC), and Office of Energy Resources (OER), have developed based on stakeholder input, interagency deliberation, and research. The principles cover four key issues that emerge when considering a regulatory perspective on efficient electrification of the transportation system by increasing use of plug-in electric and plug-in hybrid electric vehicles (EVs) to meet state policy goals: Goals and Benefits of Electrification, the Utility Role, Cost Recovery, and Implementation Design and Adaptive Learning.[3] Highlights of stakeholder comments related to each issue can be found in the Appendix below. We seek further input from stakeholders on these principles and identification of program design preferences. A future draft – to be completed by DPUC and OER without collaboration of the PUC or its staff – may include further policy determinations and refinements on program design preferences based on stakeholder responses.

1. Goals and Benefits of Electrification

On June 14, 2017, the PUC, DPUC, and OER issued a Notice of Inquiry and Request for Stakeholder Comment Regarding a Utility's Role in Deploying Beneficial Electrification with Focus on Plug-in Electric Vehicles (Notice). The Notice included the following list of beneficial electrification program goals:

- Provide reliable, safe, clean and affordable energy to Rhode Island customers over the long term (this applies to all energy use, not just regulated fuels);
- Strengthen the Rhode Island economy, support economic competitiveness, retain and create jobs by optimizing the benefits of a modern grid and attaining appropriate rate design structures;
- Address the challenge of climate change and other forms of pollution;
- Align distribution utility, customer, and policy objectives and interests through the regulatory framework, including rate design, cost recovery, and incentives.

[3] Electrification of heating is part of Rhode Island's power sector transformation strategy, but is progressing on a different schedule from EVs in the Power Sector Transformation project. This is in part because National Grid currently has existing and proposed programs as part of its Energy Efficiency and System Reliability Procurement Plans.

- Prioritize and facilitate increasing customer investment in their facilities (efficiency, distributed generation, storage, responsive demand, and the electrification of vehicles and heating) where that investment provides recognizable net benefits;
- Appropriately compensate distributed energy resources for the value they provide to the electricity system, customers, and society;
- Appropriately charge customers for the cost they impose on the grid; and
- Appropriately compensate the distribution utility for the services it provides.

The Draft Project Team notes that standards for goals and net benefits have been developed in other PUC processes.[4] The Notice also included Rhode Island's EV deployment goals, including:

- The Rhode Island Zero Emission Vehicle Plan goal of 43,000 electric vehicles by 2025.
- The Executive Climate Change Coordinating Council (EC4) greenhouse gas emissions reduction scenario targeting the electrification of 34% of on-road vehicle miles travelled by 2035 and 76% by 2050.

Commenters on the Notice generally affirmed the goals presented. Key additional goals proposed by commenters included: educate customers about the benefits of electric vehicles, accelerate and scale the electric vehicle market, address key market failures, and ensure fairness.

2. Utility Role

Commenters noted, and Draft Project Team agrees, that the utility, as manager of the electric grid, will play a key role in transportation electrification. Moreover, it was agreed that the utility in fact has multiple roles, some of which will likely change over time. In the early years of any electrification proposal, the utility should consider how Rhode Island's transportation market must transform to meet state greenhouse gas emission goals. The transportation sector is the second largest consumer of energy in the United States (behind electric power generation) and yet 92% of the energy consumed in transportation today comes from petroleum.[5] Electrification promises to transform the current transportation market, enabling utilities to capture revenues currently spent on fossil fuels, enhance their ability to manage the grid, and provide their consumers with new products and services. As the market transforms, utilities must provide nondiscriminatory service and ensure that incremental electrification load is incorporated in a safe, reliable, and efficient manner. An electrification proposal should explain how the utility's role would support the program, achieve net benefits, and help ensure the achievement of state goals.

More specifically, a proposal should articulate what the utility expects to own, operate, execute, measure, and enable, as well as explain how the utility's role relates to the potential roles of other participants in the market. For example, customer education and outreach – potentially a key role for the utility – will be important in early years, and the utility would be expected to provide a plan setting out how it expects to conduct those efforts. Proposals should also outline how other entities (for example the Department of Transportation, auto dealers, or appliance manufacturers) might

[4] *See* footnote 3 *supra*.

[5] Based US Energy Information Administration data. *See* www.eia.gov/totalenergy/data/monthly/pdf/sec2_11.pdf.

share that role. As another example, a proposal that includes the utility owning EV supply equipment should be supported by a demonstration of benefits this model achieves over other ownership models and the context in which the utility seeks this outcome. The utility may seek to develop and own EV supply equipment in areas where, absent utility intervention, market barriers might exist to deployment.

3. Cost Recovery

Commenters submitted numerous suggestions for cost recovery mechanisms and articulated various points regarding the types of investments that should be eligible for cost recovery. Several commenters also made the case for combining and leveraging ratepayer funds with other sources and made several suggestions as to what those sources might be.

The Draft Project Team expects that recovery of electrification program costs should be subject to the same considerations as other ratepayer-funded utility projects. In particular, such cost recovery mechanisms should be consistent with least-cost procurement policy and considerations of the relative risks borne by each party. Proponents of using ratepayer funding to support an electrification program would also be expected to justify the degree to which the proposal leverages other program spending, private investment, government funding, and any other sources of capital.

4. Implementation Design and Adaptive Learning

The Draft Project Team agrees with many commenters that a beneficial electrification proposal should be designed to encourage experimentation, adaptive learning, and innovation. Such approach requires that proposals include outcome-based metrics (rather than picking any specific technologies) and commit to providing regulators with sufficiently meaningful data to demonstrate performance and enable meaningful regulatory review. Use of outcome-based metrics will allow sponsors of electrification proposals to engage meaningfully in periodic program reviews by all stakeholders, with opportunities for mid-course corrections.

A research element is another acceptable component to include in a proposal. A research project may allow adaptive learning and can include pilot projects designed to test ideas and inform broader programmatic decision-making.

Highlights from Pilots in other States. Numerous pilot projects are underway around the country. The pilots range widely in terms of scope, intent, and outcomes. A number of projects simply fund EV supply equipment or distribution system "make-ready" work to learn about costs and utilization of the infrastructure. Other projects put in place consumer rebates to test their efficacy and uptake. Still others examine the efficacy of time-of-use rates and other cost recovery mechanisms in maximizing the benefits and minimizing the costs to the grid of EV expansion, and in allocating costs and benefits to customers. To the extent practical, Rhode Island will learn from and share with other states, and National Grid will do the same with other utilities, to ensure that each proposed pilot project is value added.

An EV proposal should present a set of metrics to measure the efficacy of the program. Stakeholders suggested numerous useful metrics. The Draft Project Team agrees that proposals should be accompanied by performance metrics that will help measure the proposals' achievement

of relevant goals.[6] As noted, these metrics should be outcome-focused. They also should be relevant to consumers and public policy objectives, quantifiable, and verifiable. In some cases, metrics should be related to activities the utility can affect or control through its investments and its management. If methodologies for these metrics do not exist or are not in use in Rhode Island, a methodology and justification should be included with a proposal or responses to a proposal.

It is important to understand the degree to which an electrification proposal will affect existing state and utility programs, such as energy efficiency programs or distribution system investment plans. Additionally, proposals should address training and workforce development. There are also factors beyond the purview of the PUC that could influence the success of an electrification proposal and should be considered, and so should be considered in a proposal, such as building codes and zoning requirements.

The scope of any electrification program will also be an important consideration. Proponents should address questions like: what types of customers will be directly affected? how many customers are expected to participate? what types of transportation are included? An EV proposal, for example, will necessarily have to address issues such as how targeting different end-users can affect the efficacy of the program (e.g., single-vehicle versus fleet ownership); and reasons to include or exclude other forms of transportation (e.g., industrial, train, maritime, etc.).

Rates associated with beneficial electrification proposals, like other utility programs, should be just and reasonable. Rates, such as time-of-use rates, could be designed to maximize system benefits through, for example, smart charging and could promote other benefits as well. But, given likely limits on which customers can participate in, directly benefit from, and are affected by a proposal, among other limiting conditions, rates must be implemented in a way that is equitable for all classes of electricity users.

5. Beneficial Electrification of Heating Systems

Many commenters supported including electrification of heating as part of Rhode Island's Power Sector Transformation. National Grid has energy efficiency programs to lower the barrier to replacing inefficient heating systems with efficient electric heating systems, although currently the programs do not actively promote fuel switching (such as from oil to electric heat pumps). Nation Grid has proposed updates to these programs as part of its 2018-2020 Energy Efficiency and System Reliability Procurement Plans in PUC Docket No. 4684.[7] Those plans will be reviewed in the context of the PUC's Least Cost Procurement Standards,[8] which are generally consistent with the principles outlined in this document. Should National Grid propose a program to encourage beneficial electrification of heating outside of any Energy Efficiency and System Reliability Procurement Plan, that proposal should also be consistent with the principles described above in a manner that is analogous to heating systems and the heating sector.

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[6] *See* discussion of electrification and EV deployment goals in Section II *supra*.

[7] Docket material can be found at www.ripuc.org/eventsactions/docket/4684page.html.

[8] The Least Cost Procurement Standards can be found at www.ripuc.org/eventsactions/docket/4684-LCP-Standards_7-27-17.pdf

APPENDIX: HIGHLIGHTS OF STAKEHOLDER RESPONSES TO THE NOTICE OF INQUIRY

Commenter Highlights on Key Goals and Benefits:

1. Broad goals:
    a. Optimize utility investments for a future with a smarter, cleaner and more distributed grid; optimize benefits of a modern grid
    b. Strategic electrification –i.e., powering end-uses with electricity instead of fossil fuels in a way that increases energy efficiency and reduces pollution, while lowering costs to customers and society, as part of an integrated approach to deep decarbonization
    c. Enable the widespread adoption of car-sharing and autonomous vehicles
    d. Ensure fairness, treat EV charging like other potential load, providing nondiscriminatory electric service when and where requested
    e. Lower transportation emissions
    f. Avoid stranded assets
    g. Increase affordability, reduce cost to ratepayers
    h. Incentivize clean alternatives
2. EV and EV supply equipment goals
    a. Increase charging availability, reduce barriers to EV charging, address range anxiety
    b. Educate consumers on EVs (including financial value and usability), promote customer awareness of electric vehicles
    c. Accelerate and "scale" the market, support competition and choice, attract private investment, address key market failures – e.g., in multi-unit dwellings and public infrastructure, encourage interoperability
    d. Increase demand for electric vehicles
    e. Effectively manage the EV load, efficiently utilize EV supply equipment and distribution system infrastructure, capture the benefits of load control and ultimately vehicle-to-grid technology

Commenter Highlights on Analyzing Net Benefits:

1. PUCs should NOT examine the ownership and operation model based on charging for charging, but should instead examine the market for selling charging software and hardware in the absence versus the presence of the utility role or program
2. Investment in EVs themselves (by consumers and fleet operators) should be included by Rhode Island and its stakeholders when considering the total costs of transportation electrification
3. Alternatives to traditional rate structures which specifically take into account EV load, should be evaluated across all use cases, along with the grid and societal benefits associated with transportation electrification

4. When considering whether to expand the role for utilities on the customer side of the meter and into the competitive market, it is important to consider Rhode Island's market today and how it is growing into the future. The private sector is actively selling EV charging stations around the state.

Commenter Highlights on the Utility Role:

1. Overall utility role
    a. There are several roles for utilities in accelerating EV deployment and managing EV load
    b. Transformation of the EV market in Rhode Island requires a scale of planning, coordination, and investment that may not be possible if left to unregulated private sector actors alone
        i. Need a strong utility role in growing and helping scale transportation electrification in Rhode Island
        ii. A strong utility role may be the key to growing EV adoption and scaling the market for EV charging hardware and software in line with the state's goals
    c. Utilities are ideally suited to ensure that the associated new load is incorporated in a safe, reliable, and efficient manner
        i. As the grid manager, the utility will need to manage charging to better integrate it with grid capabilities and needs
        ii. Effectively manage the new EV load either through price signals to drivers or through programs that enable direct load management by the utility to reduce stress on the electrical grid and facilitate the integration of variable renewables
        iii. Develop processes for capturing the benefits of load control and ultimately vehicle-to-grid technology
    d. The utility will treat EV charging like other potential load, providing nondiscriminatory electric service when and where requested
    e. Providing flexibility for the utility to self-select its role(s) is essential for the utility to be excited about its involvement
    f. Avoid stranded assets through hardware/software interoperability to facilitate competition and future investment
    g. Administer a rate structure that sends appropriate price signals for EV charging
2. The utility's role may evolve over time
    a. The most critical role for the utility to play in the near term is as a market accelerator
    b. A deeper role for a utility in growing EV adoption and EV supply equipment deployment is a strong positive for the market, with EV charging software and hardware sellers benefiting from utility procurement or procurement facilitation in the near term, and benefitting from a more robust market over time
    c. A utility program could represent a relatively larger percentage of a given market in the near term, with a diminishing role over time, while begetting a much stronger market over time
    d. Facilitate the buildout of EV supply equipment, especially for stations that would be publicly available
3. Rhode Island should prioritize fostering the continued growth of the competitive EV charging market

a. Utility investments in and programs related to EVs and EV charging that support third-party markets benefit ratepayers and consumers, and will help to accelerate growth in the market
b. The utility's entry into the market as a procurer or facilitator can create opportunities
c. Replicate current models in energy efficiency and renewable energy program administration to encourage EV businesses and efficient markets

4. Utility ownership of EV supply equipment
    a. Make-ready
        i. Rhode Island should direct EV supply equipment investment using a make-ready model and/or direct utility ownership
        ii. Rhode Island should support a make-ready model
    b. The utility should continue to serve as operator of public and private EV supply equipment, through the installation, ownership, and maintenance of EV supply equipment and associated electrical equipment on both the distribution system and behind customers' meters
    c. The utility should generally not be engaged in the business of vehicle charging, whether providing charging equipment or the charging service
    d. The role utilities should play is that of distribution system ownership, operation, and planning, integration, and optimization up until the point of charging stations
    e. At this stage, utility ownership and operation of EV supply equipment (including charging stations) is appropriate and possibly necessary to accelerate the market, support competition and choice, and attract private investment
    f. In the near to medium term, allowing the utility to operate EV supply equipment that is not being sufficiently developed by competitive charging business operators or individual site hosts, could help achieve the state's Zero Emission Vehicles and greenhouse gas goals
5. Education and outreach to customers. National Grid is likely one of the few organizations in the State that has everyone's contact details, leverage this list to communicate the benefits of these programs to help kick start the program
    a. Utility should execute marketing strategy to facilitate EV adoption by communicating incentives, financial value, and usability
6. Utilities should develop incentives towards EV adoption

Commenter Highlights on Cost Recovery:

1. Cost Recovery mechanisms
    a. EV program costs would best be recovered through a traditional cost of service approach, with a return on the capital portion of the total cost
    b. Under revenue decoupling, the Utility cannot retain any revenue increase from higher sales from end-use electrification, so addressing the evolution of decoupling is important
    c. Consider National Grid's proposal in MA for a tariff for concurrent cost recovery through distribution rates
    d. Consider EVs as a non-wires alternative in reliability planning
    e. Utility cost-recovery and compensation should be tied to achieving measurable outcomes and performance benchmarks, tied to the goals and factors discussed above
2. What should utilities achieve cost recovery for?

a. Utility customer funding is most appropriate for investments (1) that enhance distribution system reliability; (2) that generate broad system and public benefits that are shared across customers, and are not provided already through competitive markets; and (3) where the utility has a unique strategic role
b. Utility investments should focus on sites that enable EV ownership and that are presently underserved by private sector investment; at this early stage, the PUC should avoid encouraging substantial utility investment in sites that are not routinely visited by individual drivers such as shopping malls or restaurants
c. Important to have EV supply equipment in disadvantaged communities
d. The PUC should require that a significant percentage of the utility investment be directed to promoting electrification and EV access in low-income and disadvantaged communities
e. Utility investment should be in the public interest, meet a need for advancing EVs, and not hinder the development of the competitive EV charging market
f. Ratepayer-funded investments are not inherently aligned or misaligned with statewide transportation electrification or broader power sector goals; alignment is driven more by how those investments are made and whether they lead to the creation of widespread grid benefits
g. Consider prioritizing efforts in environmental justice areas
h. Need EV purchase incentives and electrification of medium and heavy duty fleets and associated infrastructure
i. Utility programs should target those use cases for EV supply equipment deployment that face higher barriers than others; Rhode Island should increase access to charging outside of the personal, light-duty vehicle market

3. Leveraging other investment
    a. The most efficient and effective way to deploy EV supply equipment where it needs to be is to leverage private funds
    b. Utility investments should be paired with economic incentives for EV purchases through funds from the VW settlement and through limiting, pricing, and reducing carbon pollution from transportation sector, as considered by House Bill 5369 and the State's participation in the Transportation and Climate Initiative
    c. One potential source is market-based transportation climate policy, such as cap-and-invest; could be modeled after the Regional Greenhouse Gas Initiative; another is the VW settlement funds
    d. Regional Greenhouse Gas Initiative is a potential funding source
    e. Consider how to cost-effectively use the Energy Efficiency Program Charge EVs pay
    f. Sometimes it may make sense to complement private investment with other sources of funding – e.g., in multi-unit dwellings, environmental justice communities, or in underserved markets
    g. Site hosts that make a financial contribution are far more likely to actively support the successful installation and ongoing preventive maintenance of the EV supply equipment because they have "skin in the game
    h. Programs should require private matching payments to stretch the value of public investments, efficiently site equipment, and maintain healthy competition

i. Property owners could be offered matching incentives for dollars they put towards installing and maintaining EV supply equipment

Commenter Highlights on Implementation Design:

1. Principles: Stakeholders from across the auto, utility, EV charging, and nonprofit sectors signed onto a series of Guiding Principles for Electric Vehicles and Charging Infrastructure[9] which were signed by nearly 50 industry members including 18 utilities
2. Process:
    a. The PUC should order utilities to propose EV infrastructure plans comparable to those recently submitted by National Grid and Eversource in Massachusetts
    b. It may be better for the PUC to develop a strawman proposal to solicit public input before the utility files a specific docket of its own and triggers all the accompanying rules of engagement.
    c. Develop charging station location strategy overall in order to optimize EV adoption and utilization and grid management
    d. Utility should work with Department of Transportation and agencies or non-governmental organizations to collect data and plan for distribution system upgrades to enable EV supply equipment
    e. Utility should assist in developing budgets for funding system upgrades to enable mass charging
3. Data and metrics:
    a. Utilities should be required to collect EV supply equipment data (Acadia)
    b. Utility should track deficiencies in product capability and provide information to manufacturers, distributors, and developers (Newport Solar)
    c. Utility should track metrics of success (Newport Solar)

[9] *See* https://energy.gov/eere/electricvehicles/articles/guiding-principles-promote-electric-vehicles-and-charging

4. Complementary policies
    a. Some of the most impactful policies are unrelated to energy policy. For example, building codes can decrease barriers to EV supply equipment deployment by including "EV Ready" requirements
    b. EV-friendly building codes are key
5. Clarifying the regulatory status of third-party providers of EV supply equipment and services helps to provide the regulatory certainty necessary for a competitive charging market and private investment; Rhode Island should determine that the provision of EV charging services is not the generation, transmission, distribution, or sale of electricity to EV drivers
6. Supporting the electrification of public transportation and rapidly shifting forms of mobility (e.g., ride-sharing and ride-hailing fleets) will support equitable access to clean transportation
7. Training and workforce development are necessary investments to complement other EV goals

Commenter Highlights on Potential Program Effectiveness Metrics:

1. Station deployment; number of chargers built; number of installations
2. Station reliability and availability
3. EV supply equipment utilization
4. EV rate or program enrollment
5. MWh of off-peak charging
6. Customer savings
7. Customer conversion to EVs
8. Number of registered EVs in service territory
9. Estimated emissions impact
10. Favorable shift in demand
11. Increased EV purchases in multi-unit dwellings
12. Installation and upgrades of distribution assets to encourage EV charging
13. Percentage of incentives consumed
14. The extent to which utility programs support the competitive EV charging market
15. The ratio of PEV to EV supply equipment by application category
16. Indicators of social equity; EV supply equipment deployed by geographic footprint and demographic profile
17. Effect on the efficient usage of the distribution system and avoidance of load-growth driven infrastructure upgrades

Commenter Highlights on Rates for Charging:

1. Time of use or time-varying rates are essential
2. Public education must also include public education with respect to rate design
3. Attain appropriate rate structures; the utility should prioritize smart rate structures; the rate structure should send appropriate price signals for EV charging
4. Alternatives to traditional rate structures should be evaluated
5. Avoid demand charges
6. Fast-charging stations will require individualized rate design treatment, as demand charges are not a workable rate structure for them

Commenter Highlights on Equipment Decisions:

1. EV charging site hosts should be allowed to choose equipment and services to meet the site's specific needs to support ongoing innovation in equipment and services in the competitive EV charging market
2. EV supply equipment requirements are key
    a. Agencies should consider promulgating guidance relating to Level 2 charging stations, station networking capabilities, interoperability, demand response capability, and other potential requirements
    b. As much as practicable, advanced metering functionality (AMF) should be required at customer sites with EV supply equipment
    c. The capabilities offered will help to both create grid benefits and give the utility and regulators visibility into consumption patterns and other relevant factors
    d. Access to DC fast charging stations will be important to increase range confidence; this may require more upfront cost and lower initial usage, but it will be important to prioritize as a way to seed early adoption

Commenter Highlights on Electrification of Heat:

1. Further information on air-source heat pumps.
    a. NEEP worked with regional stakeholders to develop a Regional Air Source Heat Pump Market Transformation Strategy Report that provides a collection of priority strategies to drive adoption of air source heat pumps and achieve long-term market transformation
    b. Strategy areas include consumer/installer education, cost reduction, research, improved performance metrics, integrated controls, and state/local policies
    c. Rhode Island stakeholders, including program administrators can continue to stay engaged with the regional effort and leverage resources
    d. NEEP's Cold-climate ASHP Specification can be used to identify efficient air source heat pumps that maintain efficiency even during cold temperatures and to size air source heat pumps effectively.
    e. NEEP Installer Guides can help improve the sizing, selection and installation of air source heat pumps in cold climates
    f. NEEP's Regional Working Group will continue to be a useful forum for regional stakeholder to discuss and coordinate effective market intervention strategies
2. Utility should be involved to stimulate the replacement of inefficient electric or oil heating systems with high efficiency heat pumps