

September 18, 2019

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Request for Information (RFI) on Beneficial Electrification Study

Dear Emily:

Acadia Center respectfully submits the attached comments to inform the development of the report Efficiency Maine Trust (“EMT” or “the Trust”) is writing on the barriers to beneficial electrification pursuant to L.D. 1464 – *An Act To Support Electrification of Certain Technologies for the Benefit of Maine Consumers, Utility Systems and the Environment* (Chapter 365, Acts of 2019). Acadia Center is a Maine non-profit organization headquartered in Rockport and committed to advancing the clean energy future. Through research and advocacy, Acadia Center works to empower consumers and offer real-world solutions to the climate crisis for all.

Acadia Center’s responses are based on its reports on beneficial electrification and the energy system. Acadia Center’s EnergyVision reports set forth an ambitious pathway for states to achieve an economically productive, consumer-oriented, and low carbon energy future.¹ EnergyVision integrates four key strategies, the first of which is to utilize market-ready technologies to electrify buildings and vehicles. Building on this report, Acadia Center released EnergyVision 2030, which recommends a path to achieve a 45% emissions reduction by using market-ready technologies to build a cleaner, more modern energy system.² To reach this goal, the report recommends that at least 17% of the passenger fleet and 2.5% of the medium-duty fleet in the Northeast be electrified. In the buildings sector, EnergyVision 2030 recommends that at least 13% of homes and 5% of commercial spaces electrify their heating equipment, and states must acquire all cost-effective energy efficiency to counter electric load growth.

Acadia Center looks forward to working with EMT throughout the development of this important report.

Respectfully submitted,

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¹ Acadia Center, 2014. “EnergyVision: A Pathway to a Modern, Sustainable, Low Carbon Economic and Environmental Future,” (available at: <http://acadiacenter.org/document/energyvision/>).

² See: <http://2030.acadiacenter.org/>.

Acadia Center Responses to the Required Study Areas:

1. Identify barriers to beneficial electrification in the transportation and heating sectors of the state

Beneficial electrification promises great benefits for residents of Maine. Both heat pumps and electric vehicles (EVs) cost less to operate than fossil fuel options, reduce toxic pollution from fossil fuels, and reduce greenhouse gas emissions. Despite these benefits, adoption of these technologies faces a number of barriers, including:

- Lack of consumer and vendor awareness;
- Unnecessarily high upfront costs or long payback times;
- Lack of public charging infrastructure (for EVs); and
- Competition with natural gas (in the case of heating electrification).

These barriers exist to varying degrees in Maine. Acadia Center proposes recommendations to overcome each of them through its answer to question 5.

2. Identify additional information that the Trust may require to make additional recommendations or analysis

While there is generally enough public data available to demonstrate the consumer, health, and economic benefits of beneficial electrification, there is a lack of information available on the equitability of current electrification efforts. Data illustrating the geographic distribution of heat pump and EV adoption would be helpful in determining which areas are underserved by current markets. As discussed in question 4, rental units, rural populations, and environmental justice (EJ) communities are often underserved by incentive programs. More granularity on geographic distribution of EV and heat pump adoption in Maine would help to better target efforts.

In addition, data that describes existing energy use conditions by geographical area would help to establish a baseline from which to measure progress. Useful data categories might include home energy use characteristics by end use (such as insulation R-values and heating system efficiencies), vehicle miles traveled (VMTs), and vehicle fuel efficiency, all organized geographically.

3. Consider potential roles of utilities in supporting beneficial electrification

Through their influence on electricity rates and investment programs, utility policies have significant power to affect how quickly electric technologies are adopted. Acadia Center recommends that electric utilities and regulators prioritize (1) time-varying rate structures that incentivize beneficial electrification, and (2) policies that allow utility investments to be optimized for a future with a smarter grid and widespread, clean, distributed energy resources, including energy storage.

The utilities' role should be to address key market failures. One market failure to date has been the slow adoption of EV chargers and heat pumps in rental and low-income dwellings. These market segments have been difficult to reach due to split incentives, high out-of-pocket costs, and difficulty recovering the cost of investment, which can be quite high if significant upgrades to a site's electrical infrastructure or health and safety measures are needed. Utilities can address these market failures through investing in "make-ready" infrastructure for EVs and "heat pump ready" new buildings.

Furthermore, utility investments supporting beneficial electrification should be subject to the same limitations as other types of grid modernization investment:

- Investments should be made in ways that provide concrete benefits to ratepayers and the public.
- Distribution companies must not use their position to acquire electrification-enabling assets in such a way that hinders the competitive market.
- Distribution company investments in beneficial electrification should be closely coordinated with other investments, initiatives, and programs in the state.

Acadia Center finds reasonable the regulatory limitations set forth by the Massachusetts Department of Public Utilities on EV charging investments by distribution companies in D.P.U. 13-182 that were largely codified into statute. (Chapter 448 of the Acts of 2016, §1(f)). The statutory provision requires that a distribution company proposal to build EV infrastructure can be approved only if it “is in the public interest, meets a need regarding the advancement of electric vehicles in the commonwealth and does not hinder the development of the competitive electric vehicle charging market.”

These restrictions have led to multiple proposals for “make-ready” EV infrastructure in Massachusetts, which Acadia Center has supported. Under this model, the utility prioritizes the build-out of sufficient infrastructure to support installation of a charging station by the owner of a chosen site. The purchase and maintenance of the charging station itself is then left to the site owner. These “make-ready” proposals facilitate a competitive charging market by avoiding utility ownership of the EV charger.

4. Identify areas or populations in the State less likely to benefit directly from beneficial electrification without additional policy development or utility intervention

Relative to nearby states, the potential benefit of electrification for residents of Maine is notably high. About 72% of homes in Maine use heating oil, kerosene, or propane for heating³—the highest proportion of any state by far. These fuels are expensive, high in greenhouse gas content, subject to price fluctuations, inconvenient for consumers to procure, and unlike electricity, are not subject to Maine’s winter disconnect moratorium. Electrification of heating equipment and water heaters can alleviate all these problems at once. Similarly, Maine drivers who switch to EVs will pay just 43% of what they currently pay for gasoline, according to the U.S. Department of Energy’s “eGallon” metric—saving almost \$700 per year. Maine can harness substantial benefits by advancing beneficial electrification.

Underserved populations. Areas of the state where a significant proportion of residents are racial minorities, speak a language other than English, or have low median household incomes relative to the statewide average—commonly referred to as environmental justice (EJ) populations—as well as renters and rural residents, are less likely to benefit from incentive programs encouraging electrification without further intervention. Programs should be designed to address these market failures by carving out specific expenditures for EJ populations. Larger incentives in target areas could also be considered.

Programs to construct EV charging infrastructure in EJ areas must be paired with efforts to make EVs affordable and accessible for residents, such as through a low-income EV rebate program that extends to used vehicles and provides greater discounts, fast EV chargers, and rebates for electric buses and other public transit.

Electric buses. Electrifying public buses is an important way to improve air quality. These buses typically run on diesel, which leads to high concentrations of air pollution, negatively impacting public health. Replacing these buses with electric versions without tailpipe emissions will have positive impacts regionally and particularly in the communities they serve.

³ American Community Survey 2017 five-year estimates, table B25040

Port electrification. Maine should also consider strategies for industrial electrification, such as efforts to electrify ports. The diesel engines at ports, which power ships, trucks, trains, and cargo-handling equipment, create air pollution that impacts the health of workers and near-port community residents and contributes significantly to regional air pollution. It is well-documented that air pollution from diesel exhaust is linked with high levels of asthma and bronchitis in children and leads to school absenteeism and emergency room visits.⁴

The experience of the Port of Montreal⁵ may offer some best practices for port electrification, despite its larger size than ports in Maine. The Port of Montreal has reduced emissions by 2,800 tons per year by investing in “ship-to-shore power,” where container and cruise ships connect to the power grid while in port, allowing them to use electricity to keep the ship running and load or unload goods. Prior to this upgrade, ships in port would run on marine diesel fuel, leading to substantial pollution in the vicinity of the port.

5. Recommend opportunities for beneficial electrification

The opportunities described below include recommendations regarding important factors which Efficiency Maine should consider as it plans its study of barriers to beneficial electrification.

Home Weatherization

Account for potential impact of existing weatherization programs on heat pump conversion potential savings.

Efficiency Maine has offered comprehensive home energy upgrade incentives since 2010 and heat pump incentives since 2012. Coordinating beneficial electrification of home heating in Maine via the Trust’s existing programs is a golden opportunity to save customers money while rapidly transitioning homes in Maine away from fossil fuels.

Weatherization measures like insulation and air sealing can substantially improve the value proposition of heat pump retrofits for customers. By reducing heat loss, weatherization saves customers money on both a heat pump’s operating cost and its purchase price, as homes with more efficient enclosures can install smaller, less expensive heating equipment than their leakier counterparts. At the same time, cold climate heat pumps can achieve efficiency levels up to 300%, producing more heat than they consume in electricity—by contrast, boilers and furnaces in Maine are typically around 82% efficient. Customers can compound their savings by coupling these two measures together: reducing heat loss from weatherization measures, improving heating system efficiency by replacing boilers and furnaces with heat pumps, and downsizing heating equipment.

Additionally, home energy upgrades that provide comfortable, efficient heating and cooling while reducing drafts, moisture problems, and mold can have significant health and safety benefits, especially for vulnerable populations like children and the elderly, who suffer the most during increasingly frequent extreme weather events. Some customers can also leverage participation in efficiency programs to obtain assistance in remediating asbestos or lead problems, maximizing safety while minimizing cost.

Acadia Center’s EnergyVision 2030 shows that energy efficiency is critical to meeting climate goals and countering electric load growth in the future as more heat pumps and electric vehicles are adopted.

⁴ Natural Resources Defense Council, 2004, “Harboring Pollution: Strategies to Clean Up U.S. Ports.” Available from: <https://www.nrdc.org/sites/default/files/ports2.pdf>

⁵ Port of Montreal, 2015, “Port of Montreal to Install Shore Power for Cruise Ship Terminal and Wintering Ships.” Available from: <https://www.port-montreal.com/en/electrification-quai-gare-en.html>

Consumer Incentives

Assess incentive amounts on the basis of what will achieve rapid electrification across a variety of vehicle classes and dwelling types.

While heat pumps and EVs can dramatically reduce fuel costs for consumers while sharply decreasing emissions, their initial purchase price is prohibitive for some consumers. Efficiency Maine Trust has already had success in offering consumer incentives for heat pumps. The state also recently announced that it will offer purchase incentives for light-duty electric vehicles.

To work toward full electrification of transportation, the state needs to consider investments and incentives for medium- and heavy-duty vehicles and their associated infrastructure. There are currently many commercially available electric vehicles in these classes, such as delivery trucks and buses, and the state should include investments for electrification of these fleet vehicles in its planning.

Consumer and Vendor Education

Include a review of best practices in heat pump and EV technology education in the study & provide recommendations specific to Maine.

Public education is an essential strategy to achieving widespread beneficial electrification. Currently, the vast majority of car and heating system buyers lack the basic knowledge needed to make an informed purchase of electric alternatives. For EVs, automakers bear a large responsibility for advertising the benefits of their vehicles to consumers, but government agencies, utilities, nongovernmental organizations, and others must play a role as well. For heat pumps, educational outreach programs could be run through state energy efficiency programs, which are already designed to inform utility consumers about efficient technologies, as well as by a state agency or manufacturer.

Customers also rely heavily on vendors—either HVAC professionals or car salespeople—to inform their decisions. However, the majority of professionals in these fields are unfamiliar with electric options and are not confident recommending them. Familiarizing more HVAC professionals with heat pump installation and options for integrating heat pumps with existing systems through thermostats or other controls, as well as design changes for new homes to be efficiently heated with heat pumps, will help reduce the costs of installation through learning and increased market competition. Similarly, auto dealers should be familiarizing their sales force with EVs and ensuring these vehicles are available and charged for customers to test-drive. The Trust's Qualified Partner Program provides a proven vehicle with which to implement these vendor education priorities.

Additionally, utilities have a responsibility create, promote and educate consumers about electricity rate designs that benefit users of EVs and heat pumps.

Building Codes

Assess the feasibility of making electrification into an objective of an improved Maine statewide building code.

Building codes offer a significant opportunity to accelerate deployment of clean heating and EV charging infrastructure. In the buildings sector, installing heat pumps in new construction is easier and more cost-effective than retrofitting existing buildings, and building high-efficiency or Passive House new residences reduces the total heating and cooling need of the building. Without intervention, many new homes built in Maine in the coming years will rely on propane or oil for heat, which are more costly, inconvenient, and subject to price fluctuations than electricity, and risk shut-off for nonpayment. State building codes that prohibit fossil fuels in new construction in favor of heat pumps—either through equipment efficiency standards or a ban—would be as much a consumer protection measure as they would a climate or energy efficiency measure.

Similarly, EV-ready building codes will help sustain EV infrastructure deployment beyond short-term incentive or utility programs. These building codes would require that new residential and commercial construction include the electrical circuits to support EV charging in garages or parking lots to minimize the costs for installation later.

Smart Electricity Pricing and Energy Management

Ask utility companies to design rates that facilitate electrification as a statewide policy priority.

Since heat pumps and EVs run on electricity, the cost of electricity dictates their operating cost. While consumers will save money by switching to heat pumps and EVs, changes in electricity rates can increase savings to the consumer and to the electric grid by incentivizing customers to use their new equipment most when electricity is plentiful. Smart electricity rate design, such as time-varying rates (TVR), better reflects the real cost of delivering electricity to customers, creating low-cost electricity hours that customers can take advantage of when heating their homes or charging their vehicles. Developing TVR is an important role the utility can play in advancing EVs, as described above.

Managed charging, demand response, and vehicle-to-grid programs are additional utility-run programs that can benefit consumers and minimize ratepayer costs. Coupled with TVR, these programs would encourage off-peak charging and heating and put downward pressure on electricity rates for all customers. Utilities should avoid certain types of rate structures, such as high demand charges, that inhibit otherwise sound investments in public fast-charging and other high-power-draw applications like electric buses.

Limit Natural Gas Competition

Recommend ending incentives for natural gas conversion for customers heating with oil or propane.

Utilities that have both natural gas and electric assets face a conflict of interest when it comes to home heating. When a customer converts from oil to gas, a utility can begin to collect a monthly fixed charge from their new customer. But if that same customer were to move from oil to a heat pump, the utility would not collect any additional monthly charges, because the customer already has an electric bill. The natural gas utility is also incentivized to push for oil-to-gas conversions in homes that are off the existing gas lines. Natural gas utilities earn a regulated rate of return on new gas pipes and other infrastructure, which it collects from across its entire customer base. Although electric utilities earn a similar rate of return, the incremental infrastructure needed to serve more heat pumps is far less, because the electric lines already run to all customers. This means a utility makes more money on a new natural gas customer than an electricity customer.

This increased utility revenue occurs at the expense of customers. The new customer who could have saved money by installing a heat pump instead of natural gas heat, and all gas customers who must pay for new infrastructure that could have been avoided. While Maine does not currently have widespread gas service, it should work to limit this conflict of interest and end incentives for customers to convert to gas heating.

Transportation Climate Policy

Consider the revenue generation potential of the Transportation Climate Initiative when assessing the possible impacts of transportation electrification programs.

Maine should explore non-traditional sources of capital for transportation electrification as the market grows. One revenue source gaining momentum through the Transportation Climate Initiative and other forums is market-based transportation climate policy, such as a cap-and-invest program. This type of revenue-raising mechanism could be modeled after the Regional Greenhouse Gas Initiative (RGGI), in which proceeds are returned to the participating states. A cap-and-invest program applied to transportation emissions could be used to raise funds for electrification of Maine's transportation, including EVs, buses, ports, and trains, while helping the state meet its emissions reduction goals. Acadia Center's report "[Building a Stronger Maine](#)" demonstrates that a cap-and-invest program for

transportation could raise an average of \$115 million annually for transportation electrification and other clean transportation investments.

Revenue raised through a cap-and-invest transportation climate policy can help magnify the impact of the program if it is invested in aiding compliance with the program. Since the program is designed to limit transportation carbon emissions, it would be best to reinvest the funds to support clean transportation options that reduce transportation emissions. For example, investing these funds in zero-emissions vehicle (ZEV) incentives, charging infrastructure, or education and outreach would all help compliance with the program and support the ZEV market.