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NRCM Response to Request for Information on Beneficial Electrification

The Natural Resources Council of Maine (NRCM) respectfully submits this response to the Efficiency Maine Trust's ("Trust") August 28, 2019 Request for Information on its study on beneficial electrification.[1] NRCM looks forward to providing further comment and input, including but not limited to comment on a draft study, in the coming months.

General comments

As the most oil dependent state in the country, Maine has tremendous opportunities to benefit from electrification paired with energy efficiency and an increase in renewable energy production. Maine's recently enacted policy requiring that 80% of electricity sold in Maine come from renewable resources by 2030 (with a goal of 100% by 2050) ensures adequate progress on the latter.[2] These benefits include enormous air quality and public health benefits; increased reliability, resilience and energy security; lower overall energy costs; and decreased share of energy expenditures flowing out of the state economy. If demand is managed successfully,

[1] Trust RFI EM-006-2020
[2] With a significant contribution from nuclear power plants in the region, Maine already gets more than half of its power from non-fossil fuel/non-carbon emitting sources.

increased end-use electrification also has the potential to increase utilization rates of our electricity grid, lowering the per-unit cost of electricity for consumers.

In conducting this study, the Trust should weigh heavily Maine's new requirement to reduce greenhouse gas emissions by 45% below 1990 levels by 2030 and at least 80% below by 2050. These requirements mean the state must plan for energy choices that are cost effective *and consistent with greatly reduced emission levels in the mid- and long-term*. Vehicles and heating systems purchased now could easily be operating in 2030. Building retrofits may "last" for 20-30 years, and the character of today's new construction will constrain our energy future for longer.

As a final general comment, it is important to note that, unlike the fuels used traditionally in our buildings and transportation systems, electricity is primarily delivered by monopoly utilities. Shifting to electrification requires a very close look at changes needed to utility regulation to ensure that consumers can benefit and any opportunities for market efficiencies are captured.

Existing Studies and Reports on Electrification

The primary purpose of our response is to provide the Trust with a detailed bibliography of studies and reports relevant to beneficial electrification (Attachment 1). While some of the barriers and opportunities for beneficial electrification are unique to Maine, many are shared by other Northeastern states or the United States as a whole.

Barriers and Opportunities in the Building Sector

The opportunity to benefit from electrification in buildings is large. It is particularly important to examine the improvements in indoor air quality from reduced fossil fuel combustion

within the home. Again, especially when paired with energy efficiency improvements that reduces indoor health risks such as moisture, super-efficient electric heating can reduce exposure to pollutants that are especially harmful to vulnerable populations, such as children and the elderly, and drive up societal health care costs. While these benefits have been identified for some time, they are increasingly being analyzed and quantified and should be integrated into any economic analysis of Maine's electrification strategy.

Although there are larger barriers and opportunities overall in existing buildings, the Trust should also pay special attention to barriers and opportunities for new construction, where the value proposition for integrated electrification at the time of design and construction is likely to be high. And as noted above, today's new construction needs to meet our needs (including greenhouse gas limits) in 2050 and beyond, or else require expensive retrofits in less than a generation. Building codes in some jurisdictions are beginning to anticipate electrification (including for heating and cooling, but also through on-site renewable energy production) but the 2018 model energy code set to be adopted in Maine in 2020 does not.

Barriers include lack of trustworthy information about new technology (including in the face of misinformation from fossil fuel interests), availability of qualified contractors, and the complexity of retrofitting buildings designed for centralized fossil-fuel based heating systems.

Barriers and Opportunities in the Transportation Sector

Maine's rural nature also presents significant challenges and opportunities for beneficial electrification in the transportation sector. While longer driving distances—a fact of life for many Mainers compared to their counterparts—has been seen as a barrier for electric vehicle adoption, more efficient vehicles (like other energy efficiency technologies) actually return the

highest benefits at higher utilization rates. At the end of the day, with increasing vehicle range and declining battery prices, Maine may be poised to realize even greater fuel and vehicle operating savings than other places.

However, the barriers to transportation electrification are substantial and likely much greater than in the building sector, where electrification requires customers to make more modest changes to their heating/cooling system purchasing decisions and operating behaviors. Households and commercial consumers in Maine heat and cool with several different fuels. Many of them use two fuels, or have neighbors with a different fuel, and those fuel choices have shifted somewhat over time. But for as long as anyone can remember Mainers and other Americans have fueled their vehicles almost universally in one way: by purchasing gasoline at a gas station (or diesel, which is differentiated mostly by a different colored pump handle.) The public awareness and information challenges are therefore significant, on top of traditional economic barriers such as higher up-front costs.

Another important challenge is the pace of technology change. The rate at which new models of vehicles will become available, their ranges and the prices, is uncertain. Given the general paucity of charging options available today, which will change at some uncertain pace, it is difficult to predict vehicle charging behavior in the future. All of these make vehicle and charging investment decisions more difficult, especially in the private sector,. These are not ideal conditions for markets to provide efficient outcomes and increase the need for policies and market interventions to capture the benefits of vehicle electrification.

Finally, like the greenhouse gas reduction limits now part of Maine law, the Trust should take into consideration Maine's Zero Emission Vehicle regulations that require an increasing percentage of electric vehicles to be sold in Maine. While this legal requirement is a floor, not a

ceiling, it provides an important reference point for our electrification strategies, policies and investments.

Respectfully submitted,

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Attachment 1: Electrification Studies & Reports

Document Title	Author	Date	Link
Northeastern Regional Assessment of Strategic Electrification	NEEP	2017	https://neep.org/sites/default/files/Strategic%20Electrification%20Regional%20Assessment.pdf
Action Plan to Accelerate Strategic Electrification in the Northeast	NEEP	2017	https://neep.org/sites/default/files/resources/Action%20Plan%20To%20Accelerate%20Strategic%20Electrification%20in%20the%20Northeast.pdf
Beneficial Electrification: Ensuring Electrification in the Public Interest (multiple in series)	RAP	2018-2019	https://www.raponline.org/knowledge-center/beneficial-electrification-ensuring-electrification-public-interest/
The Economics of Electrifying Buildings	RMI	2018	https://rmi.org/insight/the-economics-of-electrifying-buildings/
Electrification of buildings and industry in the United States; Drivers, barriers, prospects, and policy approaches	LBNL	2018	https://emp.lbl.gov/publications/electrification-buildings-and
Electrification Futures Study (multiple phases)	NREL	2017-2018	https://www.nrel.gov/analysis/electrification-futures.html
U. S. National Electrification Assessment	EPRI	2018	http://mydocs.epri.com/docs/PublicMeetingMaterials/ee/000000003002013582.pdf
Residential Building Electrification in California Consumer economics, greenhouse gases and grid impacts	E3	2019	https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf
Strategic Electrification and the Changing Energy Paradigm: Challenges and Opportunities for Utilities	Cadmus	2018	https://cadmusgroup.com/papers-reports/strategic-electrification-and-the-

			changing-energy-paradigm-challenges-and-opportunities-for-utilities/
Draft Results: Future of Natural Gas Distribution in California	E3 for California Energy Commission workshop	2019	https://ww2.energy.ca.gov/research/notices/2019-06-06_workshop/2019-06-06_Future_of_Gas_Distribution.pdf
Rhode Island Power Sector Transformation	RI Office of Energy Resources & RI PUC	2017	http://www.ripuc.ri.gov/utilityinfo/electric/PST%20Report_Nov_8.pdf
Electric Vehicle as Distributed Energy Resources	Electricity Innovation Lab, RMI	2016	https://rmi.org/insight/electric-vehicles-distributed-energy-resources/
AchiEVe: Model Policies to Accelerate Electric Vehicle Adoption	Plug In America and Sierra Club	2019	https://pluginamerica.org/wp-content/uploads/2019/09/AchiEVe-Model-Policies-Toolkit-3.0-2019.pdf
Environmentally Beneficial Electrification: Electricity as the End-Use Option	Keith Dennis in the *Electricity Journal*	2015	http://www.sciencedirect.com/science/article/pii/S104061901500202X
Building Good Load to Reduce Carbon Emissions: Getting Northwest Utilities More Involved in Widespread Transportation Electrification	Northwest Energy Coalition	2016	http://nwenergy.org/wp-content/uploads/2016/01/Exec-Sum-Pull-Out-1-27-2016.pdf
Electrification: Emerging Opportunities for Utility Growth	Brattle Group	2017	https://brattlefiles.blob.core.windows.net/system/news/pdfs/000/001/174/original/electrification_whitepaper_final_single_pages.pdf
America's Clean Energy Frontier: The Pathway to a Safer Climate Future	NRDC	2017	https://www.nrdc.org/sites/default/files/americas-clean-energy-frontier-report.pdf