Appendix N

Electric Vehicle Initiatives –
Targets and Priorities for Future Funding Sources

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By Amalia Siegel and Michael Stoddard
10-12-2021

1. What is the purpose of this testimony?

This testimony supplements the description of the Electric Vehicle (EV) Initiatives found in the body of Triennial Plan V by discussing, at a conceptual level, what Efficiency Maine Trust (the Trust or EMT) would do during the Plan period if it were to receive new, as-yet-unidentified, funding to promote electrification of transportation. It also identifies high-level targets (e.g., quantities of EV chargers and quantities of EVs) and initial intentions of the Trust regarding priorities for its programs. We reiterate here that the Trust is participating in an ongoing process[1] that will develop modeling and stakeholder input relevant to future EV programming, and will give full consideration to the findings and recommendations of that process once it is complete.

2. Who is introducing this testimony?

The testimony is provided by Amalia Siegel, Program Manager for Electric Vehicle Initiatives at the Trust and Michael Stoddard, Executive Director at the Trust.

3. Ms. Siegel, please state your name, title, and business addresses.

My name is Amalia Siegel, and I am employed by EMT as the Program Manager for Electric Vehicle Initiatives. My business address is 168 Capitol Street, Suite 1, Augusta, ME 04330.

4. Please summarize your educational and professional experience.

I have a Bachelor of Arts degree in Environmental Studies from Dartmouth College. I was hired by EMT in 2021 to design and implement the Trust's Electric Vehicle Initiatives. Prior to joining EMT, I worked at the Island Institute in Isle au Haut, Maine, where I served as an Island Fellow. I have five years of experience in project management in non-profits, including overseeing one of the EMT's load management pilot grants on Isle au Haut.

5. Mr. Stoddard, please state your name, title, and business addresses.

My name is Michael D. Stoddard, and I am employed by EMT as the Executive Director. My business address is 168 Capitol Street, Suite 1, Augusta, ME 04330.

6. Please summarize your educational and professional experience.

I have a Juris Doctor degree from the University of Maine School of Law and a Bachelor of Arts degree in Political Economy from Williams College. I have served as the Executive Director of the Trust since 2010, which has included oversight of the Trust's design and implementation of its EV Initiatives program and competitive solicitations for the development of DC Fast Chargers (DCFC) and Level 2 Chargers. Previously, I served as deputy director of the Acadia Center (formerly Environment Northeast), where

[1] This State initiative is referred to as the Clean Transportation Roadmap.

my duties included managing the organization's Diesel Emissions Reduction Program, co-authoring the "Transportation" chapter in the Acadia Center's 2006 Climate Change Roadmap for New England and Eastern Canada, and co-authoring the "Transition to New Travel and Freight Systems" chapter in Acadia Center's 2003 Climate Change Roadmap for Connecticut.

7. How are you defining an EV – Electric Vehicle?

For purposes of the Triennial Plan and this testimony, the Trust includes both battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) within the family of vehicles called "EVs." We exclude from the definition of EVs those hybrids that do not have the ability to charge with a plug, EVs that are not intended for regular use on state roads (e.g., golf carts), and PHEVs having an electric-only range below a minimum threshold.

8. What is the target number of electric light duty vehicles to be registered in Maine by the end of fiscal year 2025, and why is the Trust focusing its target on this class of vehicles?

The most important target on the 10-year horizon is to reach 220,000 EVs registered in Maine by 2030. This target comes out of the Maine Climate Council's most recent plan. For purposes of Triennial Plan V, the Trust is focusing on a mid-term target to be reached by the conclusion of the Plan period, i.e., the end of FY2025, and thinking about how such targets will put the state on a pathway to achieve the 2030 target.

The Trust proposes two scenarios for establishing a statewide target of EVs by the end of FY2025.

- **Scenario 1** is characterized by gradual growth each year from FY2022 to FY2025, resulting in a cumulative total of **25,000** EVs registered in Maine by the end of Triennial Plan V.
- **Scenario 2** is characterized by a doubling of growth each year from FY2022 to FY2025, resulting in a cumulative total of **42,750** EVs registered in Maine by the end of Triennial Plan V.

Scenario 1 presumes that in the last half of the decade, changes in the EV market will enable an average of 40,000 EVs—new and used—to be added each year. Many major manufacturers are forecasting that they will convert significant portions of their offerings to EVs by 2025, advances in battery production are expected to approach price parity with internal combustion engine (ICE) vehicles, and federal and state policies will have led to the development of an extensive EV charging network. The combination of these factors makes the sequel to Scenario 1 aggressive but plausible. Scenario 2 gets Maine closer to the 2030 target by presuming earlier success in ramping up EV production and consumer demand, which would likely require more significant public funding and policy support.

Under either scenario, the target pertains to light duty vehicles (LDV) only and does not include medium-duty vehicles (MDV) or heavy-duty vehicles (HDV). During Triennial Plan V, LDVs will be the primary focus of the Trust's efforts to transform the transportation market because they constitute 91 percent of the vehicle miles traveled in the state and are responsible for the overwhelming majority of greenhouse gas emissions.[2] During the period of the Triennial Plan, the LDV market is where consumers

[2] Maine Department of Environmental Protection, Bureau of Air Quality, Mobile Sources Section, personal communication with modeling personnel, February 24, 2020.

will see the most benefits from economies of scale in production of EVs. EVs in the LDV market have established reliability, performance, consumer acceptance, and improving price competitiveness (compared to conventional vehicles) such that they are poised to grow exponentially. We note that in multiple European countries, EVs now exceed 30% of new sales annually in the LDV market. By contrast, EV applications in the MDV and HDV market segment are still under development and working to prove their reliability and performance, and they are not seeing production at scale.

By focusing this target on LDVs, the Trust is not suggesting that its Plan excludes attention to MDVs and HDVs. As discussed more below in this testimony, MDVs and HDVs will play a role in helping Maine meet its carbon reduction goals, and the Trust's Plan includes activities to facilitate market transformation for those vehicles as they reach commercialization and regular production.

9. What annual growth rate scenario does the Trust assume in order to reach the LDV EV target by 2025?

The Trust starts with the assumption that the baseline comprises 4,000 EVs registered in Maine as of the end of FY2020 (June 2020). This is an approximation that reconciles conflicting data points from the Maine Bureau of Motor Vehicles and other sources. On top of the 4,000, we added 1,250 EVs in FY2021. We know from our records that the Trust issued 1,000 rebates for EVs in FY2021, and we assume that an additional 25% (250 EVs) were purchased in that year but were not eligible for the program's rebate (where their purchase price exceeds the program's maximum allowable price). The subtotal of EVs through the end of FY2021 is estimated to be 5,250, which constitutes the baseline that applies equally to both Scenario 1 and 2.

Scenario 1 – Gradual Growth

Under Scenario 1, we assume a gradually accelerating increase in year-over-year EV sales, resulting in the following units of EVs registered each year:

Table 1: EV Sales - Scenario 1

FY2022	FY2023	FY2024	FY2025	Sub-Total	Baseline	Grand Total
1,750	3,000	5,000	10,000	19,750	5,250	25,000

Scenario 2 – Doubling Growth Rates

Under Scenario 2, we assume after FY2021 that the number of EVs added to the registration rolls doubles each year through the end of FY2025. Under this scenario, 2,500 EVs are newly registered in FY2022, 5,000 more are added in FY2023, 10,000 more are added in FY2024, and 20,000 more are added in FY2025 (the last year of Triennial Plan V). The sum of the baseline plus the five years of doubling purchases is 42,750 EVs. Thus:

Table 2: EV Sales – Scenario 2

FY2022	FY2023	FY2024	FY2025	Sub-Total	Baseline	Grand Total
2,500	5,000	10,000	20,000	37,500	5,250	42,750

Officials at the Maine Department of Environmental Protection report that there are approximately 43,000 new LDVs purchased in Maine annually. (This excludes sales of used vehicles). Assuming that all

of the EVs counted toward meeting the target were purchased as new (not used), and that the total new vehicles purchased annually in the state remains constant, EVs market share of new LDV sales under Scenario 2 would be approximately 3% in FY2021, 6% in FY2022, 12% in FY2023, 23% in FY2024, and 46% in FY2025.

10. What amount of charging infrastructure is required in Maine to satisfy the charging needs of the total registered EVs, under the two scenarios, by 2025?

To answer this question, the Trust uses the assumed number of registered EVs (25,000 and 42,750) as an input to the Electric Vehicle Infrastructure Projection Tool – Lite (EVI-Pro-Lite), available online at the website of the U.S. DOE's Alternative Fuels Data Center.[3]

To serve a universe of 25,000 EVs registered in Maine, the EVI-Pro-Lite model suggests that the state should have in place by the end of FY2025 the following types and quantities of EV charger plugs:[4]

Table 3: Scenario 1 Charging Needs

Charger Type	Low	High	Existing	Net Need
DCFC Plugs	**193**	**279**	**128**	**65–151**
L2 Workplace Charger Plugs	1,030	1,335		
L2 Public Charger Plugs	790	1,025	415	
Level 2 Charger Plugs (Subtotal)	**1,820**	**2,360**	**415**	**1,405–1,945**

To serve a universe of 42,750 EVs registered in Maine, the EVI-Pro-Lite model indicates that by FY2025, the state should have in place the following types and quantities of EV charger plugs:

Table 4: Scenario 2 Charging Needs

Charger Type	Low	High	Existing	Net Need
DCFC Plugs	**315**	**455**	**128**	**187–327**
L2 Workplace Charger Plugs	1,745	2,265		
L2 Public Charger Plugs	1,285	1,665	415	
Level 2 Charger Plugs (Subtotal)	**3,030**	**3,930**	**415**	**2,615–3,515**

11. What is your estimate of the cost to provide financial subsidies sufficient to develop these quantities of EV chargers?

DC Fast Chargers

Since 2018, the Trust has provided subsidies on up to 80% of capital and installation costs (including the customer's obligations for "make-ready" costs) for DCFC installations. Across multiple bids in

[3] https://afdc.energy.gov/evi-pro-lite.

[4] The "low" results assume that 90% of EV charging is performed at the property or residence of the EV owners; the "high" results assume that 80% of EV charging is performed at the property or residence of the EV owners. These modeling results also use as inputs the default assumptions suggested by the EVI-Pro-Lite Tool regarding vehicle mix, including: (a) 15% of EVs are short-range PHEVs, 35% of EVs are long-range PHEVs, 15% of EVs are short-range BEVs, and 35% of EVs are long-range BEVs; and (b) PHEVs receive "partial support" from workplace and public Level 2 chargers.

competitive solicitations, this incentive has averaged approximately $100,000 per plug for a DCFC. This does not include any provision for subsidizing demand charges.

If we continued to offer the same $100,000 per plug, Scenario 1 would cost between $6.5 million and $15.1 million in consumer incentives. Scenario 2 would cost between $18.7 million and $32.7 million in consumer incentives.

Level 2 Chargers

During the last several years, the Trust has experimented with different approaches and levels of financial incentives for public/commercial use Level 2 chargers. Assuming that we instituted a requirement that such chargers be "networked" so that they could process customer payments and provide online information about location and availability, it would be reasonable to budget $5,000 in subsidy per Level 2 plug.

If we further assumed an incentive of $5,000 per Level 2 plug and that we provided incentives for each one of those plugs, it would cost $7,025,000–$9,725,000 in incentives to reach the 2025 target under Scenario 1. It would cost $13,075,000–$17,575,000 in incentives under Scenario 2.

12. What objectives and priorities will the Trust pursue regarding the installation of EV chargers?

The Trust's overarching objective for the EV Initiatives is to facilitate and expedite market transformation so that enough petroleum consumption can be avoided to meet the state's carbon reduction goals in 2030 and 2050.

With regard to EV charging infrastructure, the Trust seeks to promote installation of EV chargers in places and configurations that will have the most impact in persuading Maine consumers:

- To purchase more EVs; and
- To use those EVs in ways that maximize their reduction (displacement) of gasoline and diesel fuel consumption.

For DC Fast Chargers, the Trust's Plan will advance several priorities. First, it will pursue a priority of "gap filling" by extending and filling in the statewide network of DCFCs along main routes such that gaps between DCFCs do not exceed 30–40 miles. Second, it will seek to develop DCFCs to serve high-barrier and/or high-value sites. Examples of such sites include:

- Multi-unit dwellings;
- Destinations;
- High-density uses;
- Rural service centers; and
- Large, high-speed users (e.g., public transit fleets).

Multi-unit dwellings are more likely to pose a barrier to residents' being able to charge EVs overnight because they tend to have less off-street parking and there may be multiple tenants seeking to charge

on a limited number of Level 2 chargers. High-speed charging in locations proximate to multi-unit dwellings would serve as "emergency backup" for tenants when these situations arise. Similarly, destinations, such as major tourist attractions, may be located away from the major routes in the state but still see high levels of traffic. For visitors who do not intend to make an extended stay (e.g., overnight) at these remote destinations, high-speed chargers may be needed to avoid long wait times and/or stranded drivers. Certain very large vehicles, such as transit buses, require large batteries and short turnaround times to re-charge so they can be available throughout the day. If they cannot wait to re-charge overnight, or if their batteries are so large they can't be fully charged overnight, they may be a candidate for a DCFC. The Trust's view is that the high cost of DCFC would suggest that public subsidy for these measures should be focused on applications that will provide the most public benefit. This is generally inconsistent with subsidizing DCFC exclusively for private uses or limited public uses or for uses that will not tend to expand and accelerate market transformation. However, for demonstration purposes, it may be useful to pilot DCFC for large, high-speed users during the course of the Plan. This type of application might be better suited for federal grants, which the Trust will seek to acquire or facilitate.

For Level 2 chargers, the Trust will pursue two evenly weighted priorities. One priority is to promote installation of Level 2 chargers that will facilitate overnight charging, such as at multi-unit dwellings, neighborhoods that lack off-street parking, and hospitality properties. Another priority is to install Level 2 chargers at sites where drivers may engage in longer charging sessions during the day. Examples of such sites include workplaces and retail shopping areas where there is ample parking space and an EV driver could leave their car to charge for two or more hours.

Timeline and Map

In collaboration with the Maine Department of Transportation (Maine DOT), the Trust has developed an initial plan regarding timeline and locations for expanding DCFC installations across the state. The schedule and timeline are subject to change based on a variety of variables, including but not limited to funding availability, economic conditions, and policy priorities.[5] The initial, or "preliminary" plan is as follows, and is also reflected in the map provided in Figure 1 of this Appendix.

a. FY2022
    i. Extend to Crown of Maine and New Brunswick border
    ii. Route 1 gap filling (Wiscasset-Rockland-Belfast)
b. FY2023
    i. Destination Locations (Acadia, Boothbay Harbor, Moosehead, Rangeley)
    ii. Greater Portland in-filling & Multi-Unit Dwellings
    iii. Pilot Fleet charging (serving the needs of med/heavy duty fleets)

[5] The Trust staff meets quarterly with the EV Charging Initiative Advisory Committee to share plans, report progress, and discuss adjustments to the plan. The Advisory Committee comprises Maine DOT, Maine DEP, Governor's Energy Office and the Trust.

c. FY2024
    i. Gap Fill (e.g., York County & Penobscot County)
    ii. Multi-Unit Dwellings (statewide)
    iii. Priority Fleet(s)
d. FY2025
    i. Gap Fill (e.g., Western ME)
    ii. Priority Fleet(s)

13. What potential funding sources are already identified, or might be available in the future, to overcome the barriers to installation of more EV chargers or the purchases of more EVs?

- The New England Clean Energy Connect (NECEC) settlement, in which parties agreed that the NECEC project would provide $2 million per year through each year of the Plan, paid in quarterly installments, to develop EV charging infrastructure, contingent upon the project being fully permitted and not blocked or terminated;
- The federal American Rescue Plan Act (ARPA) and the Act to Provide Allocations for the Distribution of State Fiscal Recovery Funds,[6] which allocates $8 million of federal ARPA funds to expand EV charging infrastructure across the state;
- The Infrastructure Investment and Jobs Act (federal, proposed),[7] which is estimated to provide $19 million for EV charging infrastructure in Maine;[8]
- Revenues from a hypothetical future carbon cap on transportation fuels, analogous to the existing carbon cap on power plant emissions in the Regional Greenhouse Gas Initiative; and,
- Costs to support EV initiatives that are recoverable in electric rates.

14. What does the Trust assume is the cost of a program to meet the 2025 target for EVs registered in the state?

We estimate that with existing and known funding sources, the Trust will be able to continue its existing rebate program for LDV EVs another 12–14 months given current rates of participation. By the start of FY2023, however, the Trust forecasts that it will only have funding available to offer EV rebates to qualified low-income customers; funding for EV rebates for all other customers is forecasted to be exhausted before Year 1 of the new Plan.

To estimate the range of budget that would be needed to provide financial incentives on the purchase or lease of qualifying EVs through the end of FY2025, the Trust applies the following assumptions to the number of EVs modeled in the two scenarios previously introduced in this testimony:

[6] Public Law, Chapter 483, 130th Maine State Legislature, First Special Session, LD 1733, an Act to Provide Allocations for the Distribution of State Fiscal Recovery Funds, 2021.
[7] Infrastructure Investment and Jobs Act, H.R. 3684, 117th Congress (2021).
[8] See also S.Con.Res.14, 117th Congress (2021)—"A concurrent resolution setting forth the congressional budget for the U.S. Government for fiscal year 2022 and setting forth the appropriate budgetary levels for fiscal years 2023-2031," the proposed $3.5 trillion federal budget framework to invest in infrastructure, which contains, among other things, provisions to extend, and make refundable, tax credits for the purchase of qualifying new EVs.

- The federal government extends tax credits throughout the period covered by Triennial Plan V, and these incentives are big enough to defray at least half of the incremental cost of an EV (compared to the cost of a comparable ICE vehicle);
- The amount of the Trust's rebate, across all LDV types and all customer groups, averages $3,000 per EV; and
- Absent sufficient funds to offer rebates for 100% of the EVs purchased or leased in each year of the scenario, the Trust would prioritize certain vehicle types and/or customer segments based on their importance for enhancing market transformation (e.g., new duty cycles) or the severity of barriers they encounter (e.g., low-income or small business consumers) such that either 50%, or alternatively 25%, of all EV sales/leases would receive a rebate, depending on the amount of funding available.

Table 5: Annual Cost for EV Rebates under Scenario 1, by Percentage of Total EV Sales Rebated

	FY2023 (million $)	FY2024 (million $)	FY2025 (million $)	3-Yr Total (million $)
100%	$9	$15	$30	$54
50%	$4.5	$7.5	$15	$26
25%	$2.25	$3.75	$7.5	$13

Table 6: Annual Cost for EV Rebates under Scenario 2, by Percentage of Total EV Sales Rebated

	FY2023 (million $)	FY2024 (million $)	FY2025 (million $)	3-Yr Total (million $)
100%	$15	$30	$60	$105
50%	$7.5	$15	$30	$52.5
25%	$3.75	$7.5	$15	$26.25

15. What plans does the Trust have to support the introduction of EVs in the MDV and HDV segment of the market, and what would be the costs of a program?

While light-duty vehicles are the focus of the Trust's EV programs in the short term, we recognize that medium and heavy-duty vehicles will play an important role in electrifying the state's transportation system. There are a growing number of medium and heavy-duty models entering the market now, but for some the performance and reliability (especially in cold climates) have not reached the same levels as their light-duty counterparts. In addition, the incremental cost of these vehicles is much greater than that of light-duty vehicles. For instance, electric school buses can cost 2-3 times as much as diesel school buses.[9] With larger battery packs (up to 600 kWh for some transit buses), these vehicles will often need dedicated Level 2 or Level 3 charging infrastructure. For these reasons, we propose to pilot these technologies during the Plan period, if funding permits, to demonstrate their viability in Maine. If additional funding comes available to target medium-duty, heavy-duty, or marine EVs, Efficiency Maine will design a program consisting of:

[9] https://atlaspolicy.com/wp-content/uploads/2019/07/Electric-Buses-and-Trucks-Overview.pdf

- A comprehensive campaign to raise awareness of benefits, costs, and options;
- Financial incentives to defray the upfront cost differential with a standard ICE model; and
- Supplemental financing through the Clean Energy Accelerator.

The pilot program would focus on MDVs and HDVs in three categories: transit buses, school buses, and medium (also known as Class 6, single unit, or straight) trucks. The program may also include marine transport. The exact details would be developed in consultation with stakeholders, but would likely include significant incentives to address the incremental vehicle cost and the cost of charging equipment for each vehicle. School buses and medium trucks would rely on Level 2 overnight charging, while transit buses would require dedicated Level 3 chargers. We estimate that a pilot program consisting of 6 transit buses, 10 school buses, 15 medium trucks, and 3 electric boats would cost $7.8 million. The preliminary, estimated costs of such a program are summarized below.

Table 7: Estimated Cost of Medium and Heavy-Duty EV Pilot Program

Type of Vehicle	Incremental Cost	Subsidy per Vehicle	No. of Vehicles	Subsidy per Charger	Total Cost
School Bus	$ 200,000	$ 300,000	10	$ 5,000	$ 3,050,000
Transit Bus	$ 200,000	$ 300,000	6	$ 100,000	$ 2,000,000
Medium (Class 4-6) Truck	$ 100,000	$ 150,000	15	$ 5,000	$ 2,325,000
Electric boat – marine application	$ 100,000	$ 150,000	3	$ 5,000	$ 465,000
Total					**$ 7,840,000**

Finally, we recognize that certain models of MDVs or HDVs may rapidly demonstrate performance and reliability in cold climates such that they are an appropriate candidate for a traditional financial incentive program. School buses are one example of a model that seems poised for large-scale fleet changeovers. In the event that funding is available, and the task is assigned to the Trust, the Trust will modify its Plan to reflect the change.

16. Does EMT plan to subsidize all of the vehicles needed to reach the state's climate goals?

While the scenarios laid out above illustrate two paths to reaching the state's goals for EV adoption, it is not realistic to assume that 100% of LDV EV purchases through 2030 will receive a state-based subsidy. For one thing, the cost would likely be prohibitive. The role of incentive programs is not to cover 100% of the costs, but rather to facilitate the early stages of market transformation until consumers no longer need subsidies to choose EVs over ICE vehicles.

There are several factors that will likely tip the market in favor of rapid EV growth during and after the course of this plan. For one thing, it is possible that significant federal action will be put in place to remove the barriers and improve availability and appeal of EVs, whether through tax incentives, purchase incentives, regulations, or other means. For another, as EVs come down in price, fewer consumers will experience the upfront cost barrier that they do today. Therefore, the Trust plans to focus on certain market segments that will be harder to reach and thus need extra subsidy, including but not limited to:

- Low-income consumers;
- Rural areas; and
- Businesses, especially small businesses.

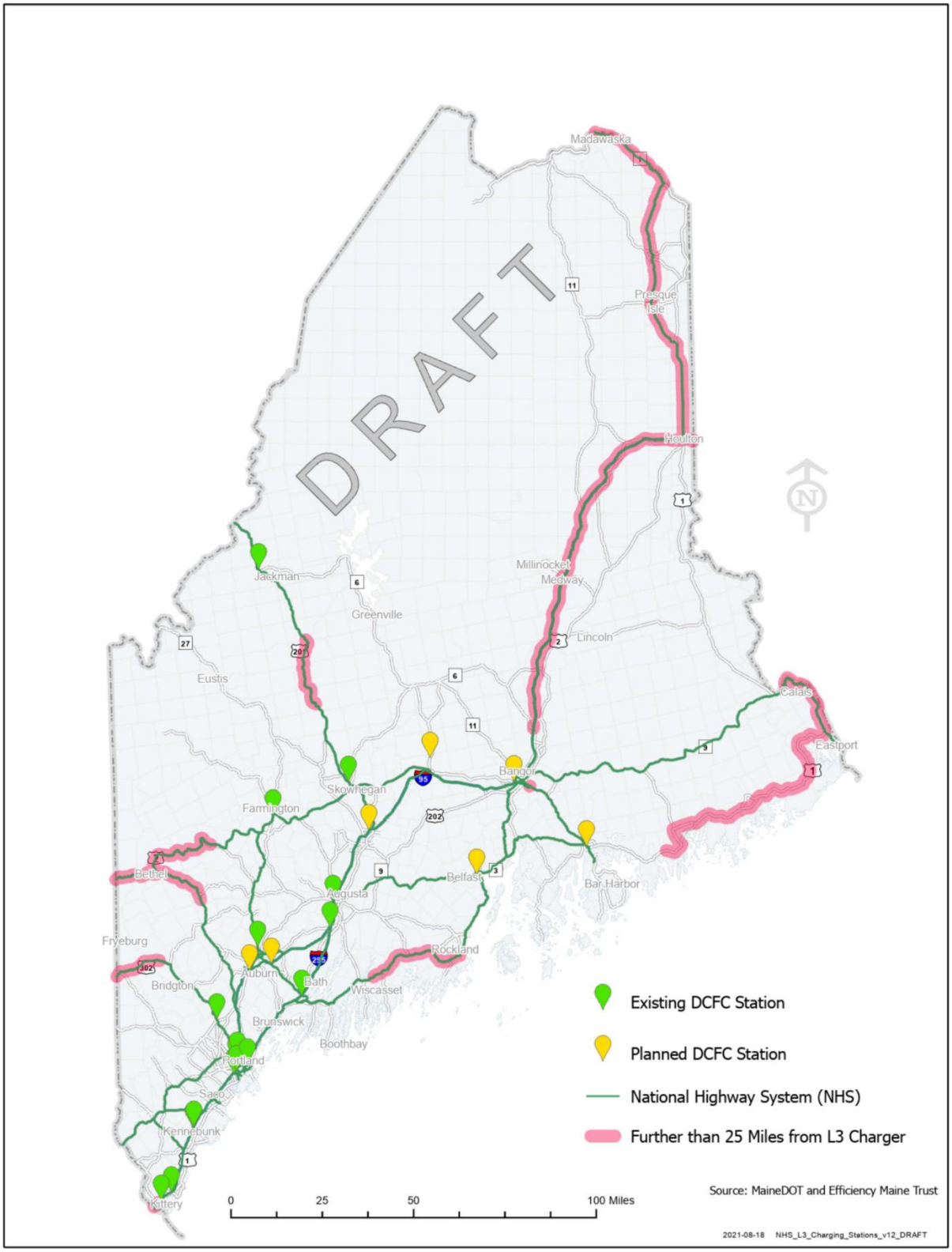
17. What role will the Trust play in promoting utility rate designs that facilitate the objectives of the EV Initiatives?

The Trust intends to be a full participant in dockets at the Maine Public Utilities Commission on matters concerning rate design and utility costs as they relate to EVs.[10] The Trust will review proposals on a case-by-case basis and will support rate designs that facilitate greater time-of-use price signals and more accurately reflect the principles of cost causation. The Trust will also be an advocate for keeping electric rates sufficiently competitive to facilitate beneficial electrification through the increased use of high-performance heat pumps, heat pump water heaters, and electric vehicles.

[10] See, e.g., Public Law, Chapter 402, LD 347, 130th Maine State Legislature, First Special Session, An Act To Facilitate Maine's Climate Goals by Encouraging Use of Electric Vehicles, 2021, which requires the Commission to open an inquiry to review alternative rate structures to support electric vehicle charging stations for nonresidential applications.

Figure 1: DC Fast Charging Gaps and Priority Locations Through FY2025

I. PRELIMINARY - Charging gaps on Maine's National Highway System and selected other routes



II. PRELIMINARY - Priority locations for DC Fast Charging infrastructure by fiscal year