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## Legislative Report

To: House and Senate Committees on Transportation  
Date: January 15, 2024  
From: Patrick Ó. Murphy, AICP, Sustainability and Innovations Project Manager  
Re: Statewide Level 3 EVSE (DC Fast Charging) Map

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Members of the Committees,

The Vermont Agency of Transportation (AOT) respectfully submits the attached maps and charts of Vermont’s public electric vehicle fast-charging network and progress towards State legislative goals. Until the National Electric Vehicle Infrastructure (NEVI) Program was created as a federal formula-funded appropriation by the Investment in Infrastructure and Jobs Act of 2021, State investments in fast charging have been managed by the Agency of Commerce and Community Development in partnership with the EVSE interagency workgroup which includes AOT, Agency of Natural Resources, Department of Public Service, and more recently the Department of Buildings and General Services. With new federal funding sources now available—the NEVI program, the Carbon Reduction Program, the Charging and Fueling Infrastructure Grants and other “gap-filling” grants through the Federal Highway Administration (FHWA)—the Agency of Transportation is primarily responsible for fast-charging to serve highway corridors.

As members may recall, Sec. 4 of Act 184 (2022 Transportation Bill) amended Sec. 30(b) of Act 55 (2021 Transportation Bill) requiring the following:

### Sec. 30. EVSE NETWORK IN VERMONT; REPORT OF ANNUAL MAP

(a) It shall be the goal of the State to have, as practicable, a level 3 EVSE charging port available to the public within:

- (1) **one driving mile** of every exit of the Dwight D. Eisenhower National System of Interstate and Defense Highways within the State; and
- (2) **25 miles** of another level 3 EVSE charging port available to the public along a State highway, as defined in 19 V.S.A. § 1(20).

(b) Notwithstanding 2 V.S.A. § 20(d), the Agency of Transportation shall file an up-to-date map showing the locations of all level 3 EVSE available to the public within the State with the House and Senate Committees on Transportation not later than January 15 each year until the goal identified in subsection (a) of this section is met.

The first map—“Vermont DC Fast Charging Availability”—shows currently available DC fast chargers and the State’s gaps in meeting its legislative goal to have a fast charger within twenty-five (25) miles of the next fast charger. The gaps appear as the darkest orange where someone would find themselves within 50 miles from a station, and slightly lighter orange where one would find themselves within 25 miles of a station. The blue crosses

denote where contracts or grant agreements have been reached by the State (through ACCD) but are in varying stages of installation/construction. For the purposes this report, the maps have excluded proprietary fast chargers using the NACS (North American Charging Standard or “Tesla”) connector. As the market shifts towards greater compatibility and/or use with the NACS connector, future maps may reflect what has become a near-universal standard.

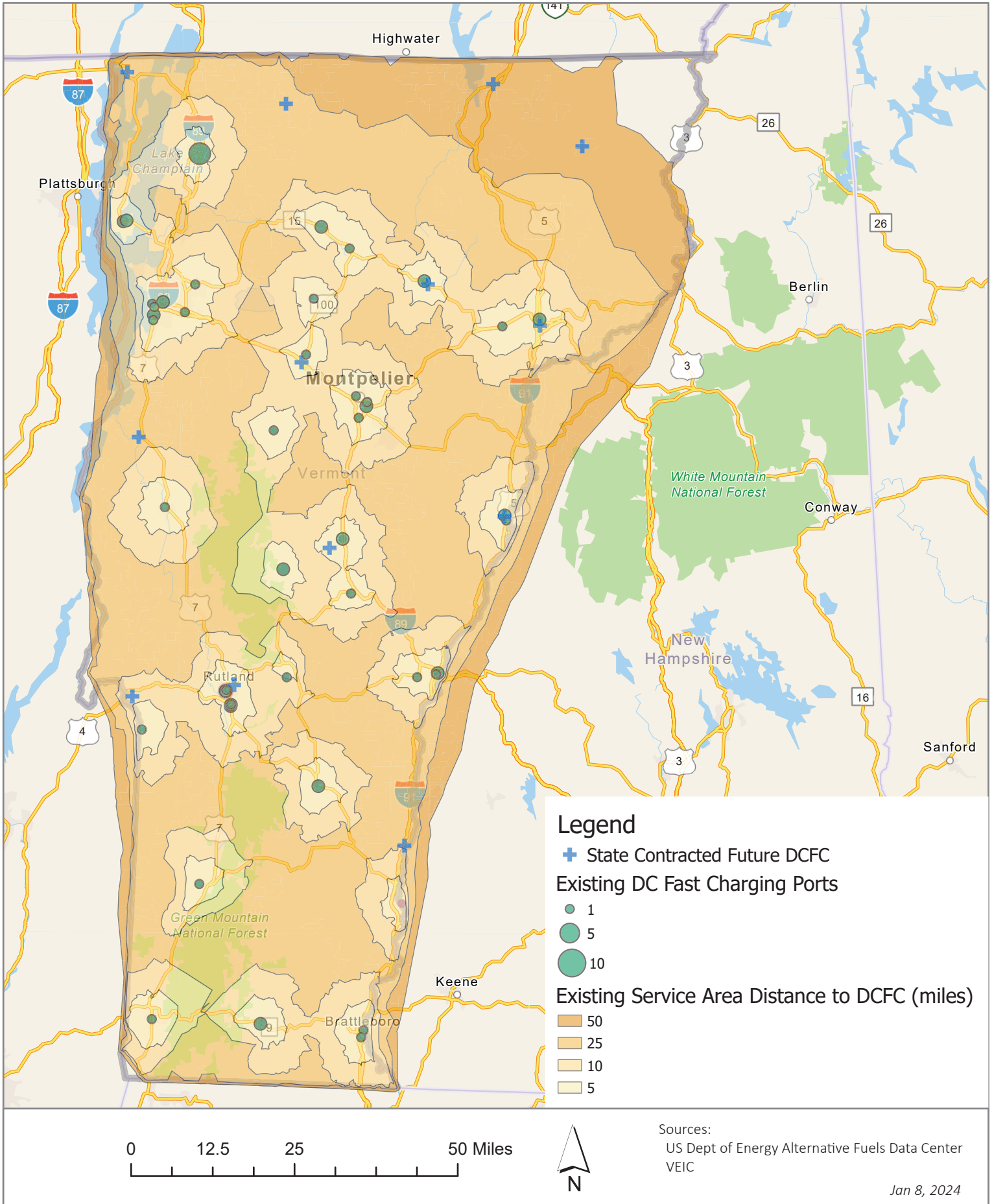
The second map considers not only existing and contracted non-Tesla charging stations, but also those planned as part of Vermont’s first two NEVI plans required by the new federal program. The attached 2023 (FFY2024) Electric Vehicle Infrastructure Deployment Plan was approved by FHWA in September 2023 and updated the initial plan to include more DC fast charging locations and greater redundancy in the statewide network, supporting not only growing passenger EV adoption but also early adopters of medium- and heavy-duty electrified vehicles along the State’s main EV freight corridors (I-89, 91, 93, 189) and at critical junctures of multiple routes.

Despite the challenges with the NEVI program which has seen delays with the issuance of evolving guidance and final rules, the Agency has achieved several key milestones in the past year. Beyond approval of the second annual NEVI plan, the Agency successfully navigated the SEP-14 (Special Experimental Project) process to obtain approval to move forward with its proposed alternative contracting methods for EV charging deployment. This has allowed the Agency to cost-effectively build upon prior efforts by ACCD to upgrade a site in Bradford to NEVI standards. When fully operational, the site will provide the traveling public with one level 2 station, two 50-kW stations, and four 180-kW stations; and positively contribute to its downtown surroundings and local economy. Construction is expected to be complete within the next month. Other contracts similarly benefiting from existing grant agreements may be possible with the use of both ARPA and NEVI funds.

Also on the horizon is AOT’s proposed two-step solicitation process (currently in draft form), beginning with a Request for Qualifications (RFQ) which will help develop a list of providers to support the State in its buildout plans, followed by Requests for Proposals (RFPs) for specific locations and projects. The initial RFQ is expected to be posted by March, with RFPs issued later this Spring. It is the goal of the Agency to have all locations that would lead the State to be certified by FHWA as “fully built-out” under contract before the end of 2024. In the meantime, the Agency will continue to seek competitive grant funds from the Charging and Fueling Infrastructure (CFI) Grant Program in the next round available. Though Vermont submitted a strong proposal to build out level 2 charging at our State Forests, Parks and Recreational Facilities, and additional DC fast charging along Vermont’s scenic byways, the Agency was unsuccessful in its first effort. AOT is also exploring use of Carbon Reduction Program funds to deploy right-sized charging to locations where equipment is in need of significant repair or replacement, regardless of whether it is on or off the designated Alternative Fuel Corridors. The intent would be to fill in the public DCFC network as quickly and efficiently as possible where gaps have been created by inoperable stations. Lastly, it remains to be seen what future rounds of FHWA’s own “gap-filling” grants will look like, but the State will be working closely with the Regional Planning Councils and municipalities to identify potential needs and opportunities which might be eligible for support through competitive grants. AOT anticipates that these collective efforts will begin to make the kind of progress needed in the State’s infrastructure to support significantly higher levels of EV registrations in each passing year.

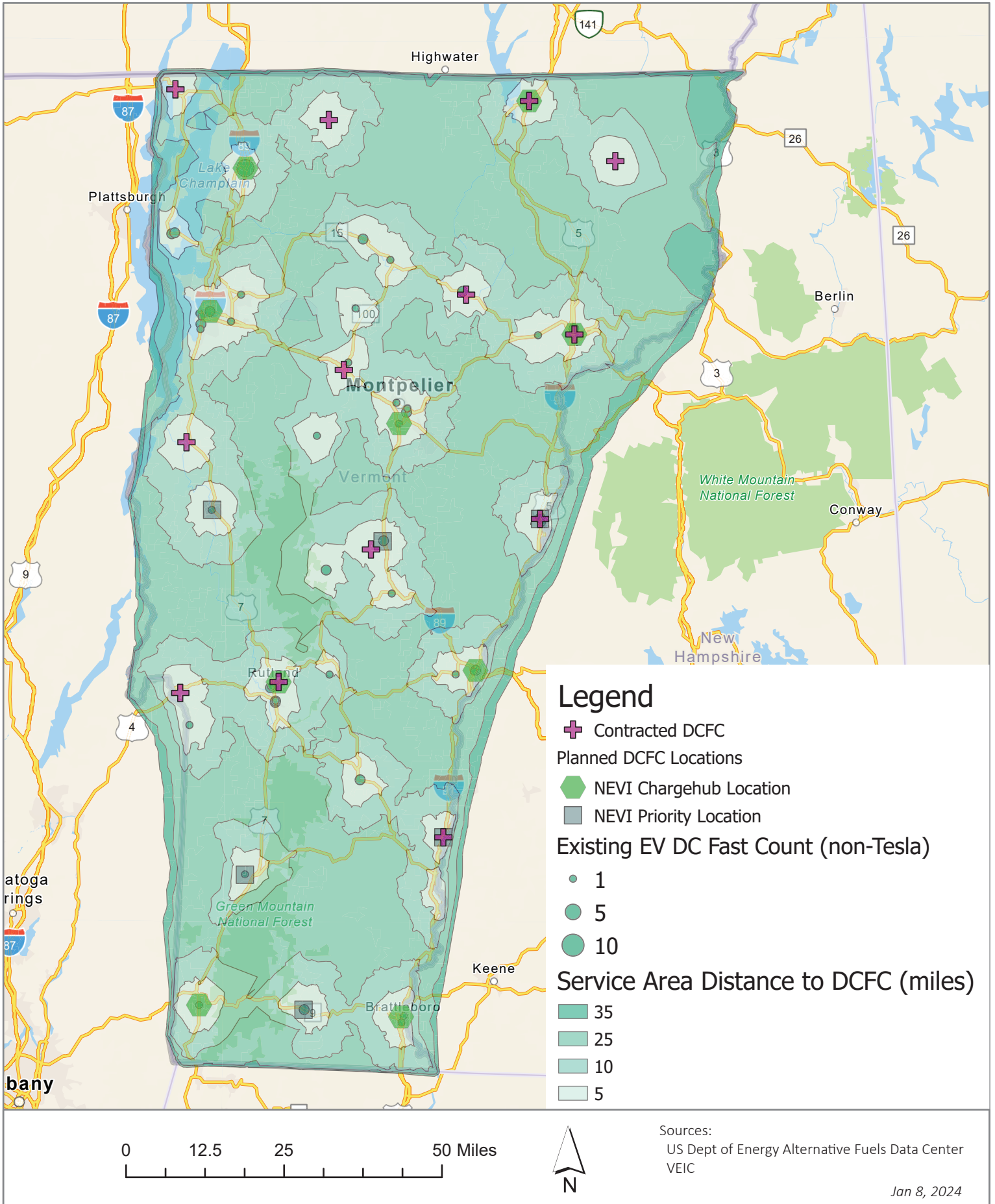
# Vermont DC Fast Charging Availability

Distance to existing non-Tesla Locations as of January 2024

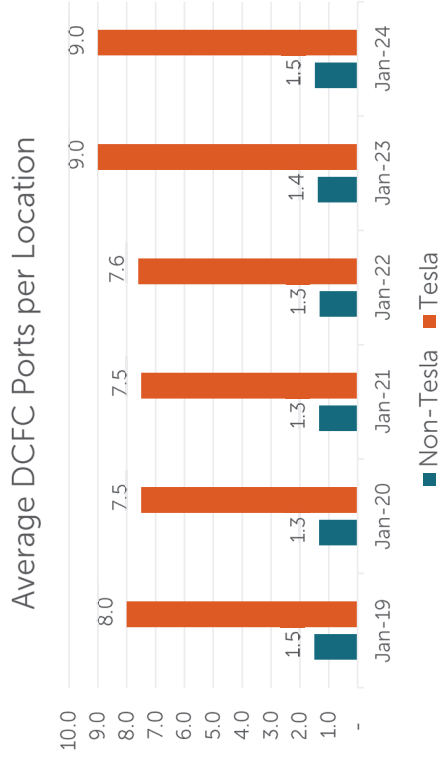
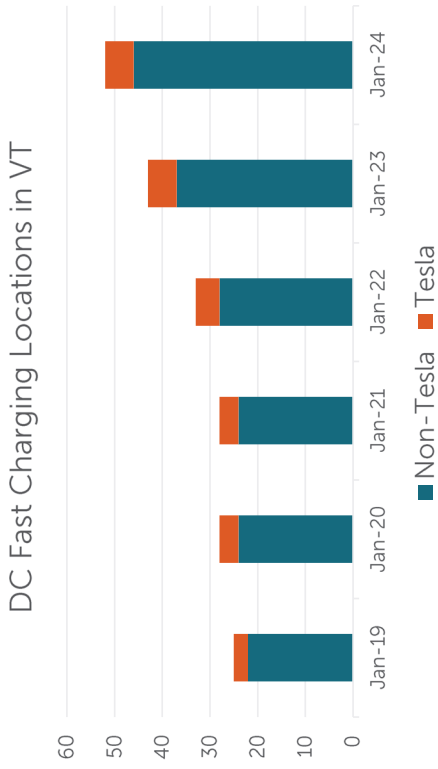


# Vermont DC Fast Charging Availability

Existing (non-Tesla), Contracted, and Planned NEVI

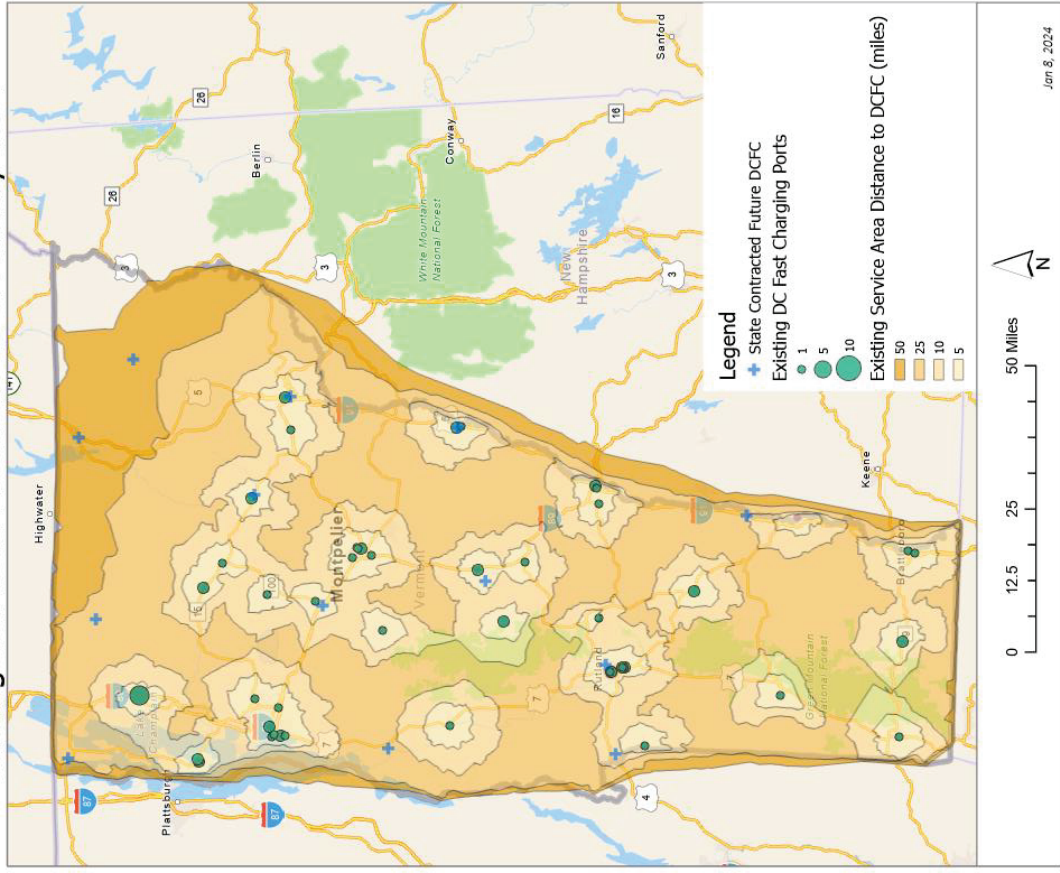


# Charging Infrastructure Development

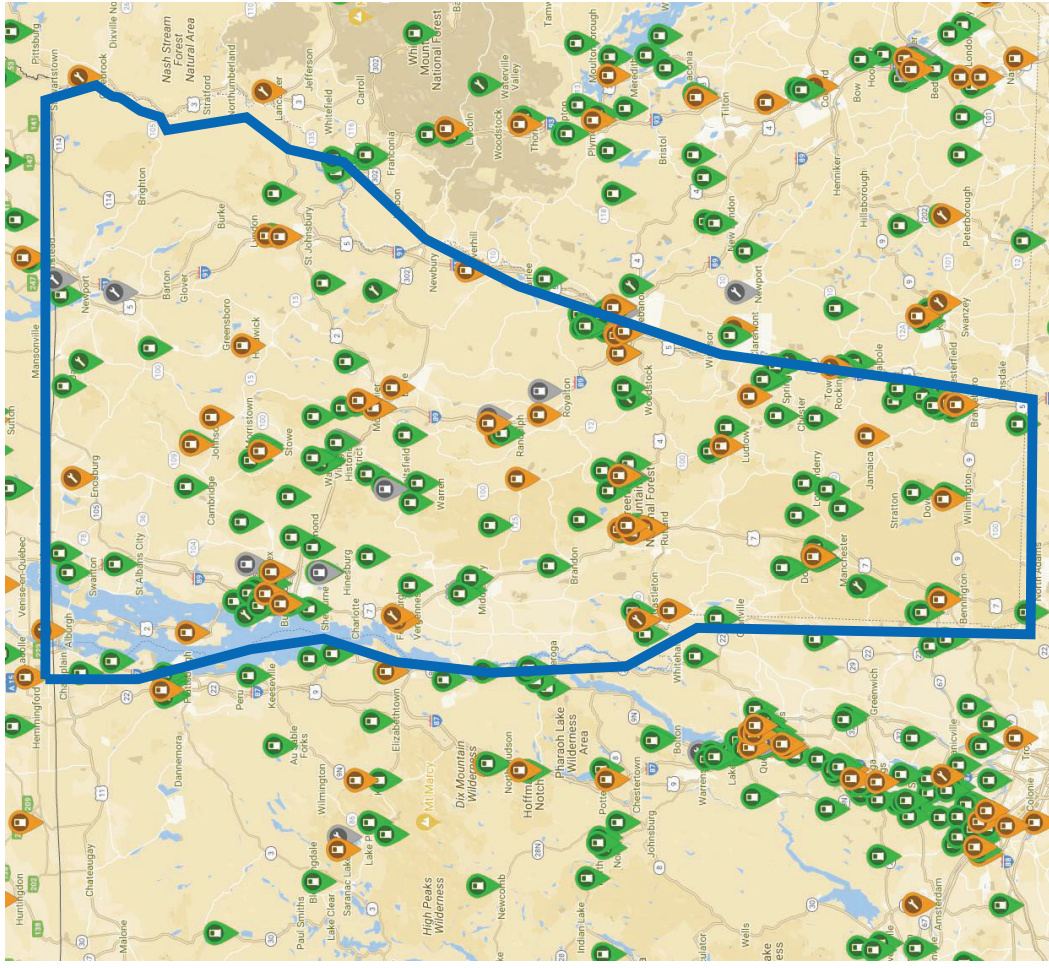


Sources:  
US DOE AFDC / VEIC

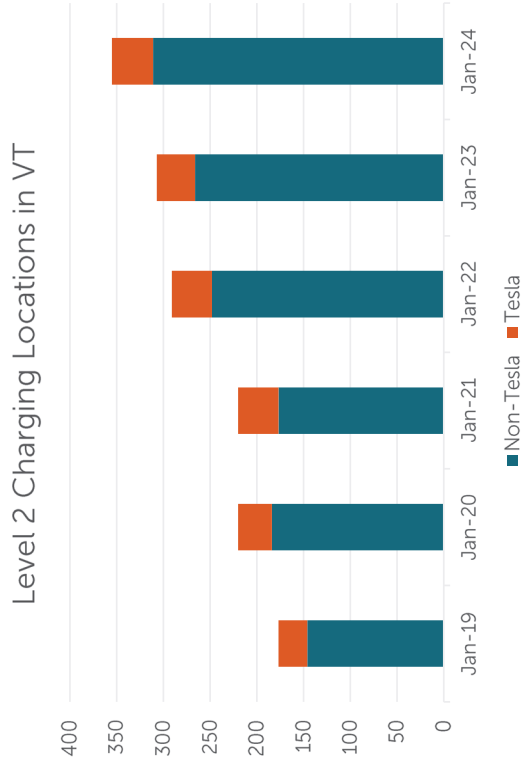
# Distance to Fast Charging Existing non-Tesla Locations as of January 2024



# PlugShare.com Charging Map



## Other Charging Availability



Sources:  
US DOE AFDC / VEIC / PlugShare.com

# State of Vermont

## Electric Vehicle Infrastructure Deployment Plan – 2023 (FFY2024) Update



Vermont Agency of Transportation  
August 1, 2023



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## Introduction

As Vermont residents contended with smoky air blown in from Canadian wildfires, closed beaches from heat-inspired algae blooms, and damaged homes and downtowns from fierce flooding, the summer of 2023 made clear the urgency of our work to address our climate crisis. The State of Vermont thus remains committed to reducing greenhouse gas emissions from the transportation sector and transition much of Vermont's motor vehicle fleet to use electricity as a cleaner source of energy. The Global Warming Solutions Act requires Vermont to reduce greenhouse gas pollution to 26% below 2005 levels by 2025 and the steps to meet this requirement are detailed in the [2021 Vermont Climate Action Plan](#) as well as climate action plans developed by local and regional partners across the state. The Climate Action Plan includes a priority of developing electric vehicle charging infrastructure to support transportation electrification.

As of April 2023, there were about 9,500 plug-in passenger cars in the state, or approximately 1.5% of registered vehicles. This includes 4,280 plug-in hybrids and 5,173 all electric vehicles. To reach the state's 2030 target of 126,000 PEVs by 2030, the Alternative Fuel Data Center's Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite indicates Vermont would need 4,345 public Level 2 charging ports (351 at public recreation areas) and 384 public DCFC ports to support these vehicles. With 356 public Level 2 charging ports and 164 public fast charging ports currently in operation, that leaves a significant gap of 3,989 Level 2 and 220 DCFC ports to rapidly close.

The State of Vermont had previously specified a goal in the SFY2022 Transportation Bill to have charging availability within five miles of every interstate exit and every 50 miles along state highways.<sup>1</sup> Vermont presently has over 350 publicly accessible chargers, equating to the highest per capita presence of EVSE in the nation.<sup>2</sup> The state has achieved this abundance of public EVSE in part through \$3.5 million of strategic state investments since 2014.<sup>3</sup> State goals for EVSE availability were re-examined in the SFY2023 and SFY2024 Transportation bills to reflect the current federal requirements and support EV adoption at levels suggested in Vermont Climate Action Plan modeling. The State now aims for public fast charging within one mile of every interstate exit and every 25 miles along state highways.

This plan is intended to help guide State investments in public EV charging infrastructure towards these targets through at least the first federal fiscal years of the National Electric Vehicle Infrastructure (NEVI) Program. Federal NEVI guidance requires that this plan be reviewed and updated annually to reflect lessons learned, rapidly changing conditions, new priorities, and refined strategies.

The Vermont Agency of Transportation (VTrans) led the development of the initial and updated NEVI plans, with support from an interagency work group of State agencies involved in transportation electrification, assistance from the Vermont Energy Investment Corporation (VEIC), coordinators of the Drive Electric Vermont program, and feedback from many stakeholders.

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<sup>1</sup> State of Vermont. June 2021. Act 55 – FY2022 Transportation Bill, Section 30.

<https://legislature.vermont.gov/Documents/2022/Docs/ACTS/ACT055/ACT055%20As%20Enacted.pdf>

<sup>2</sup> Drive Electric Vermont. 2022. Public Charging Map. <https://www.driveelectricvt.com/about-evs/charging-map>

<sup>3</sup> Vermont Agency of Commerce and Community Development. 2021. Electric Vehicle Supply Equipment (EVSE) Grant Program. <https://accd.vermont.gov/community-development/funding-incentives/electric-vehicle-supply-equipment-evse-grant-program>

This updated 2023 NEVI plan builds on several Vermont studies and other EVSE-related activities:

- 2023 FHWA Charging and Fueling Infrastructure (CFI) discretionary grant program (community and corridor) proposal
- 2022 Vermont NEVI Plan
- 2021 Vermont Climate Action Plan
- VTrans 2014 EVSE Plan
- VTrans 2017 DC Fast Charging Corridor Study
- State of Vermont EVSE grant programs administered by the Vermont Agency of Commerce and Community Development
- Federal alternative fuel corridor designations
- 2018 Multi-State ZEV Action Plan

This plan examines how the State of Vermont can support development of public electric vehicle supply equipment (EVSE, commonly referred to as “charging equipment”), the availability of which is critical to accelerating EV adoption in the State and broader region.

VTrans anticipates meeting Plan milestones according to the following schedule:

- **August 2023:** Second Year Plan submitted.
- **September 2023:** VTrans executes contracts to upgrade up to seven identified locations. FHWA plan approval decisions announced.
- **Fall 2023:** VTrans issues solicitation for qualified vendors; VTrans issues solicitation(s) for proposals using FFY2022 and FFY2023 NEVI funds as well as FY2023 ARPA funds.
- **Winter 2023:** Awards announced and contracts finalized.
- **Spring 2024:** Site work begins with 2024 construction season.
- **Summer 2024:** Annual plan reviewed, revised, and submitted to FHWA for approval.

The Agency intends to follow a rolling, iterative process of learning and planning for the NEVI program, continuously applying new lessons to future rounds of implementation. Given the many uncertainties surrounding the NEVI Program—the impact of increased demand for DC fast chargers nationwide, supply chain issues, the challenging economics of more rural locations, the adoption of NACS plugs by auto manufacturers, and more—VTrans is learning from the development of its program leading up to the first round of solicitations.

### Updates from Prior Plan

- State Agency Coordination:
  - VTrans continues to contribute to an interagency workgroup on EV Charging, sharing decision-making on investments and program design with the Department of Housing and Community Development (DHCD), Agency of Natural Resources (ANR), and the Public Service Department (PSD). The Agency has also invited the State’s Department of Buildings and General Services (BGS) to participate. As the lead agency, DHCD recently launched its community charging program which will support EVSE at multi-unit dwellings, workplaces, and community attractions. The latter may include fast charging at sites located off the state’s designated alternative fuel corridors.

- VTrans and DHCD recently executed an MOU with state funds to cost-effectively build upon past efforts of the EVSE interagency workgroup to deploy fast charging throughout the state, and to prepare eligible sites to meet NEVI minimum standards with additional investment.
- Public Engagement:
  - Vermont’s interagency workgroup and VEIC/Drive Electric Vermont released a survey targeted to property and business owners interested in supporting PEV charging as a site host or providing services associated with the installation and management of charging.
  - VTrans has presented its NEVI plans to multiple stakeholders over the past year for feedback at over a dozen meetings from October 2022 through June 2023, including Drive Electric Vermont stakeholders’ meetings, legislative briefings and testimony, Regional Planning Council meetings, the Vermont Systems Planning Committee (utility partners), among others.
- Plan Vision and Goals:
  - VTrans submitted its Round 7 Alternative Fuel Corridors nominations for Electric Freight Corridors with a focus on four National Highway System routes within the National Highway Freight Network for the new EV freight designation. This second NEVI plan begins to consider medium- and heavy-duty electrification beyond transit and school buses, as well as greater EV adoption, by introducing candidate locations for “Chargehubs” with high-powered charging and more ports.
  - VTrans applied for the 2023 FHWA Charging and Fueling Infrastructure (CFI) discretionary grant program to further support the deployment of EVSE with additional DCFC in 14 corridor locations and Level 2 EVSE at 32 locations within state and federally owned properties including state parks, and national parks, forests and wildlife refuges.
- Contracting:
  - VTrans has worked with its local FHWA office to refine a multi-step contracting process that meets both requirements for construction as well as the ongoing operations and maintenance of EVSE installed through the NEVI program. This will involve an initial RFQ to develop a list of qualified vendors, RFPs for specific projects, and a competitive solicitation for a third-party verification of construction requirements and other specified deliverables.
  - VTrans worked with its local FHWA office to determine a path to utilizing a sole source contracting process to quickly and cost effectively upgrade several sites currently in development through the state’s VW Settlement EVSE funding program to meet NEVI program requirements.
  - VTrans is submitting a Special Experimental Project No. 14 (SEP-14) request to deviate from the FHWA’s construction contracting framework to instead utilize Vermont’s own competitive procurement policies and procedures for its NEVI projects.
- Civil Rights:

- VTrans' work with a consultant to develop its Transportation Equity Framework, which will dovetail with the development of the state's new Environmental Justice policy, is nearing completion with recommendations and an implementation plan expected August 2023.
    - VTrans is working with the Office of Civil Rights to establish a process to incorporate corporate accountability metrics into the contracting process for all future EVSE installations, to ensure our vendors are held to the same high standards for the equitable distribution of funds this work entails and to more easily score and track these metrics annually.
- Existing and Future Conditions Analysis:
  - With support from VTrans, other sister agencies and external partners, the Vermont Agency of Natural Resources successfully guided a rulemaking process which led to the State's adoption of Advanced Clean Cars II and Advanced Clean Trucks standards, regulations which will ensure that automakers deliver the supply of electric vehicles needed to meet EV adoption targets.
- EV Charging Infrastructure Deployment:
  - Nine areas are being considered for potential Chargehub sites, to build more redundancy at key NEVI locations along AFCs with up to 8 ports, essentially doubling DCFC infrastructure at these locations.
- Equity Considerations:
  - VEIC is working with VTrans to engage several DACs on transportation electrification issues more broadly to better understand barriers to EV use, including affordability of vehicles, awareness of incentives, charging infrastructure, and other related factors.
  - Vermont codified into statute its vehicle incentive programs which are all income-sensitive and provide greater benefits to households with lower incomes. VTrans is further exploring ways to connect past and future incentive recipients with greater home charging access and/or discounted public charging rates, including through the contracting process for NEVI-funded charging equipment.
- Labor and Workforce Considerations:
  - VTrans is in communication with statewide workforce development partners including the Vermont Department of Labor, the Vermont Training Program within the Vermont Department of Economic Development, and the Vermont State University (formerly the Vermont State Colleges System) workforce division to build out ideas on how to best support EV and EVSE career pathways from within our programs and most effectively deploy our various funding sources.
- Physical Security & Cybersecurity:
  - VTrans has reviewed webinars, resources and sample cybersecurity clauses provided by the Joint Office of Energy and Transportation and developed by the Pacific Northwest and the Idaho National Laboratories.

- Program Evaluation:
  - Since the initial plan, Vermont has added more staff to a newly formed Environmental Policy and Sustainability unit who will, in part, aid in tracking progress and benefits from NEVI-funded projects. VTrans also plans to supplement the capacity of this unit by competitively selecting a consultant to inspect and monitor construction progress and project compliance.
- Discretionary Exceptions:
  - None. Vermont has withdrawn the original exception submitted for its proposed Randolph location. The selected vendor for this project continues to struggle to secure a host-site agreement at an eligible property. Nevertheless, VTrans will work to identify an appropriate site itself either in Randolph or at an alternative location that could still meet NEVI minimum standards.

## State Agency Coordination

State agency coordination has defined Vermont’s past, present, and future approach to building a strong public charging network. Historically, all funding decisions for EVSE have been made through the EVSE interagency workgroup, comprising the Agency of Transportation (VTrans), the Department of Housing and Community Development (DHCD), the Department of Environmental Conservation (DEC) and the newly established Climate Office at the Agency of Natural Resources (ANR), and Public Service Department (PSD - the State’s energy office). Chaired by staff from DHCD, this group has been directly involved in the design of state EVSE grant programs, contracting, and selection decisions, and contributed valuable feedback to the development of this Plan. Likewise, a larger, more informal group—the Interagency Climate and Energy Policy Action Committee (ICEPAC)—has heard multiple presentations and provided comments on the Plan at various stages. Members of this group include staff from the Department of Public Health, the Agency of Agriculture, which has responsibility for the state’s Weights and Measures programs, in addition to the core staff from DHCD, DEC, the Climate Office and DPS involved in EVSE planning. Much of the plan and its update relies heavily on the EVSE workgroup’s experience with implementation, and many of the key rules proposed by FHWA for operations and maintenance, siting considerations, uptime requirements, data collection and reporting, and more can already be found in past grant agreements.

### Memoranda of Understanding with Other Agencies

In July 2023, VTrans and DHCD signed a Memoranda of Understanding (MOU) to cost-effectively build upon past efforts of the EVSE interagency workgroup to deploy fast charging throughout the State, and to prepare eligible sites for potential public investments through sources such as the National Electric Vehicle Infrastructure (NEVI) Program, Charging and Fueling Infrastructure (CFI) Grant Program, and Carbon Reduction Program. The MOU prioritizes the use of additional state funding to support infrastructure upgrades to sites which have already received prior EVSE investment through the VW Settlement program and have been identified as eligible locations to meet NEVI minimum standards, thus contributing to rapid progress toward “fully built-out” status of Vermont’s designated alternative fuel corridors.

The MOU provides payment for incremental costs related to upgrading select EVSE installed by Blink Charging and Norwich Technologies to capitalize on work already completed, using a sole source

contracting process and the most efficient blend of funding available. If funds remain after securing upgrades to the Bradford site and six other locations prioritized for participation in the NEVI program and currently under agreement with Norwich Technologies and Blink Charging respectively, the interagency workgroup will determine through its shared decision-making process whether to expend the balance on a specific project or group of projects which will improve the State's public charging network as efficiently and equitably as possible, with due consideration to gaps which may be otherwise left unfilled or unfillable by existing funding sources and programs.

As part of its Charging and Fueling Infrastructure Grant submission, VTrans also proposed to work with State and federal agencies to deploy charging stations at public parks, forests, and wildlife refuges. If successful, the Agency would enter into an MOU with the Agency of Natural Resources as the primary site host for over two dozen locations. Other federal funding opportunities may lead to similar MOUs to boost public charging infrastructure.

### **Interagency Working Group(s)**

Despite its size, terrain, climate, and rural character, Vermont has been a leading state in deploying public charging stations to support its growing EV adoption. This is largely a result of its strong interagency relationships and external partnerships which have facilitated a coherent and coordinated approach to building out the state's entire EV charging ecosystem. The Vermont Agency of Commerce and Community Development (ACCD) has supported State EVSE grant programs for many years through the Vermont Department of Housing and Community Development (DHCD).

Historically, funding for both community and corridor charging has been managed by DHCD, as early rounds of grants for EVSE were focused on supporting economic development and vibrant downtowns. Years later, these remain important goals for Vermont's deployment of charging equipment, and DHCD has recently designed and launched programs related to community charging needs in collaboration with the interagency workgroup. However, going forward, VTrans has assumed the lead role on corridor fast-charging deployment, including use of the state's \$21.2 million in NEVI funds, \$2 million in ARPA funds, possible Carbon Reduction Program or competitive IJA grant funds, and additional state general or transportation funds as they become available. While interagency coordination will continue to inform state decision-making, this division of responsibilities will allow each agency to focus its staff energy and expertise where it will be most effective in building upon past successes.

The first state-funded EVSE grants were distributed in 2014 with \$200,000 in funding. This program continued to expand through the Volkswagen settlement environmental mitigation funds to support access to Level 2 and DCFC stations throughout the state. The State has grant agreements in place to build 17 new DCFC locations, many of which are just now coming online or in progress. Once fully complete, nearly every Vermont resident will have access to fast charging equipment within 30 miles.<sup>4</sup> Although the contracted installations do not meet the minimum NEVI requirements of four 150kW fast chargers, the State is working with contractors to consider upgrades at several locations along designated alternative fuel corridors.

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<sup>4</sup> Office of Governor Phil Scott. Governor Phil Scott Announces New Electric Vehicle Charging Stations to be Installed. February 2021. <https://governor.vermont.gov/press-release/governor-phil-scott-announces-new-electric-vehicle-charging-stations-be-installed>

## Public Engagement

In the context of limited staff time and time generally to conduct meaningful public outreach and engagement, VTrans' approach to the initial 2022 NEVI plan and 2023 update still involved consulting with many public and private partners. As the NEVI funding is highly prescribed until corridor build-out is achieved, VTrans intends to continue gathering public input to shape the deployment of funds when more flexibility is possible.

VTrans engaged with the public and as many groups identified in the guidance as possible to provide input on the initial NEVI plan. Staff, with the support of VEIC, presented Vermont's NEVI planning efforts to multiple meetings of the Transportation Planning Initiative (TPI) which brings staff at the Regional Planning Councils (RPCs) and Metropolitan Planning Organization (MPO) together to discuss areas of common interest. The RPCs act as conduits between state and local governments, helping to facilitate communication with city and town officials. VTrans also presented to the legislature and Drive Electric Vermont stakeholder meetings, which are held on a quarterly basis with representatives from industry, advocacy organizations, government officials and electric utility representatives. In May 2022, the Agency, with the support of partners like VEIC and the Vermont Clean Cities Coalition, held a longer public meeting with polls and breakout rooms for more in-depth comments and to get a better sense of what Vermonters thought about its NEVI plan goals. There were 130 registrants/participants for the webinar representing a range of the organizations listed below and providing a variety of comments on Vermont's proposed approach. This level of outreach continued through the end of 2022 and the writing of this update in 2023, engaging with RPCs, utility and other partners at the Vermont Systems Planning Committee, with both branches of the legislature at briefings and in legislative testimony, and at multiple stakeholder meetings.

Other forms of engagement included the design of a NEVI program landing page with a contact form for public comments. Drive Electric Vermont also maintains resources on charging and a public charging map and launched a mapping survey earlier this Spring to proactively identify potential site host partners for NEVI and other public charging projects. This was used primarily by private industry representatives to provide thoughts on how and where Vermont could deploy NEVI funding most effectively. Many more valuable insights came through one-on-one meetings with state agency staff, private sector EV charging providers, gas station/convenience store owners, utilities, and community-based organizations. Below are the parties with which VTrans and its team were able to engage in discussions about the NEVI program in developing the first two plans:

- Metropolitan Planning Organization and Regional Transportation Planning Organizations;
- Counties and cities, including coordination with existing EV charging programs;
- State departments of energy (Public Service Dept), and Vermont Clean Cities Coalition;
- State environmental protection agencies (Agency of Natural Resources);
- State economic development agencies (Agency of Commerce and Community Development);
- State public utility commissions;
- State weights and measurement agencies (Agency of Agriculture);
- State and Federal land management agencies;
- State public transportation agencies;
- Electric utilities and transmission and distribution owners and regulators;
- Community-based organizations, small business associations, Chambers of Commerce; labor organizations, and private entities; and
- Private sector EV charging station owners and network operators;



- Investors in EV charging infrastructure;
- Vehicle manufacturers;
- Utilities;
- Environmental justice, equity, and other community advocacy organizations with an interest in EV charging;
- EV industry organizations and EV advocacy groups, as applicable;
- Gas station owners and operators;
- Ride-share drivers/taxi drivers.

The Agency has nearly completed its Transportation Equity Framework, which will guide future sustained public engagement for plans, projects, and programs. This and a parallel effort to implement the State’s recently enacted environmental justice law will shape how the Agency approaches these responsibilities.

### **Community Engagement Outcomes Report**

As discussed in the sections above and below, community engagement is ongoing for Vermont EVSE planning and funding opportunities. VTrans has partnered with VEIC and the Drive Electric Vermont coalition to support broader plug-in electric vehicle outreach and education. This included 25 EV demonstration events across the State in the past year, directly reaching approximately 1,000 attendees and supporting broader community conversations on the potential applications of EVs.

General feedback themes from this ongoing engagement center on the urgent need to continue building out additional fast charging across the state including more locations, more charging ports per location, and higher-powered charging options of at least 150kW. Public charging infrastructure reliability has come up in many conversations, especially among current owners of non-Tesla all-electric vehicles. Many of the existing fast charging locations in the state open to those drivers are limited to one fast charger and the lack of redundancy is concerning for drivers relying on this infrastructure.

As of July 2023, no federal NEVI funding has been used to support engagement activities, but VTrans is considering future application of NEVI funds to continue this work. Meaningful community and public engagement requires that participants recognize and feel a strong connection between their participation, their input, and the resultant outcomes. Beyond constraints already identified, the challenge thus far has been the inflexibility of program rules to adequately capture and reflect how Vermonters might want to see the Agency invest in infrastructure. While folks renting and living in multi-unit dwellings may see access to home charging as the most critical barrier to EV adoption and demand more funding for cost-effective Level 2 charging shared by their communities, the NEVI program has rigid minimum standards that could preclude the State from deploying program funding where and how the public would prefer it. It is for this reason, among others, that the State hopes to reach “fully built-out” status as quickly as possible. With greater flexibility, the State could explore piloting various public engagement practices including participatory budgeting, where residents can more directly influence spending outcomes through genuine democratic processes.

### **Utility Engagement**

Vermont residents are served by 17 electric distribution companies. These 17 utility companies range in size from small municipal electric departments with several hundred customers to one large investor-owned utility, Green Mountain Power, with more than 260,000 customers.

Most of these utilities are offering incentives for EVSE installations as shown in Table 1 below.

Utilities are critical partners in advancing EV infrastructure and VTrans consults with utilities on NEVI activities through quarterly Drive Electric Vermont stakeholder meetings, Vermont Systems Planning Committee meetings, and one-on-one outreach. Additional meetings with individual utilities are scheduled as needed, as well as ongoing opportunities for discussion as siting plans are solidified.

Utility representatives have noted ongoing supply chain shortages of transformers, switch gear, and related equipment needed for DC fast charging make ready infrastructure. In some cases, utilities are hearing potential delays of a year or more for certain components, placing additional urgency on the need to site and advance NEVI-funded installations quickly to minimize any further delays. The State will have to work with its utility partners to build cooperative and creative solutions to reduce lead times for equipment and improve procurement timing.

Table 1. EVSE incentives offered by Vermont electric utilities.

Utility	EVSE Incentive (per port)	Notes
Green Mountain Power	Free Level 2 charger (Residential)	Charger must be internet connected and share access with Green Mountain Power during peak times.
	\$750 (Commercial)	Incentive that can be used for a public or workplace charger. Also offering a workplace charging program for \$35-50/month.
Burlington Electric	\$400 rebate on purchase of Level 2 charger	Charger must be purchased within 60 days of EV purchase.
	75% of installed cost up to \$3,000 (Commercial)	Eligible for workplace installations of Level 2 chargers or higher only.
Stowe Electric	\$500 rebate on purchase of Level 2 charger (Commercial)	To qualify, the charger must be for workplace or public use. Rebate is per plug.
VPPSA	\$500 rebate on purchase of Level 2 charger (Commercial)	Eligible to VPPSA members <sup>5</sup> only. To qualify, the charger must be for workplace or public use. Rebate is per plug.
Vermont Electric Co-op	\$250/\$300 (Residential)	Rebates for Level 2 residential charging equipment. Customers that opt-in to utility integrated connections get an extra \$50 in incentives.
	\$500 (Commercial)	Publicly available charging stations qualify for \$500 rebate per plug.
Washington Electric Co-op	Free Level 2 charger (Residential)	Must be co-op member participating in Powershift program to be eligible. Charger must be internet connected.

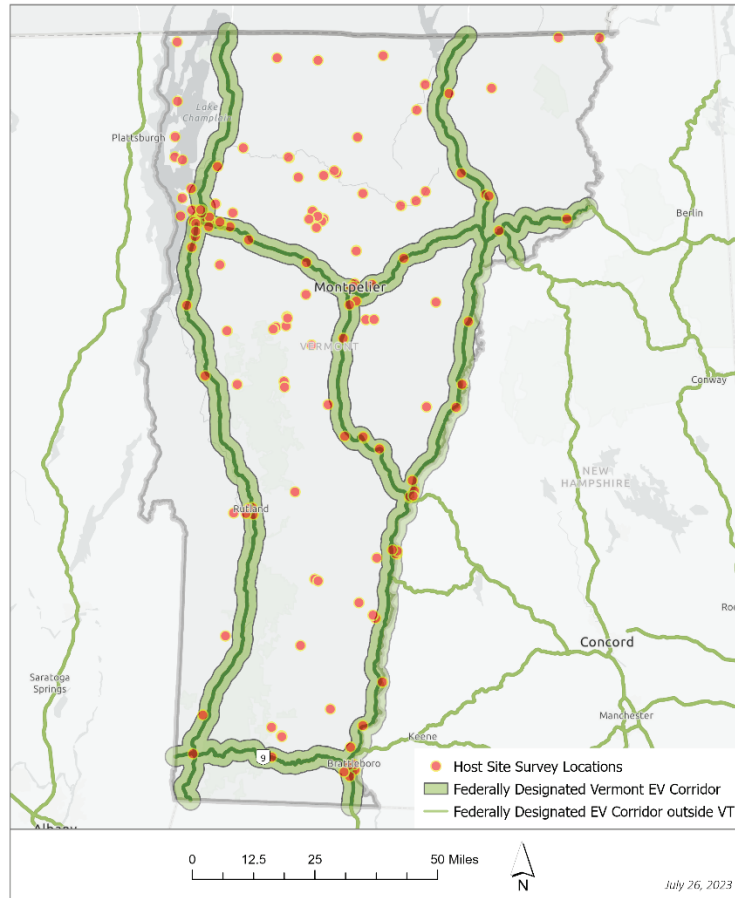
### Site-Specific Public Engagement

To identify potential host site locations for charging stations, VTrans and VEIC/Drive Electric Vermont released a survey targeted to property and business owners interested in supporting plug-in electric vehicle (PEV) charging or providing services associated with the installation and management of charging. Those interested in partnering with the State may fill out the survey at <https://arcg.is/DDeDT> [arcg.is] to offer their collaboration. The survey results will help identify opportunities for potential charging locations or EV charging services. Survey responses will be shared to facilitate potential partnering discussions between property owners/managers, charging service providers, and installation contractors.

As of July 2023, the survey has collected approximately 195 responses, with 28 of the potential host sites identified located within a mile of proposed corridor fast charging priority areas indicated below. Figure 1 below illustrates the wide spread of properties across the state. The survey will remain open to continue collecting responses and streamline location siting processes for NEVI and CFI funded EVSE installations.

<sup>5</sup> VPPSA members include Barton Village, Village of Enosburg Falls, Hardwick Electric Department, Village of Jacksonville, Village of Johnson, Ludlow Electric Light Department, Lyndonville Electric Department, Morrisville Water and Light Department, Northfield Electric Department, Village of Orleans, and Swanton Village.

Figure 1. Potential EVSE Site Host Locations



## Plan Vision and Goals

The primary purpose of this plan is to develop a deployment strategy for statewide EVSE that will enable EV adoption at levels necessary to meet the State’s climate and energy goals identified in the Vermont Climate Action Plan, the Vermont Comprehensive Energy Plan, and related legislation such as the annual State transportation funding bill. It will also be used to meet federal IIJA eligibility requirements—the NEVI Program in particular—to advance availability of IIJA EVSE funding in Vermont, and the equitable distribution of benefits across the state, its diverse populations, communities, workforce, and economy. It is envisioned that public funding for DCFC locations in this plan will help build an accessible, reliable, equitable charging network through public-private partnerships and with increasing levels of private sector support.

State goals in the above plans or documents call for an increase in the total registrations of electric vehicles to 27,000 by 2025 and 126,000 by 2030 to meet the greenhouse gas emissions reductions called for in Vermont’s Global Warming Solutions Act. The annual state transportation bill contains goals for siting DCFC (or Level 3 chargers) within one mile of every interstate exit in Vermont, and within at least 25 miles of the next DCFC on the state highway system. These are ambitious targets, but VTTrans is committed to advancing toward these goals as quickly as possible. The NEVI program guidance laudably

calls for project timeframes of six months or less from procurement to completion. Installations currently underway along Vermont’s highway corridors are in some cases almost three years in the making. While many factors contributing to delays are outside the control of state government, others are not. Vermont must continue to learn and do what it can to supply the infrastructure necessary to support these important goals in a timely manner. Therefore, it shall be the goal of this plan to obligate all NEVI funding for Federal Fiscal Year 2022 and FFY2023 by the end of Calendar Year 2024 on contracts to install, operate, and maintain the required EVSE at all proposed locations, allowing for FHWA to certify “fully built-out” status for the State’s existing alternative fuel corridors.

In the early stages of Vermont’s NEVI roll out—with a focus on site selection, design, and future-proofing—it is also important to include considerations for medium- and heavy-duty freight and fleet electrification. After reaching “fully built-out” status, VTrans is looking toward building more redundancy at its NEVI locations with up to eight (8) ports, essentially doubling the infrastructure, with more 350kW stations at sites along EV freight corridors. In anticipation that future federal guidance will include minimum requirements for freight charging, VTrans submitted its Round 7 Alternative Fuel Corridors nominations for Electric Vehicle Freight Corridors with a focus on four National Highway System routes within the National Highway Freight Network for the new EV freight designation.

Vermont also put forth its application for the 2023 FHWA Charging and Fueling Infrastructure (CFI) discretionary grant program to further support the deployment of EVSE in community and corridor locations. VTrans’ proposal for CFI-supported corridor charging is designed to supplement planned corridor charging locations already in development with NEVI funding to reinforce fast charging availability in high traffic locations in metropolitan locations, including one in a key disadvantaged community in the greater Burlington area, as well as rural locations where private investment is less likely to support EVSE installations without significant subsidies. Each of the proposed NEVI priority locations will meet the minimum federal requirements for corridor fast charging with at least four 150kW CCS charging ports.

VTrans’ proposal for CFI-supported community charging would further efforts to provide charging across the state as quickly as possible by leveraging state and federally owned properties including state parks, and national parks, forests, and wildlife refuges. Providing Level 2 EVSE at 32 proposed locations would increase charging availability in many rural areas of the state, enabling more EV travel and tourism in these areas and along designated scenic byways.

## Contracting

In order to create an efficient and effective contracting process for the majority of NEVI-funded projects and future charging installations regardless of funding source, VTrans plans to issue a Request for Qualifications before the end of the summer and develop a list of EV charging providers who can perform nearly all aspects of the NEVI program from working with site hosts on agreements, designing and installing NEVI-compliant equipment, to operating and maintaining the equipment to meet accessibility, uptime, reporting and other requirements. Although the list of qualified providers may be updated every few years to allow for new entrants to the marketplace, the strategy should allow for multiple rounds of streamlined competitive solicitations to a diverse group of vendors, with the ability to award projects based on transparent scoring criteria and according to a provider’s interest, ability, and price.

How to structure contracts out of those second-tier solicitations was not so straightforward. Earlier guidance from FHWA that contracting ought to treat EVSE installations as construction projects created

uncertainty as to the best path forward. Although VTrans has provided some input and oversight to prior grant rounds run by DHCD, the Agency has not been involved in contracting for installations, operations, and maintenance itself. Initial internal discussions with the Agency's contract administration section seemed to indicate a contract for services scenario, with waivers necessary to award contracts longer than the two plus one plus one year cap. EVSE projects did not fit neatly into traditional design-build contracts either, as the NEVI program requires an ongoing relationship with maintenance, uptime, reporting, and other requirements that will have to extend for at least five years beyond the construction itself. So, the Agency's team has circled round to a contract for services that resembles a blend of the two, with the idea that the contracts will be performance-based, reimbursements made upon meeting certain milestones/deliverables, including annual submissions attesting to program compliance.

As the lead agency receiving and deploying NEVI funds, VTrans will therefore contract with third party vendors to efficiently and effectively deliver EV charging infrastructure at the State's proposed locations in its plans and new sites as public feedback informs future plans or grants and prioritization is recalibrated to reflect new priorities, goals, or conditions. This will slightly evolve the State's prior approach through grant agreements to single providers. Rather than issuing a grant for the installation of charging equipment with the hope of meeting grant program requirements outside of the grant period, VTrans will pursue a longer-term contract for services model which passes through all the state and federal requirements to which these projects will be subject. Therefore, contracting is the key tool the State of Vermont holds for meeting NEVI guidelines and obtaining vendor compliance around everything from Buy America provisions to EVSE operations and maintenance standards, accessible payment options, data reporting, ADA and Civil Rights requirements, and more. By developing a list of qualified providers, the State can ensure that projects will be completed by experienced vendors with a high degree of confidence in building a reliable network. By advertising a clear scoring rubric through a competitive process, VTrans can ensure that what is developed in response to a call for proposals is designed to align with all program guidelines and state priorities.

For existing locations where EV charging providers have recently installed or will soon install DCFC as part of prior grant agreements, VTrans is working with DHCD to provide State general funds and VW settlement funds for make-ready work and a more cost-effective path to NEVI compliance. Where it makes sense, VTrans is proposing to pursue a sole source contract over new selection processes, because of the original bidder's experience in the location, with the local permitting process, the local utility, the site itself and site host, the existing agreement and any future-proofing work that had been performed as part of the scope.

With the goals of maximizing federal and state funds, limiting risk, accelerating project delivery, and advancing equity, VTrans continues to believe that an RFQ process followed by multiple RFPs may help to reduce overall project timelines and streamline selections from year to year. State contracting strategies may shift during or after the first rounds of funding as VTrans learns more from vendors, site owners, colleagues in partner agencies, peers in other state DOTs, community organizations, and the general public. An openness to different or new approaches will allow VTrans to meet unexpected challenges in a timely and creative manner. However, this flexibility will be grounded by following Vermont Agency of Administration Bulletin 3.5: *Procurement and Contracting Procedures*, recent amendments to the bulletin for ARPA funding where relevant, federal requirements under 2 CFR 200 and 23 U.S.C 304 among others detailed in the NEVI program guidance documents.

### **Status of Contracting Process**

VTrans continues to work with FHWA to refine a contracting process that meets both requirements for construction as well as the ongoing operations and maintenance of ESVE installed through the NEVI

program. The design, installation, operation, and maintenance of EV charging infrastructure do not fit the traditional standards required in agreements for federal highway construction projects. As such, VTrans is submitting a Special Experimental Project No. 14 (SEP-14) request to deviate from the FHWA's construction contracting framework to instead utilize Vermont's own competitive procurement policies and procedures for its NEVI projects. Once the SEP-14 request is accepted and the contract document is approved, VTrans will issue a Request for Qualifications (RFQ) and, subsequently, its Request for Proposals (RFP) (anticipated Fall 2023) with the goal of awarding contracts over the winter so that site work may commence in Spring 2024.

### **Awarded Contracts**

Vermont has not yet awarded any contracts but is poised to reach sole-source contracts for infrastructure upgrades in short order, with a Request for Qualifications and second-tier Requests for Proposals to soon follow this fall.

### **Scoring Methodologies Utilized**

VTrans will be using a clear scoring rubric which considers past performance, including workforce diversity, and the ability to complete projects in a timely, cost-effective, and equitable manner.

### **Plan for Compliance with Federal Requirements**

VTrans continues to work with FHWA to develop a contracting process that ensures contractors comply with 23 U.S.C., 23 CFR 680, and all applicable requirements under 2 CFR 200. VTrans is working with its local FHWA District Office to determine a path to utilize a sole source contracting process to quickly and cost effectively upgrade a selection of sites currently in development through the VW Settlement program to meet NEVI program requirements. Locations awarded to Norwich Technologies (Bradford, VT) and a selection of sites under contract with Blink are well positioned to contribute to progress toward "fully built-out" status.

VTrans is also coordinating internally and with the local FHWA Office on a checklist and clear process for NEPA permitting and Right of Way (ROW) requirements that must be included in site host agreements. It is envisioned that VTrans would also work with a third-party consultant to verify that deliverables have been met during the construction process and beyond so that compliance with federal requirements can be confirmed.

## **Civil Rights**

The NEVI Formula Program presents an extraordinary opportunity to invest in EV infrastructure throughout the state, and VTrans plans to work to ensure that funding benefits are broadly enjoyed across diverse communities, businesses, and workers. VTrans has significant experience with Civil Rights requirements related to federal funding and can ensure compliance with state and federal civil rights laws by following existing plans and processes for Title VI of the Civil Rights Act and accompanying USDOT regulations, the Americans with Disabilities Act, and Section 504 of the Rehabilitation Act.

The Agency's Office of Civil Rights serves as the point for equal opportunity compliance activities and functions conducted throughout the state, responsible for overseeing VTrans' internal and external civil rights programs, insuring compliance with all federal and State civil rights and non-discrimination laws and requirements and acting to move forward the Agency's civil rights goals and objectives.

Working closely with VTrans leadership and in partnership with other Agency divisions, the Office of Civil Rights administers the following mandatory civil rights programs: Internal and External Equal

Employment Opportunity (EEO) Programs, Contractor Compliance Program, Supportive Services Programs (on-the-Job Training), Labor and Wage Compliance Program, Title VI Program, and ADA Program.

The Office of Civil Rights strives to be the catalyst that facilitates and supports equity principles throughout the organization utilizing a proactive, interdisciplinary strategy to fulfill the following goals and objectives:

- To proactively provide strategies and/or remedies to promote equity, inclusion, and fairness.
- To engage all stakeholders respectfully and promote a culture of respect.
- To maintain state and federal compliance with all civil rights requirements.
- To ensure nondiscrimination in VTrans programs or activities receiving federal financial assistance by reviewing, consulting, and monitoring our practices.
- To eliminate unlawful discrimination in contracting practices and policies.

Current initiatives include the Agency’s work on its Transportation Equity Framework which will dovetail with the development of the state’s new Environmental Justice policy and shape each phase of the project development process: how comprehensive public involvement should occur; and how public involvement should determine tools, methods, and best practices in the Vermont context to integrate equity considerations into projects. Subsequent plans and projects will be developed through the framework proposed and adopted in 2023 once recommendations and an implementation plan are published.

## Existing and Future Conditions Analysis

### Geography, Terrain, and Climate

Vermont experiences harsh winter conditions with low temperatures that reduce electric range. In addition, many residents live in mountainous and rural areas off of gravel roads which experience spring thaw “mud season” conditions with major ruts and potholes. Consumers living in these areas often perceive they need PEV models with all-wheel drive, higher ground clearance, increased range, and lower cost. Many Vermonters will not strongly consider PEV options until models are available that address these issues.

Vermont is also experiencing the impacts of climate change. Vermont’s Climate Action Plan details the impacts of climate change occurring across the state<sup>6</sup>:

*The last decade was the warmest on record. The disruptions are already being felt, from extremely hot days in the summer to increasingly severe storms. If action isn’t taken soon, by the end of the century, Vermont will see at least 57 days above 86°F a year under a high emissions trajectory. Across Vermont, natural hazards of varying intensity, duration and frequency occur. These include severe storms, winter storms, drought, flooding, wildfires, air pollution, ground-level ozone, temperature extremes, localized winds, and biotic elements (insects and disease). Some of these hazards are ubiquitous, while others tend to occur at specific geographic locations. This poses varying exposure or risk and therefore, societal vulnerability. As climate change continues to be observed in Vermont, the characteristics of these hazards are also changing and this sets up cultural, socioeconomic and policy implications for Vermonters as individuals,*

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<sup>6</sup> Initial Vermont Climate Action Plan. (2021). <https://climatechange.vermont.gov/readtheplan>.



*municipalities, communities, and indigenous peoples, as well as for the built and natural environments.*

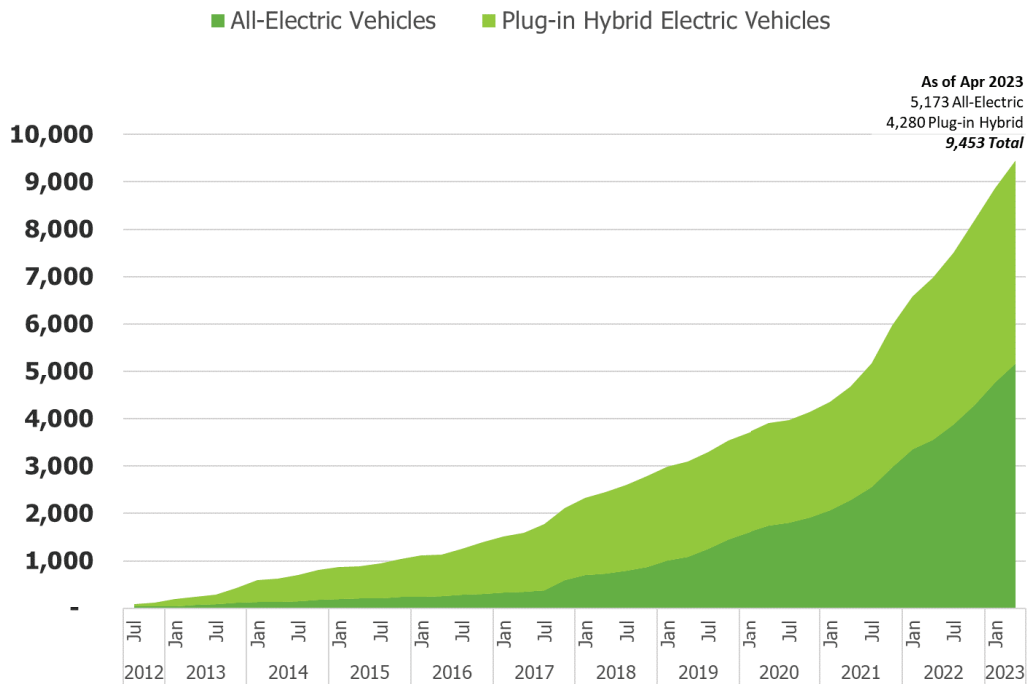
*The topography or physical geography of Vermont is one of the most important factors in influencing the occurrence of natural hazards their impacts on human settlements, the location of our major roadways in steep, V-shaped valleys, and our ability to increase resilience as a state. The north-south spine of the Green Mountains, along with the complex east-west valleys and the north-south ridges of the Taconic Mountains affect the movement of localized winds and incidence of freezing rain conditions; produces enhanced orographic precipitation and the associated flooding events; control the incidence of pollution and stagnation events, as well as variations in freeze and frost dates.*

Transitioning off fossil fuels in the transportation sector presents significant opportunities for Vermonters including lower energy costs, greater investment in the regional economy and more high-paying jobs in the weatherization, electricity, and clean energy sectors.

### **Industry and Market Conditions**

In Vermont, EV market share has reached about 8% of new vehicle sales as of June 2023, and the State had 9,546 EV registrations across 90 unique models as of April 2023. Figure 2 below illustrates the growth in Vermont EV registrations over the past 10 years. The EV market is expected to continue advancing at a rapid pace, partly in response to regulatory requirements associated with Vermont's adoption of the Advanced Clean Cars II and Advanced Clean Trucks programs as detailed below.

Figure 2. Vermont Electric Vehicle Registrations

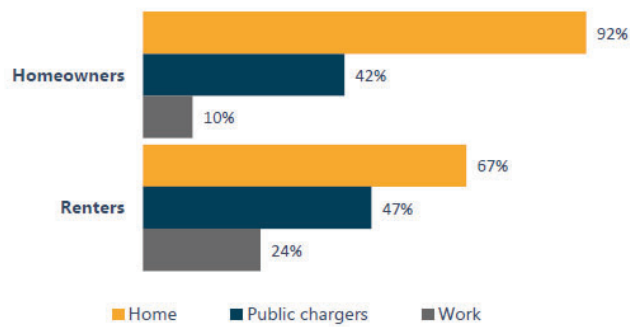


### Vermont Charging Usage

In Vermont, a 2022 survey of recipients of the state’s incentive for new plug-in electric vehicle (PEV) purchases revealed information on charging patterns across the state. The results highlighted important differences between the experience of homeowners and renters who own EVs.<sup>7</sup>

Consistent with national trends, most respondents to the survey charged their vehicles at home. However, while more than 92% of homeowners charged at home, the figure for renters was much lower, at 67%. Renters were much more likely to charge at work, while the rate of public charger usage was nearly identical for renters and homeowners.

**Q15 | Where do you charge your [Car Model]? Please select all that apply.**

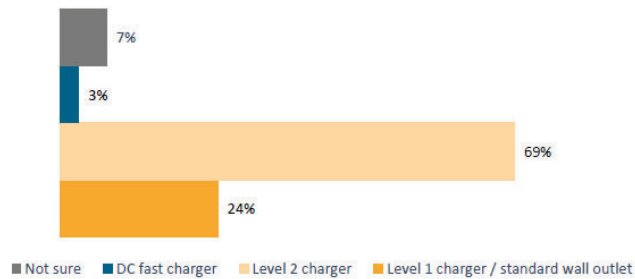


<sup>7</sup> VEIC. Vermont PEV Recipients Survey. March 2022.

The survey found significant differences in the type of chargers used at work, home, and at public charging stations. At home, renters were much less likely to use Level 2 chargers (38%) than homeowners (62%), and more likely to use slower Level 1 charging. While rates of Level 2 charging at work were nearly identical for renters (70%) and homeowners (67%), renters were less likely to use DC fast chargers at work (48%) than homeowners (66%).

The survey also revealed that most Vermont EV incentive recipients used Level 1 or Level 2 chargers at public charging stations. Only 3% of respondents reported using a DC fast charger at a public charging station. As introduced above, DC fast charging is important to facilitate long-distance travel with EVs, and to supplement home charging needs.

**Q21 | [If charge at public] What type(s) of charger do you use at public charging stations?**



	%
Level 1 charger / standard wall outlet	24%
Level 2 charger	69%
DC fast charger	3%
Not sure	7%

**Current EV Market Trends**

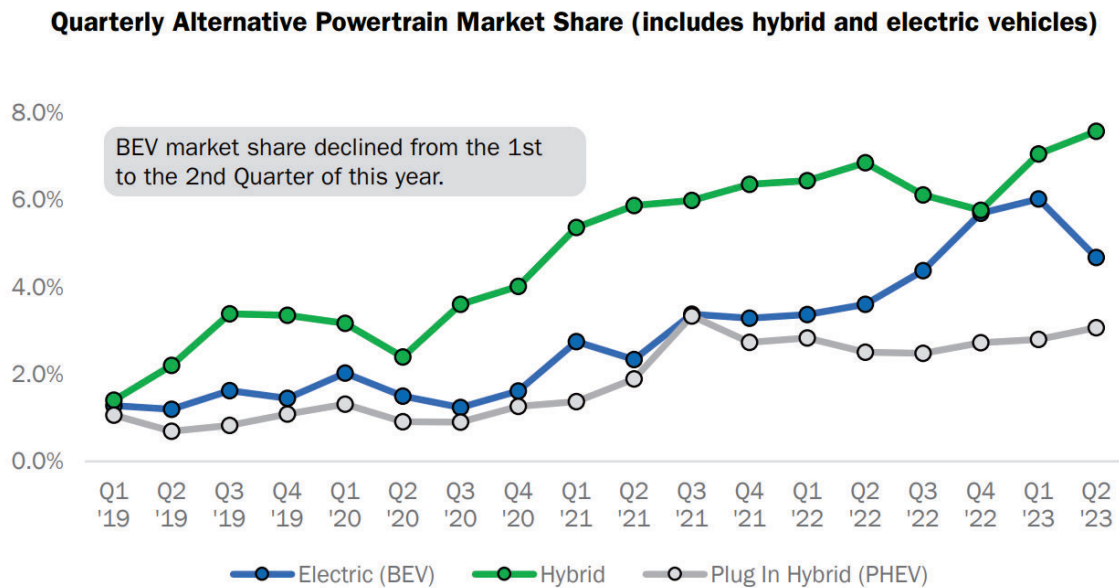
Vermont participates in the California-led Zero Emission Vehicle (ZEV) program enabled through Section 177 of the federal Clean Air Act. This requires auto manufacturers to sell in increasing shares of EVs over time as the “technology forcing” regulation grows increasingly stringent.

Many automakers are also making significant investments and setting their own goals for electrification of their new vehicles, with most calling for at least half of new sales to be electrified by 2030. This could include all-electric, plug-in hybrid, or in some cases conventional non-plug-in hybrid options.

Vermonters have already demonstrated significant interest in EV purchases as EV share of new vehicle purchases in the state is already a bit over 8% market share as of June 2023. Figure 3 below illustrates market share data over the past two years, as reported by the Vermont Auto Dealers Association. The introduction of several new EV models over the past few years has supported this interest. Recent EV market research undertaken by Efficiency Vermont found approximately 40% of Vermonters were

interested in purchasing an EV for their next vehicle, particularly if incentives and charging infrastructure were available to support them.<sup>8</sup>

Figure 3. Vermont EV Market Share, by Type<sup>9</sup>



## EV Forecasts

Forecasts of Vermont EV adoption are impacted by many factors, including availability of new EVs from automakers meeting consumer preferences (e.g., all-wheel drive, higher ground clearance, long range, fast charging, etc.), supply of used EVs to Vermonters, pricing of EVs, fuel prices, incentive availability, charging availability, auto dealer ability to sell EVs, ZEV regulations, and broad economic factors. Accurate predictions of these factors is very challenging, especially in the current market conditions where ongoing supply chain issues due to COVID, a widespread shortage of microchips used in new vehicles and other factors has led to shortages of vehicles and long wait times for many new EV options.

Recent estimates of EV adoption developed for VELCO’s long range transmission plan considered three distinct scenarios for EV adoption based on assumptions regarding EV market growth over time. Table 2 and Figure 4 below summarize the results of this work.

<sup>8</sup> Efficiency Vermont. Are Vermonters Ready to Drive Electric? Nov 2021.

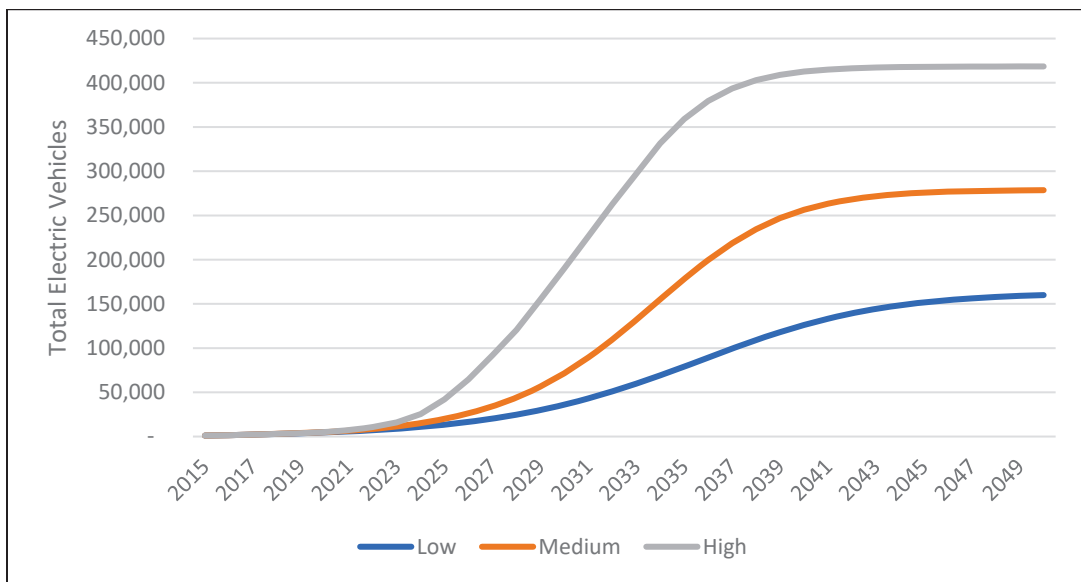
<https://www.efficiencyvermont.com/online-trainings/are-vermonters-ready-to-drive-electric>

<sup>9</sup> Vermont Vehicle and Automotive Distributors Association. Vermont Auto Outlook. June 2023.

Table 2. Vermont Light Duty Vehicle EV Forecast Scenarios - Total EVs Registered

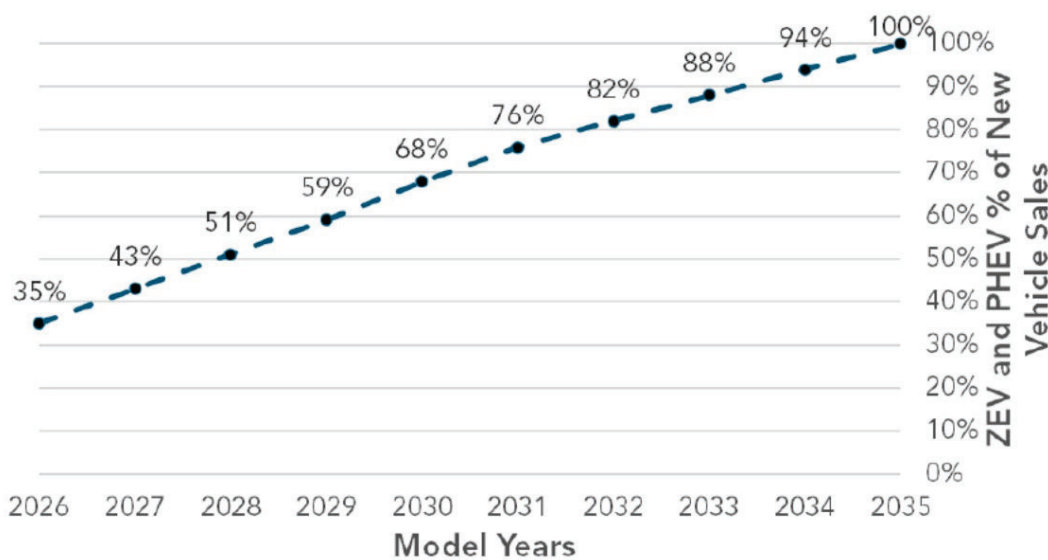
Year	Low	Medium	High
2020	4,624	4,941	5,189
2025	13,476	20,007	41,969
2030	36,080	71,624	190,125
2035	79,179	178,162	359,077
2040	126,184	256,417	412,689
2045	151,678	275,702	418,038
2050	159,931	278,561	418,464

Figure 4. Vermont Light Duty Vehicle EV Registration Forecasts – Total EVs Registered



The State of Vermont Agency of Natural Resources has drafted estimates of EV market share associated with Vermont’s continued participation in the California-led Zero Emission Vehicle (ZEV) program through the Advanced Clean Cars II and Advanced Clean Trucks rulemaking now underway. As Figure 5 below shows, if these rules are finalized as proposed it will significantly advance automaker EV sales requirements, with 100% EV sales in 2035, including all-electric and PHEV options.

Figure 5. Potential EV Market Share of New Vehicle Sales<sup>10</sup>



Ongoing work associated with the Vermont Climate Action Plan has also created a clean energy pathways analysis suggesting one approach to meeting the Vermont Global Warming Solutions Act requirements for GHG reductions would need 27,000 EVs by 2025 and 126,000 EVs by 2030, falling between the medium and high adoption forecast scenarios described above.<sup>11</sup>

### Future EVSE Requirements

Vermont has relatively good availability of EV charging infrastructure compared to many other states, but there are still significant needs to build-out additional infrastructure to reduce the distance between charging opportunities and increase redundancy.

How much and what type of charging will be needed in the future will need to be revisited frequently in the coming years as market conditions change and new technologies are introduced.

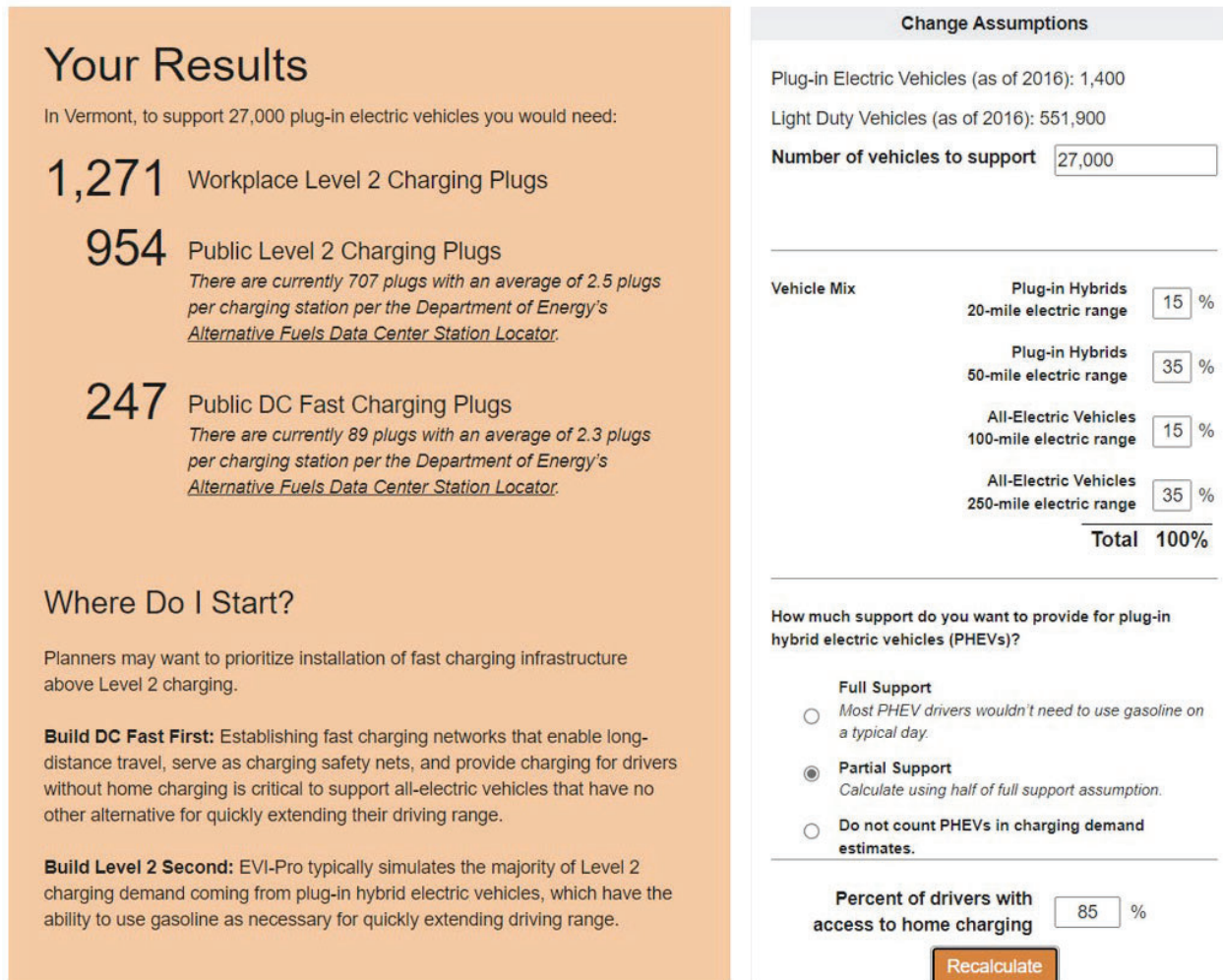
The US Department of Energy and National Renewable Energy Lab (NREL) developed the EVI Pro tool to provide guidance to states on EV charging needs associated with different levels of adoption. VTrans used the EVI-Pro Lite tool to estimate charging needed for the 2025 pathways target of 27,000 EVs in Vermont. Figure 6 below includes the results of this analysis, which assumed that about half of the EVs in Vermont would be PHEV models and 85% of EV drivers would be able to access charging at home.

Based on this analysis Vermont will need at least another 150 DCFC plugs spread across the state to ensure EV owners are able to travel freely. The significant ramp up in EV adoption after 2025 suggests charging infrastructure development will continue to be a critical need in the future.

<sup>10</sup> VT ANR. Draft Regulation Summary Document, Advanced Clean Cars II, Advanced Clean Trucks. May 2022. <https://climatechange.vermont.gov/node/442>

<sup>11</sup> Energy Futures Group. Vermont Pathways Analysis Report 2. Feb 2022. <https://climatechange.vermont.gov/node/457>

Figure 6. Vermont Estimate of 2025 EV Charging Needs<sup>12</sup>



## EVSE Fee Requirements

Prior to the passing of the 2019 Vermont Transportation Bill, the state prohibited non-state agencies or unregulated utilities to sell electricity by the kilowatt-hour, preventing other EVSE operators from charging for costs directly associated with electrical consumption. Instead, EVSE operators typically based fees on time connected to the charging unit or through subscription services that provide unlimited charging for a fixed monthly fee. The 2019 Vermont Transportation Bill exempted private operators of EVSE stations from Public Utility Commission oversight and allowed these unregulated EVSE operators to charge by the kWh at EVSE.<sup>13</sup>

NIST guidance supports both energy and time-based methods of EVSE cost recovery but reiterates kilowatt-hour should be primary. The State may want to consider monitoring how EVSE stations are charging customers to ensure best practices are being followed where applicable and continue to standardize a statewide approach.

<sup>12</sup> US DOE Alternative Fuels Data Center. EVI-Pro Lite Statewide Analysis. May 2022. <https://afdc.energy.gov/evi-pro-lite>

<sup>13</sup> Vermont State Legislature. H. 529 (Act 59). June 2019. <https://legislature.vermont.gov/bill/status/2020/H.529>

If the charging equipment is owned or controlled by a Vermont agency or department, fees may be established up to equal cost of charging or to the retail rate for use of publicly available EVSE. Any fees collected must be deposited into the original fund or account that supports the installation, operation, and maintenance of the equipment. This provision is set to sunset July 1, 2025.<sup>14</sup>

## **Municipal Policy**

The passage of Act 89 in 2013 authorized municipalities to adopt stretch energy codes to be used for new residential buildings. Stretch codes are locally mandated codes or compliance measures that are more aggressive in pursuing energy savings than the base code. Stretch code requirements are often precursors to the next iteration of base codes.

Vermont recently updated residential and commercial building energy standards in 2020 based on International Energy Conservation Code that applies to all new low-rise residential construction, additions, alterations, renovations, and repairs. This update to the 2015 standards includes a strategic shift toward adopting more efficient electric heating and ensuring homes are solar ready and electric vehicle charging capable.<sup>15</sup> Furthermore, as of September 1, 2020, all residential projects requiring an Act 250 permit must comply with stretch codes outlined in the 2020 building energy standards.<sup>16</sup>

Equally important to building codes is the development of planning and permitting structures that can streamline EVSE deployment. Every EVSE installation, excluding some single-family residences, must meet Vermont Department of Fire Safety's State Electrical Safety program permitting requirements. Other state permits are site specific, such as Act 250 permits, state environmental permits, or VTrans highway permits for sites located in the state right-of-way.<sup>17</sup> Each municipality may enact specific ordinances for EVSE, resulting in a mosaic of requirements that result in geographic disparities in public access. The Chittenden County Regional Planning Commission's 2014 EVSE Guidebook contains suggested language for municipal bylaws to streamline installations in communities. The Department of Housing & Community Development (DHCD) has also developed a resource to support local EVSE development, as shown in Figure 7.<sup>18</sup>

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<sup>14</sup> 32 V.S.A. § 604. July 2022. <https://legislature.vermont.gov/statutes/section/32/007/00604>

<sup>15</sup> Faesy, Richard and Dave Keefe. Vermont Residential Building Energy Standards Update. February 2019. <https://www.encyvermont.com/Media/Default/bbd/2019/docs/presentations/efficiency-vermont-bbd-vermonts-new-2019-residential-building-energy-standards-energy-codes.pdf>

<sup>16</sup> Vermont Public Service Department. Vermont Residential Building Standards (RBES) Energy Code Handbook. 2020.

<sup>17</sup> VEIC. Drive Electric Vermont Electric Vehicle Charging Station Guidebook. 2014. <https://www.driveelectricvt.com/Media/Default/docs/electric-vehicle-charging-station-guidebook.pdf>

<sup>18</sup> VT DHCD. Local Electric Vehicle Charging Station Regulation. Sept 2018. [EVSE-Friendly Development Regulations.VT\\_.DHCD\\_.Sep2018.pdf \(vermont.gov\)](https://www.dhcd.vermont.gov/Files/20180920/EVSE-Friendly_Development_Regulations.VT_.DHCD_.Sep2018.pdf)



Figure 7. VT DHCD guidelines on local regulations for EVSE development

### **Supporting EVSE in Municipal Regulations**

1. Define frequently used terms and ensure they are understandable
2. Allow charging stations as an accessory use and structure wherever there is parking
3. Allow charging stations as a principal fueling station in specific cases
4. Keep permit review process simple and allow for exemptions and administrative review
5. Prepare parking standards
6. Update sign standards
7. Check performance standards

One avenue that may assist municipalities and other public entities considering EVSE installations is the opportunity to access EVSE discounted pricing through the Vermont Department of Buildings and General Services (BGS) state contract for EVSE.<sup>19</sup> This contract could save significant time and money associated with the installation of charging equipment.

## **Travel Patterns in Vermont**

### **EV Charging Geographic Analysis**

There are many considerations in identifying the ideal locations for EV charging infrastructure. For NEVI funding, there are requirements to be within a certain distance of corridors. Availability of grid infrastructure, traffic volumes, and the location of disadvantaged populations are all considered in the map series below, starting with Figure 8 showing the federally designated EV corridors in Vermont and neighboring states that are the focus of this plan.

Additional analysis from the 2022 NEVI plan is included in the Appendix and updates will be made as the State solicits stakeholder feedback on prioritizing future charging investments and makes progress in building out the designated corridors to the federal requirements.

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<sup>19</sup> VT BGS. EV Charging Stations. Accessed Jan 2022. <https://bgs.vermont.gov/content/electric-vehicle-ev-charging-stations>

Figure 8. Federally Designated EV Corridors

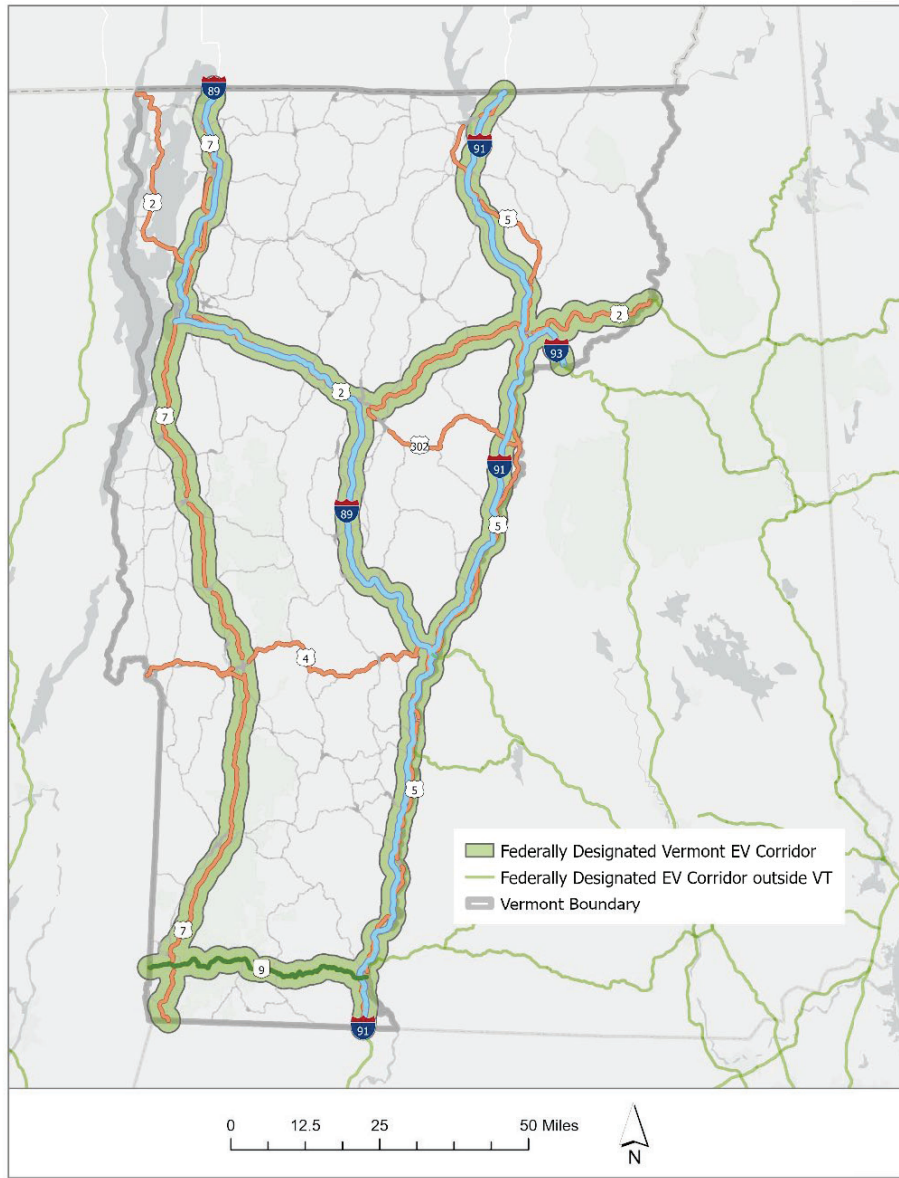
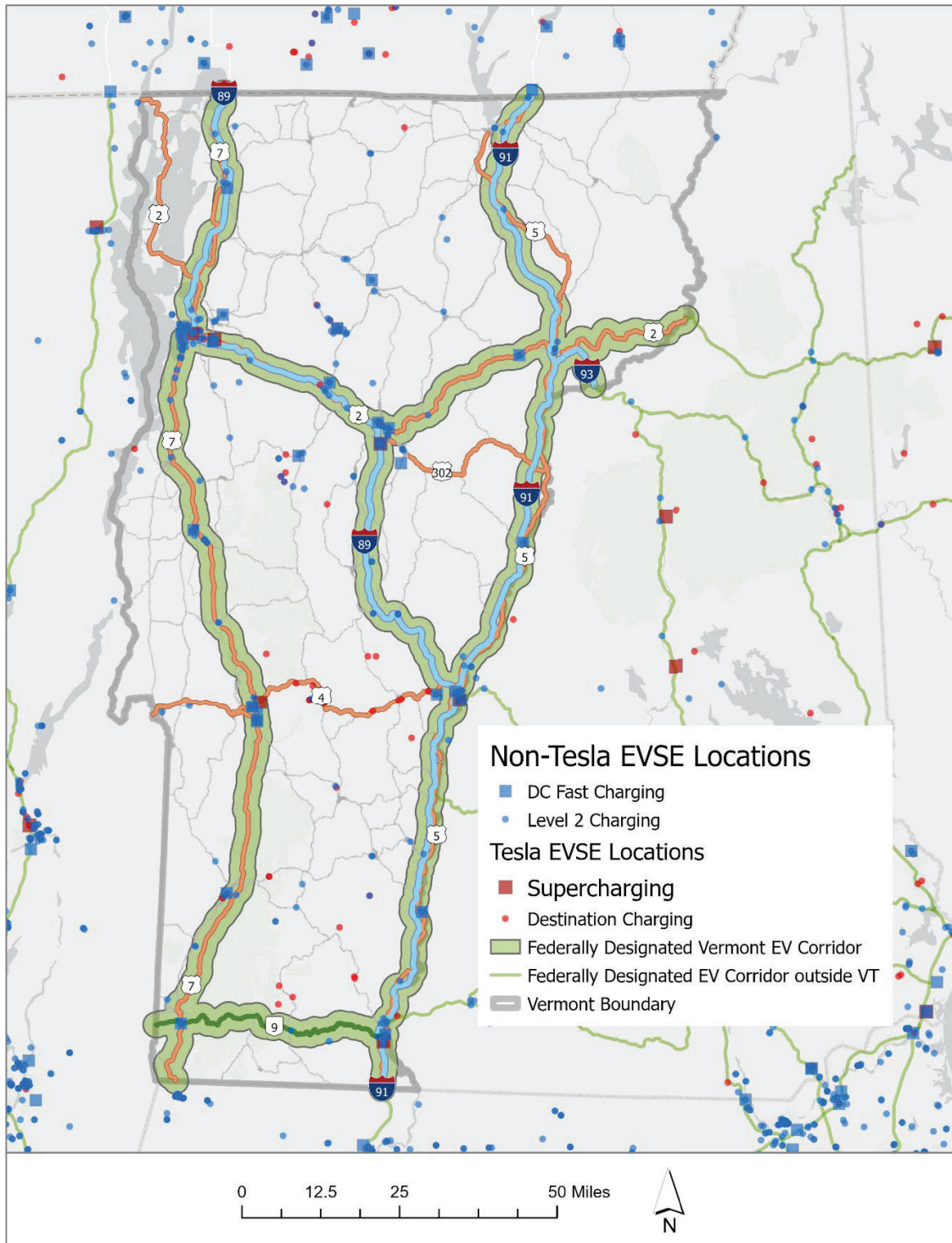


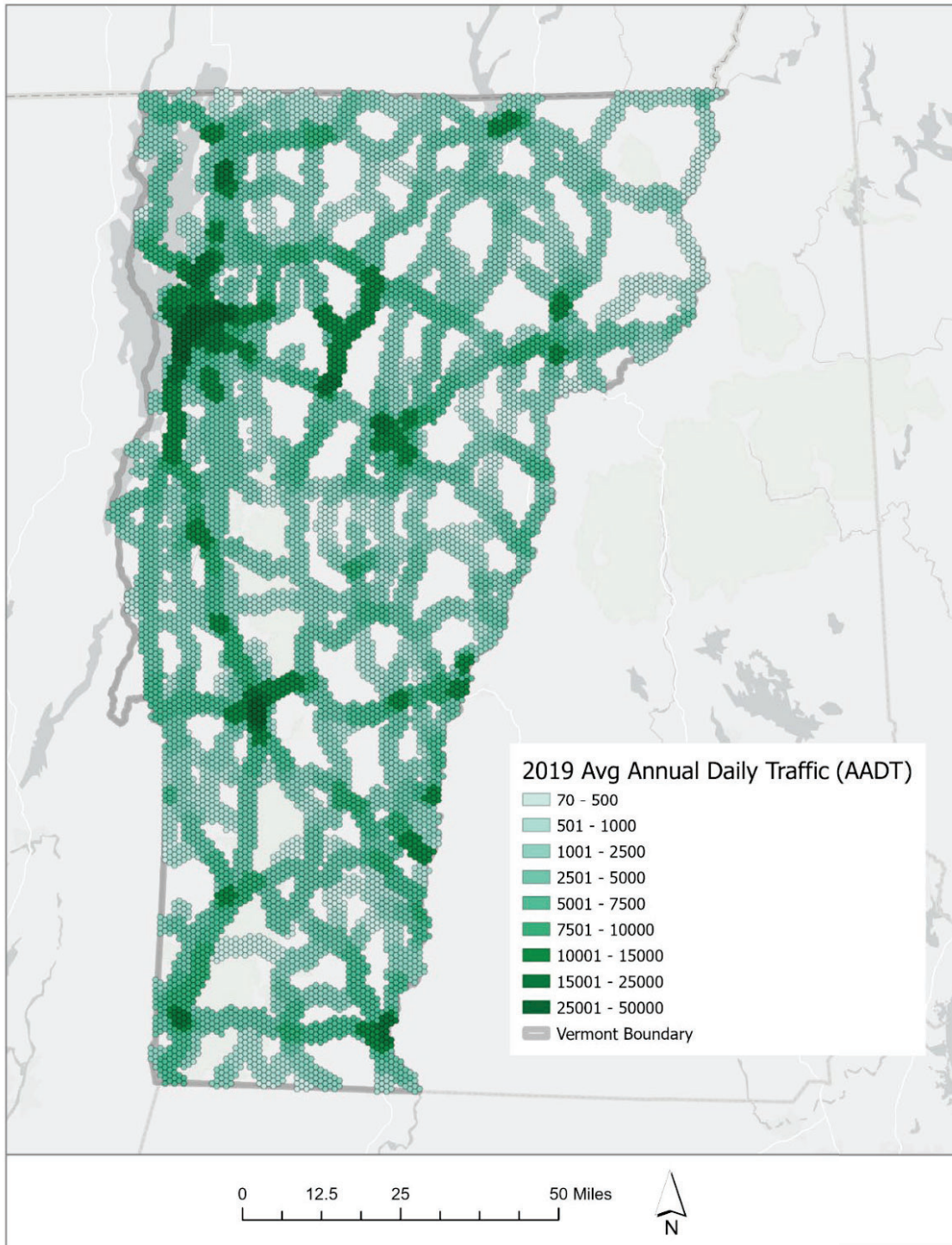
Figure 9 below overlays current EV charging availability on the corridor locations, with distinctions made between Tesla-specific infrastructure and other non-Tesla charging locations.

Figure 9. EV Corridors with Existing EVSE Locations



Traffic flows are also an important consideration in identifying areas more likely to have drivers in need of charging infrastructure. Figure 10 below includes the maximum estimated average annual daily traffic for 2019 within 1 mile of non-limited access highways.

Figure 10. Traffic Volumes



## Fleet Considerations and Future Advancements

### Light-Duty Fleets

Businesses and organizations can realize cost saving benefits by transitioning fleets to electric vehicles.<sup>20</sup> Currently, as many as half of private EVSE ports are used for fleet charging, the majority of which are Level 2 stations. Of these, nearly 75% are dedicated to light duty vehicles. This number will continue to rise as infrastructure becomes more widely accessible, as the per mile cost savings of electric vehicles already presents a strong business case for electrifying fleets. Moreover, increasing competition and innovation in the EV market will drive down initial purchase costs and close the upfront affordability gap between EVs and fossil-fuel powered vehicles. By 2050, the Energy Information Administration projects that EVs will account for 31% of fleets globally, up from 0.7% today.<sup>21</sup>

To better understand savings potential, VEIC analyzed<sup>22</sup> several EV fleet case studies for Vermont municipalities and nonprofits that utilized electric vehicles as part of fleet offerings. The research demonstrated that the cost of maintenance, lease payments, insurance, and fuel costs can be lower than the federal fuel reimbursement rate (\$0.54/mile) if the vehicle was driven at least 10,000 miles per year. Notably, as the report was completed in 2016, the economics have only continued to improve in favor of EVs. Challenges identified in the report, too, have continued to be addressed as the EV market matures. Winter performance, and particularly range, have significantly improved for newer EV models compared to the Mitsubishi i-MiEV's studied in the report. Improvements in these areas will enable fleets to be used in a greater capacity than identified in the report and yield even more potential cost savings.

In 2023, the Agency proposed, and the legislature approved extending electric vehicle incentives to business, municipal, and nonprofit fleets. Expected to launch in the fall, the program will provide additional financial encouragement with the Inflation Reduction Act's Clean Commercial Vehicle Tax Credit to electrify Vermont's light-duty fleets.

### Private Heavy-Duty Fleets

Despite making up just 4% of the total vehicle stock, heavy-duty vehicles account for nearly a quarter of total transportation emissions in the United States. This hard-to-reach segment of the transportation sector requires a multifaceted approach to decarbonize and is especially concerning as emissions from heavy-duty vehicles continue to rise. Recognizing this challenge, in 2021 Vermont signed the Northeast States for Coordinated Air Use Management (NESCAUM) memorandum of understanding, a multi-state agreement to accelerate electrification of trucks and buses. This agreement sets a goal for all new medium- and heavy-duty vehicle sales to be zero emission by 2050. Connecticut, Massachusetts, Maine, New York, Rhode Island, and Quebec were also part of the 17 jurisdictions that signed the agreement, providing support in neighboring areas that will be key in connecting the transportation network for electrified medium- and heavy-duty vehicles.

It is recognized that heavy-duty vehicles that travel shorter distances on predictable routes that return to a centralized fleet depot are well suited for transitioning to electric today. These types of near-term deployments will help to prove electrification of this segment of the transportation sector, while the technology and market for more challenging applications evolve. For example, with funding from the

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<sup>20</sup> Brown, Abby, Alexis Schayowitz and Emily Klotz. Electric Vehicle Charging Infrastructure Trends from the Alternative Fueling Station Locator: First Quarter 2021. 2021. <https://www.nrel.gov/docs/fy21osti/78486.pdf>

<sup>21</sup> Dwyer, Michael. EIA projects global conventional vehicle fleet will peak in 2038. October 2021. <https://www.eia.gov/todayinenergy/detail.php?id=50096>

<sup>22</sup> VEIC. Electric Vehicle Fleet Case Studies. 2016. [https://www.ccrpcvt.org/wp-content/uploads/2018/12/V2-FINAL-CCRPC\\_EV\\_Fleet\\_CaseStudies\\_CCRPC.pdf](https://www.ccrpcvt.org/wp-content/uploads/2018/12/V2-FINAL-CCRPC_EV_Fleet_CaseStudies_CCRPC.pdf)

VW settlement, Casella Waste Systems has ordered two electric waste haulers. In the coming year, Green Mountain Power will be replacing two fossil-fuel vehicles with two fully electric heavy-duty vehicles, a stake truck and bucket truck, largely supported by the VW settlement fund proceeds. Additionally, two vehicle-to-grid chargers will be dedicated for the trucks, which GMP expects to generate more than \$135,000 in savings for customers through peak energy reductions. Furthermore, financial models by the National Renewable Energy Laboratory (NREL)<sup>23</sup> have found that fully electric Class 8 tractors and Class 4 parcel delivery trucks will be competitive to conventional alternatives by 2025. Refueling and infrastructure costs were found to be the most influential on the total cost of ownership, signifying the need to prioritize work on making the transportation sector electric ready and crafting favorable policies that promote this transition.

The State's role in addressing these challenges will be to standardize best practices and alleviate financial burdens in the development and operation of charging stations. These classes of vehicles have unique challenges to electrification, and therefore must have separate considerations from light-duty vehicles in the development of a charging network. Unlike private vehicles which experience extended periods of downtime and can take advantage of flexible charging schedules, medium- and heavy-duty vehicles operate under strict schedules and often require long distances between charges. This necessitates higher power infrastructure designed to allow larger vehicle access to charge larger batteries in a timeframe consistent with vehicle operating schedules. In other words, supporting medium- and heavy-duty fleets will likely require more DCFC ports and at higher power levels than light duty fleets.

DC is less standardized but can provide higher voltage levels that are better aligned with larger battery packs. With higher voltages, safety is a greater concern. This opens the possibility for utilities to provide DC as a service (DCaaS), as they have the expertise, equipment, and business model in place to manage this type of infrastructure. This could eliminate a potential barrier for station operators that do not want to take on the comparatively higher risk for an entity that has no other use for such infrastructure.

Utilities in other states have already made strides in supporting the transition to EV fleets with similar kinds of services. Vermont will consider prioritizing innovative programs that support the development of charging infrastructure for medium- and heavy-duty vehicles and expedite the regulatory process as opportunities arise. As such, VTrans submitted its Round 7 Alternative Fuel Corridors nominations for four Electric Freight Corridors, outlined in more detail in this plan's AFC designation update, to further the state's vehicle electrification efforts and reduce greenhouse gas emissions from the transportation sector.

Other challenges arise in meeting charging needs of larger vehicles while limiting demand impacts. Colocating onsite renewable generation and/or battery storage is a reliable method to reducing demand on the grid. Private fleet EVSE may also benefit from future V2G applications that can take advantage of vehicles' battery storage that are not in use to assist in recharging others. Considerations must also be made for EVSE to support long-range public transit networks that cross the state. These stations will require significant power capacity and would similarly benefit from onsite power generation and storage. The State will continue to investigate these opportunities, particularly around depots that can presently support medium- and heavy-duty vehicle parking. It is hoped that funding for such opportunities may become available in federal infrastructure spending for EV freight corridors.

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<sup>23</sup> Hunter, Chad, et al. Spatial and Temporal Analysis of the Total Cost of Ownership for Class 8 Tractors and Class 4 Parcel Delivery Trucks. 2021. <https://www.nrel.gov/docs/fy21osti/71796.pdf>.

## Bus Fleets

### Public Transit

Efforts are underway to electrify bus fleets across Vermont. The first two electric transit buses in the state were delivered in early 2020 to Green Mountain Transit in Burlington and four more electric buses are on the road. Procurement for twelve more electric transit buses is proceeding, largely funded by FTA Low- and No-Emission Grant Awards. In addition, VTrans was recently notified of an FY2023 Low/No award of over \$22 million to further support this transition, marking the seventh consecutive Low/No program award for Vermont transit operators.

In compliance with Act 55, VTrans submitted a Zero-Emission Transition Plan to the legislature on January 31, 2022, which examined ways the State and transit agencies can meet zero-emission targets of 10% of the transit fleet electrified by 2025 and 100% by 2050. The plan evaluates a range of operational scenarios, including smaller vans and buses that are common throughout the state, and made recommendations for which routes could be electrified with present-day technology. The plan also makes high-level recommendations on charging infrastructure, maintenance and training, and funding strategies. The plan will serve as a living document to be updated iteratively as progress is achieved and external conditions change.

### School Buses

In addition to public transit, Vermont school districts have partnered with the Agency of Natural Resources and VEIC to pilot an electric school bus program to determine feasibility of use across the state.<sup>24</sup> Champlain Valley School District, Franklin West Supervisory Union, and Barre Unified Union School District obtained school buses through a competitive application process and began operating two electric school buses during the 2021/2022 school year. These buses will be tracked over the course of the year as part of the pilot program to test how electric school buses perform in Vermont. VEIC includes resources on their website<sup>25</sup> school districts may use to understand the process of obtaining electric school buses, including guidance on getting started, comparing different models, utility bill impacts, and funding opportunities. The U.S Department of Energy's Alternative Fuels Data Center recently began hosting a series of webinars and technical trainings for K-12 school districts interested in electric school buses.<sup>26</sup>

Though as much as \$36,000 can be saved in fuel costs across the lifetime of the bus, school districts still rely on additional funding resources to bridge the gap in up-front capital costs that presently exists between diesel powered and electric buses; electric options cost more than two-and-a-half times as much than conventional counterparts even before the cost of charging equipment.<sup>27</sup> Other challenges the buses will contend with are range and charging infrastructure. Due to Vermont's mountainous terrain and cold winters, buses are not always able to reach the 100-mile range that can be achieved in optimal driving conditions. The longest route piloted so far extends 90-miles in a day, necessitating the driver to recharge midday to complete the route.

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<sup>24</sup> VEIC. Vermont students head back to school on electric buses. 28 October 2021.

<https://www.veic.org/news/vermont-students-head-back-to-school-on-electric-buses>.

<sup>25</sup> Wallace-Brodeur, Jennifer. Electric School Bus Resources. November 2019. <https://www.veic.org/clients-results/reports/electric-school-bus-resources>.

<sup>26</sup> Alternative Fuels Data Center. Electric School Bus Education. December 2021.

[https://afdc.energy.gov/vehicles/electric\\_school\\_buses.html](https://afdc.energy.gov/vehicles/electric_school_buses.html).

<sup>27</sup> Robinson, Shaun. "Electric school buses roll out in pilot project in 3 Vermont districts." November 2021.

<https://vtdigger.org/2021/11/02/electric-school-buses-roll-out-in-pilot-project-in-three-vermont-districts/>.

## Known Risks and Challenges for EV Deployment

### NIST EVSE Fee Transparency

Any product sold involving “weights and measures” in the United States is regulated to protect consumers, provide transparency, and ensure uniform standards are applied across commercial activities. The National Institute of Standards and Technology (NIST) collaborates with government officials and industry practitioners to provide technical guidance and ensure measurement systems work properly and are clear to consumers. NIST guidance is documented in handbooks covering products ranging from foods to vehicle fuels and includes inspection procedures to ensure compliance and accuracy. The State of Vermont adopts NIST guidance on weights and measures issues by reference under state statute.<sup>28</sup>

Electric vehicle “fuels” are also subject to standards developed by NIST, although the rapid evolution of EV technologies has made it challenging to develop relevant standards. NIST has adopted legal method of sale requirements that require electrical energy for the purpose of EV charging is to be sold in megajoules or kilowatt-hours.<sup>29</sup> Although this guidance is clear many EVSE operators continue to charge exclusively by time of use or provide a subscription service to users. NIST allows for time-based or subscription fees but stipulates they should be charged and displayed to customers separately from electric energy sales. Discrepancies between the standards and how stations are actually charging customers will likely continue until there is broader national acceptance of submetering for EV charging as Vermont has allowed.

The Vermont Agency of Agriculture Food and Markets (AAFM) is aware of the need to monitor EVSE weights and measures issues and has begun working toward the establishment of an EVSE registry as part of its weights and measures program. They are also exploring options for measurement technologies that could be used to verify kWh provided at EVSE, which can be especially challenging at high powered DC fast charging locations. AAFM may also want to consider how different payment methods may impact equal EVSE access for those who may not have credit card payment options available.

### Barriers to Adoption

There are a number of state actions, and inactions, that present barriers to the widespread and equitable adoption of EVs. Most importantly, entities that sell electricity for EV charging need to be given the freedom to set prices without being regulated as a traditional electricity provider. In most states, this requires special action, but is essential to enabling the proliferation of a competitive private-market charging ecosystem where providers can set prices to respond efficiently to consumer demands. With the passage of Act 59 in 2019, the State of Vermont has overcome this regulatory barrier.

Certain types of incentive programs will be more effective at providing meaningful access to EVs and chargers for drivers with lower incomes. Programs that provide funding at the time of purchase, such as vouchers or “point of sale” rebates, reduce the amount that drivers need to bring to the purchase through savings or financing. In contrast, programs that provide funding after the sale of an EV or charger, such as mail-in rebates and tax credits, still require the purchasers to provide the full purchase price in cash or financing and may pose a barrier to drivers with lower incomes.

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<sup>28</sup> 9 V.S.A. § 2653 State standards of weight and measure.

<https://legislature.vermont.gov/statutes/section/09/073/02653>

<sup>29</sup> National Institute of Standards and Technology. 2020. "B. Uniform Regulation for the Method of Sale of Commodities." In NIST Handbook 130 - Uniform Laws and Regulations in the Areas of Legal Metrology and Fuel Quality. <https://www.nist.gov/weights-and-measures/weights-and-measures-publications/handbook-130-current-edition>



When planning for EVs and charging infrastructure, it's important to recognize that different communities may have very different transportation needs that are more or less compatible with EV ownership and different forms of EV charging. People in rural communities often drive long distances for daily activities and have limited access to public transportation services. People in more urban areas may rely less on personal vehicles and be less likely to have access to home charging. It may be valuable to conduct community mobility assessments, or to leverage existing ones, when considering how and where to deploy resources to encourage EV usage.

### Site and Installation Challenges

Significant challenges have been discovered through prior grant rounds issued using VW settlement funds and State capital funds. Those grant agreements, reached in 2020 and 2021, still have many incomplete projects. Two of the locations currently have no site host agreements, with others having changed one or more times. Within the constraints of a one-mile requirement from a designated corridor, this has made the problem of site selection in largely rural Vermont more acute. In those grant agreements, the site host agreements are also not required until grant closeout. This has highlighted the need to be proactive in identifying site hosts (as VTrans has been in releasing its mapping survey), as well as requiring more legwork to be completed upfront to ensure smooth permitting, site evaluation, cost estimating, and general project compliance. Every site funded thus far has also required some level of utility upgrades, again reinforcing the need for evaluating and determining specific sites earlier on in the process.

While some installations were completed months ago, several fast chargers have not yet been energized as of writing because of poor connectivity issues. Efforts to boost wireless signals have failed to produce acceptable results, which may be both a function of the EV charging equipment deployed and rural areas with poor connectivity generally. Although the EV charging provider conducted initial testing of the wireless strength, it is unclear what testing equipment or procedures were used and over what time period. With the NEVI program requiring 97% uptime delivered and an important emphasis on developing a reliable national network, it seems reasonable and more cost-effective to also require that EVSE be hard-wired from the start to provide that consistent connection. Indeed, the EV charging provider has now committed to doing so on all future installations.

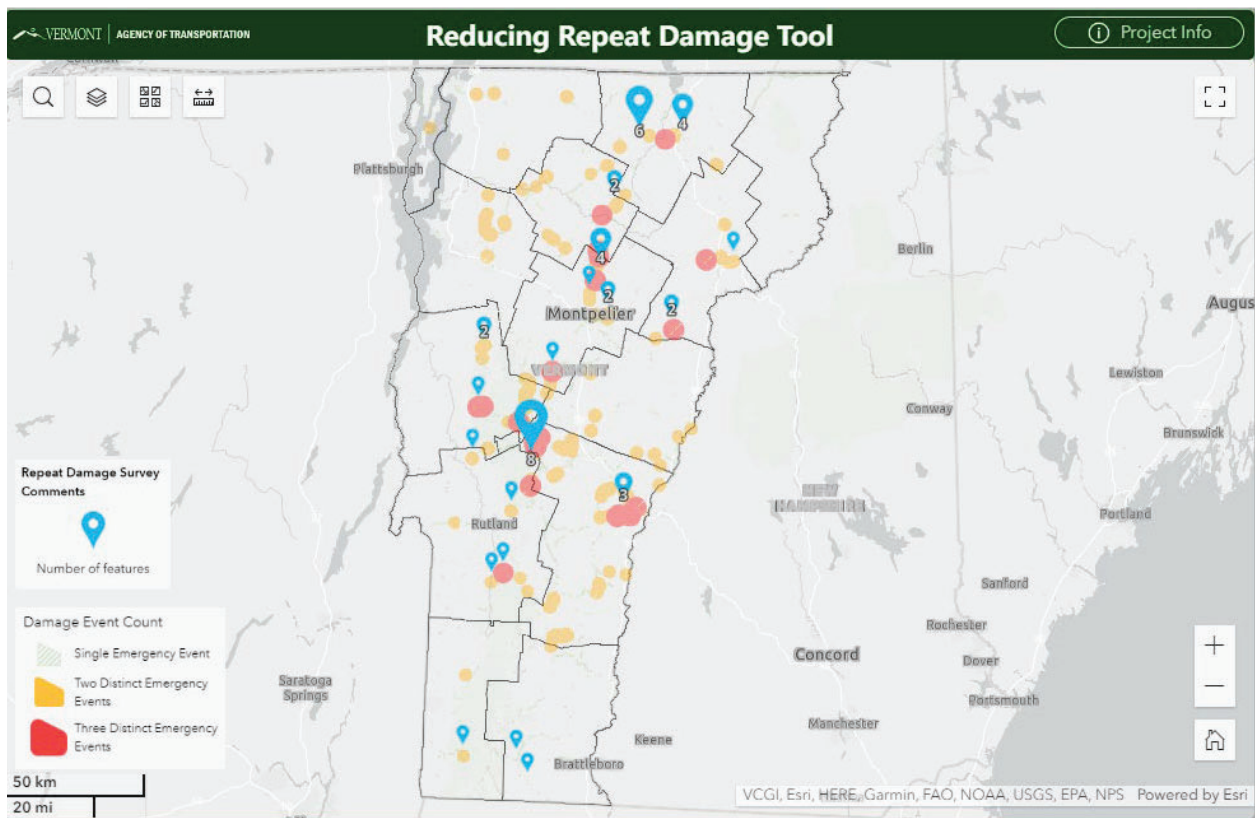
Because every site will likely need electrical upgrades to support the sort of power required for 600 kW locations, let alone the proposed Chargehubs of well over a megawatt, each site and installation is bound to experience delays with transformers, switchgear, etc. in addition to the charging equipment itself because of very long lead times. Add Buy America requirements to the mix as domestic production is trying to catch up with an enormous surge in demand, and it is clear that Vermont, like other states, will have to coordinate closely at the planning stages with its local utilities and others to reduce potential pain points in project schedules. To that end, Green Mountain Power proactively ordered its estimated equipment needs for the proposed NEVI sites a year ago and continues to work collaboratively with the State and other utilities to secure much needed supplies.

Though the State has only a few points of comparison, the contrast between the responsiveness of a local company and slow communication from a large, national provider has been instructive but hopefully not predictive of what's to come. Coordination with local utilities is enormously important for these projects, as is trusted communication with local site hosts. But so, too, are the economics. From the outset of the IJA, VTrans has been concerned that the larger EVSE providers could be less interested in Vermont, leaving more rural, lower demand sites behind in favor of states with larger populations, more urbanized areas and higher travel demand. However, through the State's leadership in transportation electrification, adoption of Advanced Clean Cars II and Advanced Clean Trucks, multiple progressive incentive programs for households, businesses, and organizations required GHG emissions reduction targets, and

additional state-funded investments in community charging access, Vermont should prove to be an attractive location for private investment in EV infrastructure.

The State is painfully aware of the site and installation challenges in Vermont within flood-prone areas. A final assessment of damage to public charging infrastructure in the latest flood event (July 2023) is not yet complete, but there are likely several DC fast chargers and Level 2 chargers which were severely impacted. Sites must not only account for things like charging demand, but also the resiliency of the infrastructure in the face of climate hazards—during extended heat waves or snowstorms or significant flooding events. Siting decisions must consider both the specific designs and potential alternative evacuation routes. The Agency has developed important resources like the Transportation Resiliency Planning Tool and Reducing Repeat Damage Tool (Figure 11) to prepare for higher likelihood of damages due to flooding events, which will help to inform EVSE planning and adapt to more extreme weather events.

Figure 11. Vermont sites incurring repeat damages in emergency events.



### Alternative Fuel Corridor (AFC) Designations

To receive formula funds from the NEVI program, stations must be located along federally designated Alternative Fuel Corridors (AFC) and be built out to a specified degree prior to expanding eligible uses of this funding to other areas beyond these corridors. Since 2016, FHWA has recognized several Vermont AFCs listed in Table 3 and mapped in Figure 12 below. The most recent designations occurred in 2021 and expanded AFC coverage to include US 7 south of Burlington, VT 9 and US 2 east of Montpelier as either corridor-ready or corridor-pending.

Pending corridors were meant to highlight important corridors the State was working to support, but did not yet meet the coverage required at the time of the designation.<sup>30</sup>

In 2016, FHWA designated Vermont’s entire Interstate highway system as alternative fuel corridors for PEVs. These designations were primarily “corridor-ready,” with one segment of “corridor-pending.” At the time of the round one designation, it was acceptable to include Level 2 charging locations for EV corridor designations. This changed in later rounds of the corridor designation process to focus on DCFC. In round 5 of the Alternative Fuel Corridor designation process, Vermont nominated four additional National Highway System routes: US Route 7, US Route 2, US Route 4, and Vermont Route 9.

The State of Vermont has invested over \$3 million of VW settlement, State capital, and transportation funds into public-private partnerships with Blink Charging and Norwich Technologies to build out coverage of DCFC at 17 locations along key travel corridors in the state. These investments are closing gaps in DCFC availability along the existing interstate highway corridor-ready and corridor-pending designations within Vermont such that EV drivers on these designated highways will never be more than 30 miles from a DCFC providing both CHAdeMO and SAE CCS fast charging plugs.

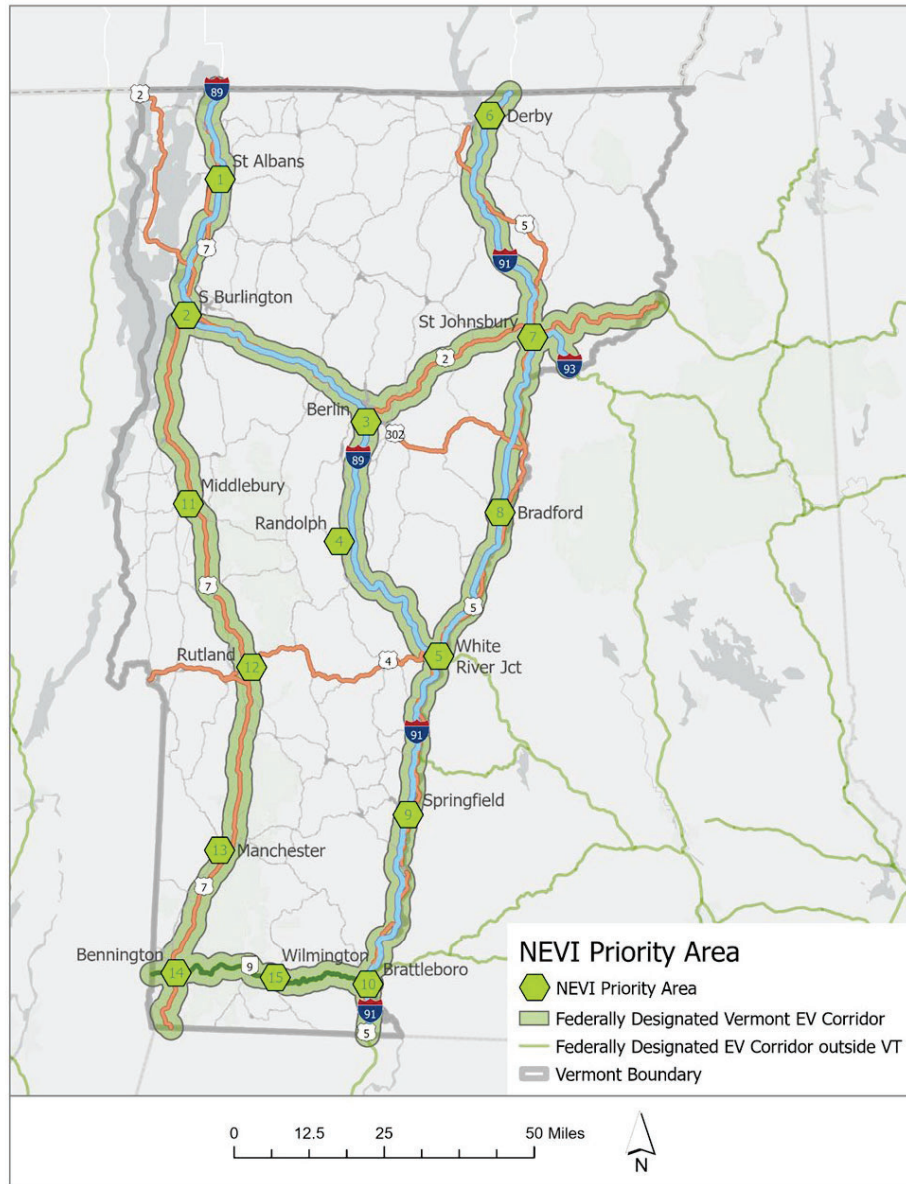
However, none of the projects to date have met what are now the minimum standards for the NEVI Program—at least four ports in a single location capable of charging vehicles simultaneously at 150kW within one mile of the designated AFC. Vermont’s first NEVI plan proposes fifteen (15) locations which would allow the State to approach fully-built-out status and convert all remaining corridor-pending segments to corridor-ready. Further, the State has proposed an additional fourteen (14) locations in its CFI application to build greater redundancy in the network, support local economic development and environmental stewardship of the State’s scenic natural resources.

Table 3. Federally Designated Alternative Fuel EV Corridors in Vermont.

Route	Designation
I-89 from NH border to Quebec border	Corridor-ready
I-91 from MA border to Quebec border	Portions corridor-ready and pending
I-93 from St Johnsbury to NH border	Portions corridor-ready and pending
US 2 from Montpelier to the NH border	Portions corridor-ready and pending
US 7 from MA border to S Burlington	Portions corridor-ready and pending
VT 9 from NH border to NY border	Corridor-ready

<sup>30</sup> Vermont Agency of Transportation. Vermont Receives Federal Designation for Alternative Fuel Corridors. May 2021. <https://vtrans.vermont.gov/sites/aot/files/press-releases/05.19.2020%20-%20Vermont%20Receives%20Federal%20Designation%20for%20Alternative%20Fuel%20Corridors.pdf>

Figure 12. Vermont NEVI Priority Areas



### VTrans Round 7 AFC Designation Nominations

In its round seven nomination for AFC designations, Vermont identified four National Highway System routes within the National Highway Freight Network for the new EV freight designation. Vermont submitted to FHWA its nominations for the first-ever EV freight corridors (VT interstates I-89/189, I-91, and I-93). These routes have already been designated in prior AFC rounds, and by planning and building charging infrastructure for medium- and heavy-duty vehicles along these corridors, they will serve important freight connections across state and national borders into Canada:

- **I-89** – a north-south highway spanning central and northwestern part of VT, connecting NH to Canada.



## EV Charging Infrastructure Deployment

Vermont aims to reach fully built-out status as rapidly as possible, having proposed fifteen (15) locations in the initial NEVI Plan in 2022, fourteen (14) locations in between for the Charging and Fueling Infrastructure Grant Program in June 2023, and now proposes to build out nine (9) areas for chargehub locations in July 2023, sites which will serve electric freight travel and/or greater redundancy in the EVSE network for passenger EVs. It is estimated and hoped that with the combined use of State general funds, remaining VW settlement funds, \$2 million in ARPA funds, \$12.2 million in NEVI funds, and \$13.4 million in CFI funds, VTrans will be able to build out a broad and deep EVSE network detailed below to support greater levels of EV adoption. Other sources of federal funds like the Carbon Reduction Program may also supplement charging infrastructure as necessary. With all funding sources, it is anticipated that the private sector (EV Charging providers) will provide any local match required (20%), although it may be possible for companies to take advantage of the Inflation Reduction Act which renewed the Alternative Fuel Vehicle Refueling Property (EV Charging) Tax Credit.

Figure 14 shows twenty (20) areas prioritized for NEVI (and CFI) investments at which a minimum of 4 CCS ports of 150kW fast charging are proposed to be sited. Once complete, charging should be available within less than 50 miles along all of Vermont’s designated corridors. These areas were selected based on the potential to serve a corridor by upgrading an existing location or one under State contract for construction. The additional areas were selected based on the geographic analysis factors as described in the Appendix: Nine areas are being considered for potential Chargehub sites, to build more redundancy at key NEVI locations along AFCs with up to 8 CCS ports, essentially doubling DCFC infrastructure at these locations. These will likely include multiple 350kW stations which can still can charge two vehicles simultaneously at 175kW if need be.

### Planned Charging Stations

Table 4. NEVI Priority Locations

State EV Charging Location Map ID	Route(s)	Location	Type	Anticipated EV Network	Utility Territory	Status
1	I-89	Swanton	NEVI Standard	TBD	Swanton Electric Dept	To be constructed
2	I-89	St Albans	Chargehub	TBD	Green Mountain Power	To be constructed
3	I-89	Winooski	NEVI Standard	TBD	Green Mountain Power	To be constructed
4	I-89	S Burlington	Chargehub	TBD	Green Mountain Power	To be constructed
5	I-89	Williston	NEVI Standard	TBD	Green Mountain Power	To be constructed

6	I-89	Waterbury	NEVI Standard	TBD	Green Mountain Power	To be constructed
7	I-89	Berlin	Chargehub	TBD	Green Mountain Power	To be constructed
8	I-89	Randolph	NEVI Standard	TBD	Green Mountain Power	To be constructed
9	I-89	Sharon	NEVI Standard	TBD	Green Mountain Power	To be constructed
10	I-89 / I-91	White River Jct	Chargehub	TBD	Green Mountain Power	To be constructed
11	I-91	Derby	Chargehub	Blink	VT Electric Coop	Potential upgrade of current installation
12	I-91	Barton	NEVI Standard	TBD	Barton Electric Dept	To be constructed
13	I-91 / I-93 / US 2	St Johnsbury	Chargehub	Blink	Green Mountain Power	Potential upgrade of current installation
14	I-91	Bradford	NEVI Standard	Norwich EV	Green Mountain Power	Potential upgrade of current installation
15	I-91	Springfield	NEVI Standard	Blink	Green Mountain Power	Potential upgrade of current installation
16	I-91	Putney	NEVI Standard	TBD	Green Mountain Power	To be constructed
17	I-91 / VT 9	Brattleboro	Chargehub	TBD	Green Mountain Power	To be constructed
18	US 2	Lunenburg	NEVI Standard	TBD	Green Mountain Power	To be constructed
19	US 2	Marshfield	NEVI Standard	TBD	Green Mountain Power	To be constructed
20	US 2	Montpelier	NEVI Standard	TBD	Green Mountain Power	To be constructed
21	US 7	S Burlington	NEVI Standard	TBD	Green Mountain Power	To be constructed
22	US 7	Vergennes	NEVI Standard	TBD	Green Mountain Power	To be constructed
23	US 7	Middlebury	NEVI Standard	TBD	Green Mountain Power	To be constructed
24	US 7	Brandon	NEVI Standard	TBD	Green Mountain Power	To be constructed
25	US 7	Rutland	Chargehub	Blink	Green Mountain Power	Potential upgrade of current installation
26	US 7	Danby	NEVI Standard	TBD	Green Mountain Power	To be constructed
27	US 7	Manchester	NEVI Standard	TBD	Green Mountain Power	To be constructed

28	US 7 / VT 9	Bennington	Chargehub	TBD	Green Mountain Power	To be constructed
29	VT 9	Wilmington	NEVI Standard	TBD	Green Mountain Power	To be constructed



Figure 14. Vermont NEVI Priority Areas

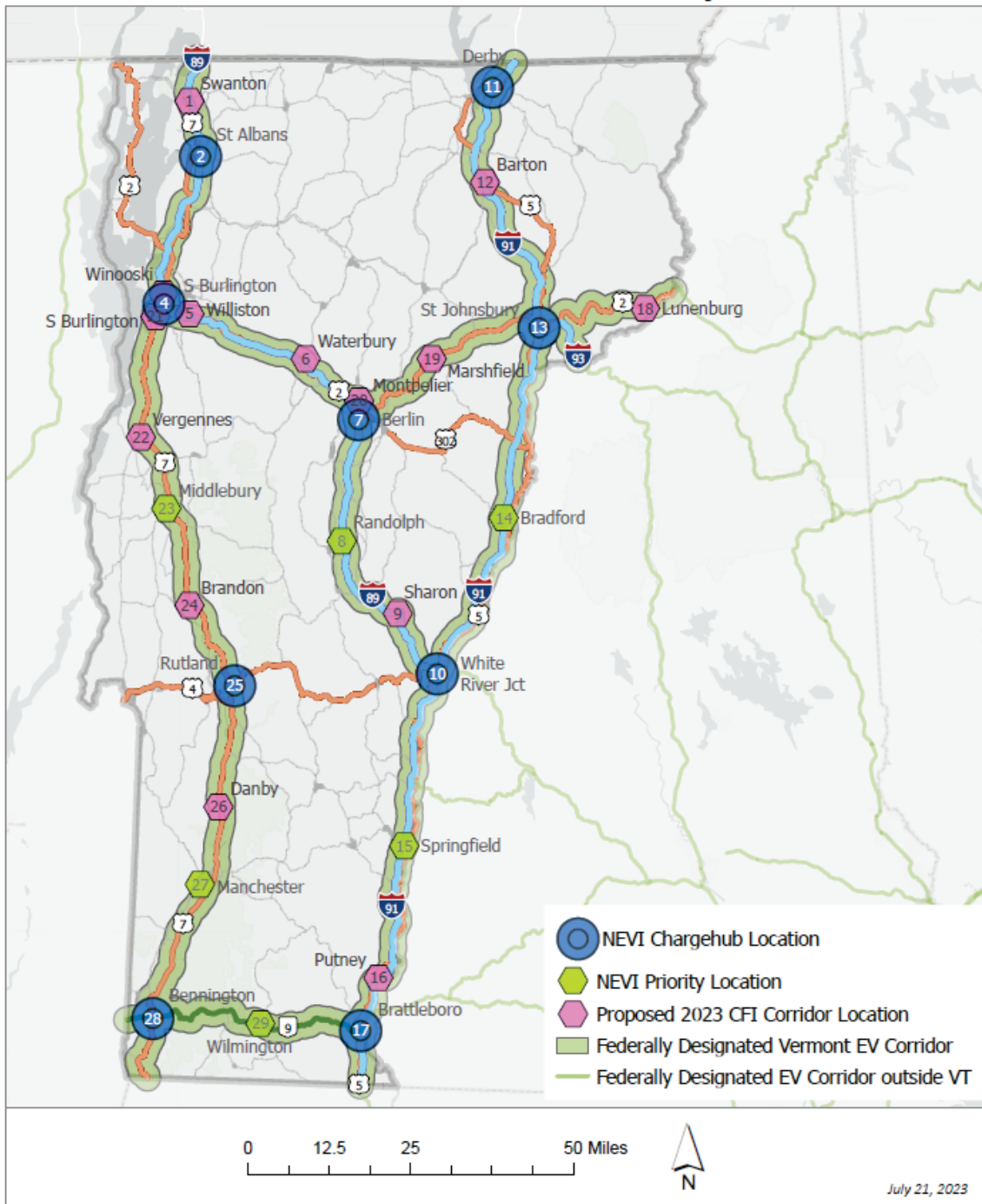


Table 5. Designated Corridor Distances

Corridor	Corridor Mile	Distance from Previous	Location ID	Location	Potential Location Distance to Corridor
<b>I-89</b>	0	0		<i>Vermont – Quebec Border</i>	
	7	7	1	Swanton	< 1 Mile
	17	10	2	St Albans	< 1 Mile
	40	23	3	Winooski	< 1 Mile
	42	2	4	S Burlington	< 1 Mile
	46	4	5	Williston	< 1 Mile
	66	20	6	Waterbury	< 1 Mile
	80	14	7	Berlin	< 1 Mile
	100	20	8	Randolph	< 1 Mile
	117	17	9	Sharon	< 1 Mile
	130	13	10	White River Jct	< 1 Mile
	131	1		<i>Vermont – NH Border</i>	
<b>I-91</b>	0	0		<i>Vermont – Quebec Border</i>	
	5	5	11	Derby	< 1 Mile
	22	17	12	Barton	< 1 Mile
	49	27	13	St Johnsbury	< 1 Mile
	80	31	14	Bradford	< 1 Mile
	107	27	10	White River Jct	< 1 Mile
	136	29	15	Springfield	< 1 Mile
	160	24	16	Putney	< 1 Mile
	169	9	17	Brattleboro	< 1 Mile
	178	9		<i>Vermont – MA Border</i>	
<b>I-93</b>	0	0		<i>Starting junction with I-91</i>	
	0	0	13	St Johnsbury	< 3 Miles
	11	11		<i>Vermont – NH Border</i>	
<b>US 2</b>	0	0		<i>Vermont – NH Border</i>	
	6	6	18	Lunenburg	< 1 Mile
	27	21	13	St Johnsbury	< 1 Mile
	48	21	19	Marshfield	< 1 Mile
	63	15	20	Montpelier	< 1 Mile
	64	1		<i>Corridor End</i>	

<b>US 7</b>	0	0		<i>1-189 Ramp</i>	
	0	0	21	South Burlington	< 1 Mile
	21	21	22	Vergennes	< 1 Mile
	34	13	23	Middlebury	< 1 Mile
	50	16	24	Brandon	< 1 Mile
	64	14	25	Rutland	< 1 Mile
	83	19	26	Danby	< 1 Mile
	96	13	27	Manchester	< 1 Mile
	119	23	28	Bennington	< 1 Mile
	130	11		<i>Vermont – MA Border</i>	
<b>VT 9</b>	0	0		<i>I-91 Interchange</i>	
	0	0	17	Brattleboro	< 1 Mile
	18	18	29	Wilmington	< 1 Mile
	39	21	28	Bennington	< 1 Mile
	43	4		<i>Vermont – NY Border</i>	

### Planning Towards a Fully Built Out Determination

Vermont expects to be able to obtain “fully built-out” status for its corridor network using the first three years of NEVI formula funds, ARPA funds authorized for DC Fast charging along highway corridors, and CFI grant awards. Final project costs are unclear at this point but given increasing electrical equipment costs and the likely need for operating and maintenance assistance for many of the locations with more challenging business cases, it seems clear that they will end up higher than originally estimated. These uncertainties around price make it difficult to project when the initial list of site locations will be built, and how far the remaining NEVI funding might be stretched to meet state goals beyond NEVI requirements.

If timing allows Vermont to certify its corridors as fully built-out, greater flexibility in deploying NEVI funds will be key to delivering greater benefits to disadvantaged and underserved communities as a result of deeper public engagement. As discussed earlier in the plan’s sections on Public Engagement and Equity, while public comments and feedback have informed all aspects of this plan, it is expected that greatest opportunity for public input to shape Vermont’s EV charging landscape is through a deeper engagement over the next year and beyond to determine collective priorities post-certification of Vermont’s fast-charging corridors. Through its most recent transportation bills, Vermont has set even more aggressive goals for its fast-charging (Level 3) corridors: at least one DCFC station within one mile of every exit along the interstates (89, 91, 93), as well as a DCFC station within 25 miles of the next throughout the state highway system. Future NEVI engagements (in FFY23-26) may help to identify additional locations to fund within this framework, or they may point to a wholly new or different set of priorities and goals by which to evaluate potential site locations and configurations.

In any case, Vermont’s prioritization analyses will need to be updated continually, based upon state environmental justice rules and tools currently under development, and as other factors such as EV adoption rates change. Deployment in future years will be guided by NEVI program

requirements, public input and legislative goals, funding availability through overlapping state or federal sources (state transportation fund or the Carbon Reduction Program, for example), but also by evaluating the effectiveness of NEVI and similar investments to help achieve the greenhouse gas emissions reductions targets set by the Biden administration and required by Vermont’s Global Warming Solutions Act.

## Implementation

### Strategies for EVSE Operations & Maintenance

The State of Vermont still does not plan to own, operate or maintain EVSE along highway corridors or other public chargers, other than perhaps workplace stations that may be made available to the public outside of business hours. Prior granting strategies through the State of Vermont interagency workgroup on EVSE have sought proposals from EV charging providers to work with site hosts to install, operate and maintain equipment within general areas of the state where critical gaps have been identified in the public charging network. These grant agreements have been for a duration of five to seven years, with specific performance standards like the 97% uptime requirement already well-aligned with the NEVI guidance.

For example, the State’s most recent agreement with Norwich Technologies clearly defines expectations around operations, maintenance, and customer support services for each site location:

“12. Operations:

- (a) The costs for any fee based EVSE must be easy to understand with fees fully disclosed to the consumer prior to initiation of a charging session.
- (b) Charging stations must include appropriate safety instructions for EV drivers regarding the proper use of the charging equipment.
- (c) Charging stations are required to display real-time operational status on a smartphone application, either through a network-specific application or a third-party aggregator.
- (d) Rate fees must be in kW hour, and clearly displayed at the charging station.

13. Maintenance:

- (a) Ensure maintenance of the chargers including; cables, ancillary equipment, and any awnings, canopies, shelters and information display kiosks for signage associated with the charging station. Equipment shall be kept safe and presentable.
- (b) Charging stations must be operated, maintained, and available year-round 24 hours per day, seven days a week (including snow removal).
- (c) Grantee shall address any issues such as, but not limited to, malfunctions and repairs. The grantee must propose a plan to ensure that the equipment at each EV Charging Station is operational at least 97% of the time based on a week of 24 hours a day and 7 days (no more than 5 hours cumulative downtime in a 7-day period) and include a schedule for regular inspection and maintenance of each charging station and all ancillary equipment. It is the responsibility of the grantee, and any successor-in-interest, to ensure the 97% uptime requirement is met. Any necessary repairs must be completed within 72 hours.
- (d) Grantee shall include a written plan for station maintenance. This plan shall include a description of available technical resources, qualifications of personnel who will assist during maintenance events, expected response times, and any specific, foreseen challenges/barriers to maintenance and to meeting specified uptime requirements. The plan shall also provide a summary of planned maintenance activities by frequency and a communications strategy to keep DHCD informed about operations and maintenance activities. Preventative hardware maintenance and any necessary software upgrades shall be addressed within the proposed plan. Where necessary, the plan should note any special maintenance requirements unique to an individual station.

14. Customer Support Services: Provide customer service support as follows:

- (a) Be available 24 hours a day, seven (7) days per week, via a toll-free telephone number posted on or near the EV Charging Station, that is clearly visible to the customer.
- (b) Provide customer support for the duration of the grant term.
- (c) Resolve customer issues over the telephone, or dispatch service personnel to the host site as needed to

resolve the issue.

(d) Have the ability to perform remote diagnostics and the ability to initiate a charging session remotely (remote start).

(e) Provide customers with immediate assistance.”

Similar language, modified to include other NEVI-specific requirements will be included in future RFPs and contracts. More than the inclusion of language in contracts, however, it will likely be important for the State of Vermont to align payment schedules with performance measures. Particularly for those sites and providers receiving additional operating assistance, new clauses may need to be structured to encourage compliance with these and other expectations.

A couple of areas where there is and may be some divergence among states centers around a discussion of accessibility to charging, both in terms of payment methods and charge port connections. Vermont’s interagency workgroup has historically required debit and credit card swipe and chip reader technology in order to ensure that un- and underbanked Vermonters and those without tap card or mobile payment options are not left behind in the transition to electrify the transportation sector. Likewise, Vermont has a number of Nissan Leaf owners or drivers which it does not want to leave behind, and is exploring a requirement that at least one (possibly lower level) charger is equipped with a CHAdeMO connection along with the required 4 (four) 150+ kW ports. These connections might be later swapped out for NACS connections as the last of those vehicles are phased out. Although these measures might be utilized by but a fraction of travelling public, Vermont recognizes and shares the goal of the NEVI program to provide widespread public charging access to all, regardless of the size of the populations that individual sites or program requirements might serve.

### Strategies for Identifying Electric Vehicle Charger Service Providers and Station Owners

Vermont has worked with a few EV charging providers for its needs already and has had multiple conversations with others throughout the NEVI planning process. In prior rounds for fast-charging corridor grants, the state has awarded a single provider the opportunity to build out the general locations identified. Sites were analyzed for their potential profitability, with more rural sites expected to experience lower utilization. Both lower and higher demand locations were then bundled together to encourage private providers to advance a more equitable distribution of public investments. VTrans anticipates replicating this strategy to some degree while also exploring how qualified providers might be able to propose for selected sites.

Working solely with EV charging providers seemingly has the benefit of simplicity. There could just be one or a few contracts to manage, with all the details spelled out and handled by a third party— negotiations with a site host, parking space configurations, permitting processes, electrical service evaluations, etc. However, in the state’s experience, these are also the kinds of things that can contribute to project delays and last-minute changes which could pose risks to the efficient use of public funds. The issues also inevitably involve state staff to work through the various sticking points towards a resolution.

Through the ongoing online mapping survey issued by VTrans, sites and site hosts can be vetted for their eligibility and ability to effectively carry out aspects of the NEVI program. Sites and site owners can then be matched with qualifying EV providers through the separate bid selection process. Other models may yet emerge through a deeper public engagement process and as strategies are refined in years two through five to reflect lessons learned from the initial rounds of NEVI funding.

### Strategies for EVSE Data Collection & Sharing

Vermont has included requirements for data collection and reporting in its grant agreements with past recipients, and the Department of Public Service has only this year begun receiving quarterly reports from

some of those recipients. These reports are important not only to evaluate individual projects and providers, but also to understand the demand for and performance of the entire fast charging network. The following language has been included in prior State of Vermont agreements:

“Data Capture Requirements: Each EV Charger should have network communications that, at a minimum, provide the following information about each charging transaction, at each location (usage data will be submitted quarterly to the Public Service Department, as defined in Attachment B):

- (a) Charging data such as date and time of usage (start and stop time) and accurate utilization rates.
- (b) Total kWh dispensed and Total kW draw.
- (c) Total revenue collected.
- (d) Pricing Structure.
- (e) Station status and health in real time.
- (f) Number of days station was online and functional.
- (g) Malfunction or operating errors.
- (h) Number of charging sessions.
- (i) Total cost to operate each station.”

The structure of EVSE contracts should encourage compliance with reporting requirements by including annual performance metrics tied to reimbursement. VTrans understands that the Joint Office is working on an EV Charging Analytics and Reporting Tool (EV-ChART) to standardize and streamline the reporting process for states, which should help to build transparency and accountability among EVSE providers across the country. This is an important development that VTrans requested in its first NEVI plan and staff look forward to participating in the pilot program over the next few months.

## Regional Collaboration

In developing the NEVI Plans, Vermont has been in contact with all neighboring states (Massachusetts, New York, and New Hampshire) as well as the province of Quebec to understand how their own EVSE plans might address connections with Vermont’s highway corridors. All states are at varying stages in the development of a NEVI Plan, and all committed to continued coordination around common corridors. VTrans has also participated in multiple multi-state EV planning workgroups, which have provided platforms for bordering and nearby states in the region to exchange information.

Because the State’s existing corridor-ready and -pending segments already represent significant coverage for the State and because none of those segments currently meet NEVI standards, Vermont decided to not nominate any new light-duty corridors.

Vermont and Quebec enjoy an important relationship which results in close collaboration on a number of fronts. While EV charging investments are made by the province’s public utility—Hydro Quebec—these are informed by recommendations developed with the Ministry of Transport. Fast charging stations have recently been installed near the border in Stanstead, where Canadian route 55 runs to I-91, and Vermont has likewise invested in installations in Derby (now online). Future plans will coordinate EVSE deployment along the I-89 corridor up to Canadian Route 133, as well as address the important issues around EV freight travel that will require even more collaboration, power and funding.

## EVSE Siting Considerations

### Site Purpose

EV performance has continued to improve alongside market expansion and auto manufacturer investments. Some new BEV models entering the market have reached parity with the range of ICE vehicles, while PHEVs are able to handle local trips exclusively on battery. Despite this, range anxiety still exists amongst would-be consumers, likely due to the limited infrastructure to support long-range travel. To counter this, guidance for NEVI funds considers a fully developed network to have stations

located within one mile from the Interstate Highway System and highway corridors and spaced no more than fifty miles apart. To meet this goal, stations may be located on public lands, including Federally owned lands.

Expectations for how long EV drivers will remain at a charging station is dependent on host site characteristics. Even host sites with similar purposes may benefit from customer turnover differently; one store may benefit from longer dwell times while others may prioritize customer turnover. As previously discussed, it is important to consider these discrepancies between site hosts and maintain flexibility in siting considerations while incorporating some standards to protect consumers and investments alike. Past grant opportunities from ACCD<sup>33</sup>, for example, required site hosts to agree to at least seven years of operation and maintenance of the station. This ensured site hosts were personally invested in long-term prospects of station viability and planning.

Further NEVI guidance prioritizes buildout in areas that have existing public infrastructure such as restrooms, appropriate lighting, and sheltered areas. The ambiguity in site description encourages diverse candidates to apply for funding while limiting station buildout costs. Moreover, this ensures multiple purposes for station visits and encourages indirect funding opportunities. While the state should allow for this kind of flexibility for site hosts and business models, it also must consider consumer protections against deceptive or fraudulent business practices.

### EVSE Location Planning

Coordinating station rollout with utilities must be considered for how EVSE impacts power supply. Unmanaged or unplanned for EV charging could cause utilities to incur significant costs to maintain grid reliability and create challenges for grid operators. Clusters of high-power stations may also necessitate intensive grid upgrades and buildout. Site planning may incorporate utility management of EV charging resources, particularly during times of peak energy costs. This may take the form of rate designs with obvious price signals to influence charging patterns and behaviors to align with off-peak hours or peak renewable energy generation as suggested by past PUC reports on electric vehicles.<sup>34</sup> Planning with utility partners may streamline permitting and limit project costs and impacts to the energy grid.

Grants offered by ACCD to support EVSE stations have focused on site design. Relevant to siting considerations, supported projects must have at least three dedicated parking spaces for EVs that are always accessible. This exclusivity for EVs is necessary to ensure drivers can refuel their vehicles at the cost of sites with smaller footprints potentially being ineligible for consideration. The addition of EVSE also cannot impede or interfere with the flow of traffic while accommodating for different charging port locations on vehicles.

Both past ACCD grants and NEVI funds include provisions regarding “future proofing” EV charging locations as part of their design. While ACCD has only stipulated designs must incorporate electrical infrastructure accommodations to support future higher capacity chargers, NEVI will only support projects with at least four 150 kW CCS ports that are capable of simultaneous charging. The federal funds also call for design considerations beyond this to support the expansion of higher power chargers, particularly those that may support the needs of future medium- and heavy-duty electric vehicles. The proposed upgrades of active installations is now the first test for the extent of future-proofing work

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<sup>33</sup> Agency of Commerce & Community Development. 2021. Vermont Electric Vehicle Charging Station Grant Program – Round 4. <https://bit.ly/3LEPhXI>.

<sup>34</sup> Public Utilities Commission. 2019. Promoting the Ownership and Use of Electric Vehicles in the State of Vermont. [https://www.driveelectricvt.com/Media/Default/docs/Vermont\\_PUC\\_Electric\\_Vehicle\\_Report\\_June2019.pdf](https://www.driveelectricvt.com/Media/Default/docs/Vermont_PUC_Electric_Vehicle_Report_June2019.pdf)

performed and point to the need for more specificity in defining what is meant by future-proofing and how that should be verified.

### EVSE Infrastructure Resiliency

EVSE resiliency increases as more infrastructure becomes available. With more stations operating across geographies, an outage becomes less impactful as drivers can source from alternative locations. This is supplemented by Vermont's 2032 goal of sourcing 75% of retail electricity sales to be from renewable resources, with at least 10% coming from new facilities on customer sites generating less than 5 MW.<sup>35</sup> A robust network of distributed energy resources and microgrids could limit large-scale grid disruptions and enable faster restoration of services following an outage.

The state has experienced a fair number of severe weather events that have had profound impacts on infrastructure. Hurricane Irene was declared a federal emergency in nearly all counties and left well over 100,000 residents without power, while the Great Ice Storm of 1998 provided constant precipitation for several days. Assessments of the most recent flooding event in June 2023 are still underway, but over 4,000 households are believed to be impacted. These kinds of events are unlikely to be isolated, as Vermont is clearly not immune to impacts from a changing climate, either. Along with warmer average temperatures, the state will experience increased precipitation and greater instability of weather events overall.<sup>36</sup> These factors play into siting and infrastructure considerations for optimal deployment of EVSE.

Operating and maintenance strategies also impact the availability of EVSE infrastructure during and after severe weather events like snowstorms. The State of Vermont uses performance standards within its contracting approach in order to ensure that EVSE providers develop plans (snowplowing and shoveling, for example) for public charging equipment and host sites to be accessible during emergencies and major climate events.

### Cold Weather Resilience

While EV performance is impacted by cold weather, proper weatherproofing protections on charging equipment can insulate against environmental impacts. The National Electrical Manufacturer Association (NEMA) provides standardized ratings for electrical equipment's enclosure capacity to withstand various conditions. For cold climates, EVSE should be NEMA-4 rated to protect internal components against dirt, dust, precipitation, and ice formation.<sup>37</sup> This also protects components from freezing during periods of extreme cold. EVSE should be purchased with reliable weatherproofing certification to protect it from Vermont's environmental conditions.

### Flooding

There are no codes or ordinances that specifically prevent charging infrastructure from being built in areas that may experience flooding, though EVSE is still subject to general development restrictions that may apply to designated floodplains and flood hazard zones.<sup>38</sup> Electric grid infrastructure extensions to an EVSE location would also be regulated by the Vermont Flood Hazard Area & River Corridor Rule.

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<sup>35</sup> Vermont Department of Public Service. Vermont Comprehensive Energy Plan. 2022.

[https://publicservice.vermont.gov/sites/dps/files/documents/2022VermontComprehensiveEnergyPlan\\_0.pdf](https://publicservice.vermont.gov/sites/dps/files/documents/2022VermontComprehensiveEnergyPlan_0.pdf).

<sup>36</sup> Crossett, Caitlin and Mahalia Clark. "Climate Change in Vermont." The Vermont Climate Assessment 2021. Ed. G. L. Galford, J. Faulkner and L. Edling. 2021.

<sup>37</sup> National Electrical Manufacturer Association. NEMA Ratings for Enclosures. 2016.

<https://www.nemaenclosures.com/enclosure-ratings/nema-rated-enclosures.html>.

<sup>38</sup> Vermont Agency of Natural Resources. Flood Hazard Area and River Corridor Protection Procedure. 2017.

[https://dec.vermont.gov/sites/dec/files/documents/DEC\\_FHARCP\\_Procedure.pdf](https://dec.vermont.gov/sites/dec/files/documents/DEC_FHARCP_Procedure.pdf).



Additionally, development that occurs within a “base flood” zone that has a 1% chance of occurring each year falls under requirements set by the National Flood Insurance Program (NFIP).<sup>39</sup> NFIP requires methods for minimizing damage from floods, such as preventing water from entering or accumulating in equipment and resisting flood damage. These measures are typically achieved through raising the equipment above the base flood elevation to the greatest extent possible and protecting components that are below from water damage. While charging equipment is engineered to be safe in wet conditions, areas that are prone to flooding should be avoided. Anticipated impacts of a changing climate should also be considered when siting charging stations. The Transportation Resilience Planning Tool will aid VTrans in identifying the potential degree of risk at particular sites or along specific corridors.

## Power Outages

In 2021, Green Mountain Power and Vermont Electric Co-op reported average outage durations of approximately 2.5 and 1.5 hours, respectively.<sup>40</sup> Interruptions were limited as well, averaging between 1-2 outages experienced throughout the year for customers. These numbers align with historical averages, and along with the aforementioned renewable generation goals, this suggests Vermont is well suited to supply reliable power to EVSE stations.

For instances where reliability is a must, such as along evacuation routes, charging equipment can be supplemented with energy storage technologies. Incorporating batteries as part of a charging solution will also aid in load shedding and shifting during peak times, avoiding significant demand charges for operators. However, the rated power capacity of the battery must be considered to fit the maximum potential electrical output of the charging station. For emergency situations, having a backup diesel powered generator is an option as well.

This also speaks to the need for redundancy in charging network buildout. Similar to how multiple gas stations are available where permitted, multiple options for vehicle charging should be made available along high traffic corridors. Redundancy has remained a priority for the Vermont Legislature as exemplified in recent rounds of funding to support DCFC stations along high use areas on highway corridors.<sup>41</sup> With greater access of charging stations across the state, power interruptions become less detrimental to electric vehicle drivers. Along with this, the State will develop plans for how an electric vehicle charging network can be supported through varying degrees of outages. Responses and support will vary depending on if the outage is an hour, day, week, or whether it is localized or statewide. Proactive planning for different scenarios will allow the State to remain prepared under any condition.

## Emergency Response

With appropriate protections and planning as noted above, Vermont will be well suited to respond to emergency situations with an electrified transportation sector. In scenarios where power won't be restored for an extended period of time, several options exist. Co-located power generation, storage and EVSE are a resilient option if islanded from the rest of the grid. Charging equipment manufacturers have introduced mobile EVSE trailers that can be deployed in emergency scenarios, some of which have the capacity for DCFC ports. Alternatively, mobile backup generators can be deployed to power EVSE if sites are designed with pre-planned interconnections and space for the generator. As a final consideration, Level 2

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<sup>39</sup> State of Vermont. Flood Ready Vermont.

[https://floodready.vermont.gov/flood\\_protection/river\\_corridors\\_floodplains/floodplains](https://floodready.vermont.gov/flood_protection/river_corridors_floodplains/floodplains).

<sup>40</sup> U.S. Energy Information Administration. Electric Power Annual. 2021. <https://www.eia.gov/electricity/annual/>.

<sup>41</sup> Vermont Agency of Commerce and Community Development. Electric Vehicle Supply Equipment (EVSE) Grant Program. 2021. <https://accd.vermont.gov/community-development/funding-incentives/electric-vehicle-supply-equipment-evse-grant-program>.

chargers should be installed near evacuation shelters or hotels. This will shift demand from vehicles relying on DCFC while driving to areas that can be charged overnight.

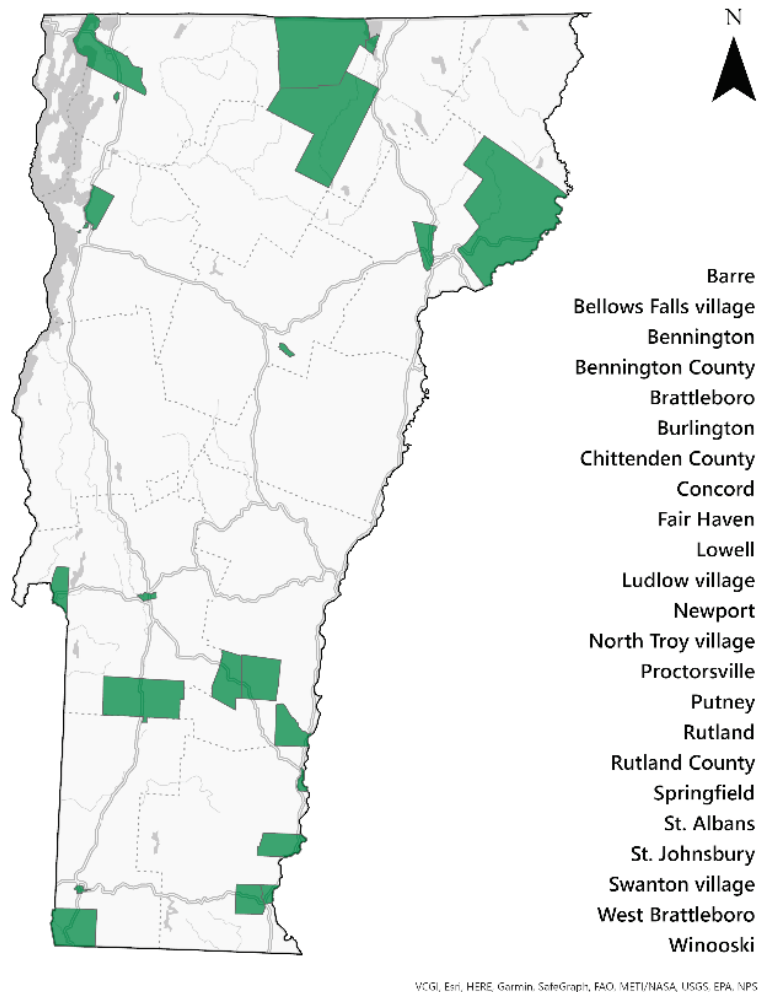
First responders are also gaining access to electric options. In 2020, the Windham County Sheriff's Office received a Tesla Model 3 to pilot as a replacement for several end-of-life vehicles and is expected to deliver cost savings to the department. Electric emergency response vehicles are being tested in other states as well. Electric vehicle manufactures Lightning eMotors and REV Group, Inc. announced the co-development of an electric ambulance with units delivered to the American Medical Response and U.S. General Services Administration in late 2021. In 2020, the Los Angeles City Fire Department signed a contract to receive the first plug-in hybrid electric fire truck in North America, while the Mesa Fire and Medical Department in Mesa, AZ has coordinated with REV Group to receive a battery electric fire truck in 2022. As this market develops, emergency responders should ensure EVSE at facilities can operate reliably regardless of environmental factors.

## Equity Considerations

### **Identification and Outreach to Disadvantaged Communities (DACs) in the State**

Figure 15 displays disadvantaged communities (DACs) in Vermont as defined in NEVI guidance as part of the Justice40 initiative. The Initiative, established under Executive Order 14008, sets a goal of directing at least 40 percent of overall benefits from certain federal investments toward DACs. DOT and DOE combined definitions of DACs to produce data relevant to NEVI funding to highlight energy and transportation-burdened communities, those facing high rates of pollution or are highly dependent of fossil energy sources, and those with high rates of social vulnerability. FHWA dictates that 40 percent of all charging infrastructure funded by NEVI does not have to be distributed to DACs, rather states must ensure a magnitude of benefits flow into these communities. This may take place through access to resources, reduced energy burden, increased penetration of renewable energy resources, or reduced vulnerability through jobs or transportation security.

Figure 15. Disadvantaged communities in Vermont.



VEIC is working with VTrans to engage several DACs on transportation electrification issues more broadly to better understand barriers to EV use, including affordability of vehicles, awareness of incentives, charging infrastructure and other related factors.

Activities in this initial pilot are focused on Swanton, St Albans, Enosburg, Rutland and Brattleboro. This work is expected to continue over a multi-year period and will expand to additional communities in the future.

### **Process to Identify, Quantify, and Measure Benefits to DACs**

Pollution resulting from the transportation and energy sectors have been disproportionately borne by disadvantaged, low-income, and otherwise underserved communities<sup>42</sup>. Further, these populations have historically been excluded from the benefits of clean market transitions. Considerations for developing the EVSE network must be made regarding siting, distribution,

<sup>42</sup> Huether, Peter. 2021. Siting Electric Vehicle Supply Equipment (EVSE) with Equity in Mind. [www.aceee.org/white-paper/2021/03/siting-electric-vehiclesupply-equipment-evse-equity-mind](http://www.aceee.org/white-paper/2021/03/siting-electric-vehiclesupply-equipment-evse-equity-mind).

access, and affordability across all demographics. It is important to note that, as many EV drivers charge at home, those that will be utilizing the public network the most are those that do not have access to private charging infrastructure. Given the cheaper relative cost of at home charging, particularly when taking advantage of time-of-use rates offered by utilities, public chargers will be more expensive to construct, own, and operate. These costs will be passed down to consumers to ensure station viability, in turn harming those most susceptible to economic hardship.

Lower income and multifamily households are at a disadvantage due to this higher cost of public charging. Costs vary for public Level 2 and DCFC stations in Vermont but it is common for fast charging cost double or more for the same kWh of energy compared to home rates, especially if the driver is on one of the off-peak rates offered by several Vermont electric utilities. In some cases those reliant on the public charging network must pay five times more to refuel an electric vehicle than those that have access to home charging. Multifamily households are disproportionately burdened by this and must contend with parking availability and inability to connect the vehicle to their metered electric service. Without this, and without a strongly built-out EVSE network, multifamily households are barred from the benefits EVs can provide.

Rural stations present a competing challenge of lower utilization with higher vehicle miles traveled per capita<sup>43</sup>. These stations may also see a greater ebb and flow of utilization in areas with high tourism traffic, impacting demand charges levied on station owner-operators. Moreover, many areas in rural Vermont do not yet have the electrical infrastructure capacity to support DCFC, adding to upfront project costs. Without these populations included in the market transition however, Vermont will be unable to achieve carbon reduction goals.

The NEVI charging location prioritization process developed in Vermont's initial 2022 NEVI plan is detailed in Appendix A and included detailed consideration of income, race and other factors associated with disadvantaged communities in the state. As the State's recently enacted environmental justice policy is implemented VTrans will consider updates to the location prioritization and EV charging policy goals to reflect learnings from this work.

### Benefits to DACs through this Plan

Some of these challenges may be addressed through policy and program design. Presently, the State of Vermont ACCD is issuing grants that prioritize EVSE projects located in affordable multifamily building complexes. The State will continue to design equity considerations into grant funding to uplift those who would benefit most from accessible and affordable charging. As upfront costs are offset, fewer costs must be passed down to the consumer. The State can design consumer protections into grants that are subsidizing costs to projects designed to benefit low-income and otherwise disadvantaged families. In particular, VTrans is interested in exploring the ability of EV charging providers to charge discounted public charging rates for households with lower incomes, with reimbursement for annual operating and maintenance costs potentially tied to the total amount of subsidy provided to Vermont customers. This will in turn expand access to electric vehicles for these populations to benefit from clean technologies while home charging access remains out of reach. Additionally, the inclusion of EV make-ready infrastructure as part of new multifamily building codes will be a driver of lower costs and a means to reduce state funding for charging stations.

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<sup>43</sup> U.S. DOT. 2022. Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure. <https://www.transportation.gov/rural/ev/toolkit>

Engagement with rural residents will be critical to best understand needs and determine desirable locations for stations to be sited. While rural stations will be more dependent on public funding sources, the State can help encourage investments in rural and underserved areas through policy measures such as working with utility stakeholders, businesses and other organizations to further encourage investments. Additionally, the U.S. Department of Transportation has developed a Rural EV Funding Matrix<sup>44</sup> to help support states grow EVSE networks in rural areas.

The State of Vermont passed Act 154 in 2022 establishing a new state policy to advance environmental justice in disadvantaged communities, including development of mapping tools and engagement strategies to support this work.<sup>45</sup> Future iterations of this plan will consider new resources to identify DACs and consider associated EV charging needs and investments.

## Labor and Workforce Considerations

Vermont recognizes that the NEVI Program established by the Infrastructure Investment and Jobs Act (IIJ) aims to create not just better infrastructure, but better jobs, too. Labor and workforce considerations are thus closely tied to Civil Rights and Equity Considerations, as this unprecedented funding poses a unique opportunity to encourage and develop a more diverse workforce to participate in state projects. The Agency has recruited 18 -20 participants annually for its On-the-Job Training (OJT) Program through career fairs and other strategies found in its guide *Hiring and Retaining a Diverse Workforce* (2022).

VTrans will follow existing processes to ensure that the NEVI program, like other projects subject to Davis-Bacon rules, is providing Vermont's workforce with good wages. The State intends to work with VEIC, industry partners, labor groups and workforce development staff to support a diverse, and well-trained group of local tradespeople who can install and maintain EVSE. Just as an expected shortage of Buy America-compliant charging equipment will likely result in costly delays, it could also be the case that a shortage of qualified electricians and other tradespeople would compound the problem and further delay implementation.

Beyond growing a more diverse and fairly compensated workforce, state efforts should encourage the safe, professional installation and maintenance of EVSE so that State and federal investments function as intended. In discussions with representatives for the IBEW Local 300, the union has proactively signed up their membership to complete the Electric Vehicle Infrastructure Training Program (EVITP) to prepare for working on NEVI projects.

In compliance with [23 CFR 680.106\(j\)](#) to ensure that the installation and maintenance of chargers is performed safely by a qualified and increasingly diverse workforce of licensed technicians and other laborers, all electricians installing, operating, or maintaining Electric Vehicle Supply Equipment must receive certification from the Electric Vehicle Infrastructure Training Program (EVITP) or a registered apprenticeship program for electricians that includes charger-specific training developed as part of a national guideline standard approved by the Department of Labor in consultation with the Department of Transportation, if and when such programs are approved.

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<sup>44</sup> U.S. Dot. 2022. Rural EV Funding Matrix. <https://www.transportation.gov/rural/ev/toolkit/ev-infrastructure-funding-and-financing/funding-matrix>

<sup>45</sup> Vermont General Assembly. Act 154 – An act relating to environmental justice in Vermont. May 2022. <https://legislature.vermont.gov/bill/status/2022/S.148>

VTrans has met with statewide workforce development partners including the Vermont Department of Labor, the Vermont Training Program within the Vermont Department of Economic Development, and the Vermont State University (formerly the Vermont State Colleges System) workforce division to build out ideas on how to best support the EV career path from within our programs and most effectively deploy our various funding sources. The Agency will continue to meet and work with partners to identify workforce needs and gaps, with a decided emphasis on growing work opportunities for women and people of color.

## Physical Security & Cybersecurity

Understanding the potential risks to public infrastructure and the people it serves, Vermont takes cybersecurity and privacy seriously and has longstanding policies that all agencies and their contracts must follow. Vendors with the State of Vermont must certify their compliance with all of the State's [Cybersecurity Standards and Directives](#). Contracts involving any IT-related concerns must be reviewed by the Agency of Digital Services and include an Attachment D: *Information Technology System Implementation Terms and Conditions*. Although prior grant agreements executed by Vermont's Department of Housing and Community Development do not contain this attachment or provisions specifying cybersecurity responsibilities, it is expected that NEVI-funded contracts may be subject to this additional review and contracted third parties will be responsible (as with other NEVI program guidance and proposed rules) for compliance with these terms and conditions.

## Program Evaluation

The State of Vermont has required past funding recipients to collect data and report on a number of performance measures incorporated into their grant agreements. The Department of Public Service had been designated the point of contact and is only now beginning to receive those submissions as EVSE come online. As this data is critical for program evaluation purposes and continual improvement, reimbursement will be structured to ensure timely reporting. Data submissions to DPS have varied in format and frequency, which should now be facilitated by the EV-ChART reporting tool. To the extent that VTrans may be able to encourage existing station owners to participate, VTrans could use the data both to analyze possible greenhouse gas emissions reductions attributable to the infrastructure and to shape future rounds of investment.

Performance measures already exist for the charging stations and locations themselves, but there would be nothing to measure until the first units become operational. Thus, VTrans will develop a new set of measures to understand how well the Agency is performing, tracking the time it takes for elements of the process to be delivered, the costs of contracts executed, and so on. Although many factors play a role in EV adoption, a clear measure for whether policies and investments are working is the number of plug-in electric vehicles registered in the State of Vermont, data measured on a quarterly basis. Lastly, public engagement can be both a measure to track the Agency's progress in reaching or involving more Vermonters in overburdened, disadvantaged, or underserved populations, but also a source of important data points to reflect upon and help refine strategies to deploy more EV charging investments. VTrans is eager to dive into the work ahead.

# Appendix A: Supporting Materials

## 2022 Vermont NEVI Plan Location Prioritization

Vermont's initial NEVI plan completed in 2022 included a detailed geographic analysis to prioritize potential locations for NEVI-compliant fast charging. The text below summarizes some of the key factors considered in this prioritization.

Figure 16 below summarizes general availability of three-phase power across the State by dividing Vermont into 800-meter radius hexagonal grid cells. This unit of analysis was selected to offer localized analysis at a manageable scale as it was not feasible to perform site visits or grid assessments for thousands of potential individual locations. The presence of three-phase power is generally regarded as a baseline requirement for installing four 150kW DCFC. The State will work with electric utilities, contractors, potential site hosts and other stakeholders as specific locations are identified and supported through NEVI funding.

Figure 16. Three-Phase Power Availability along Corridors

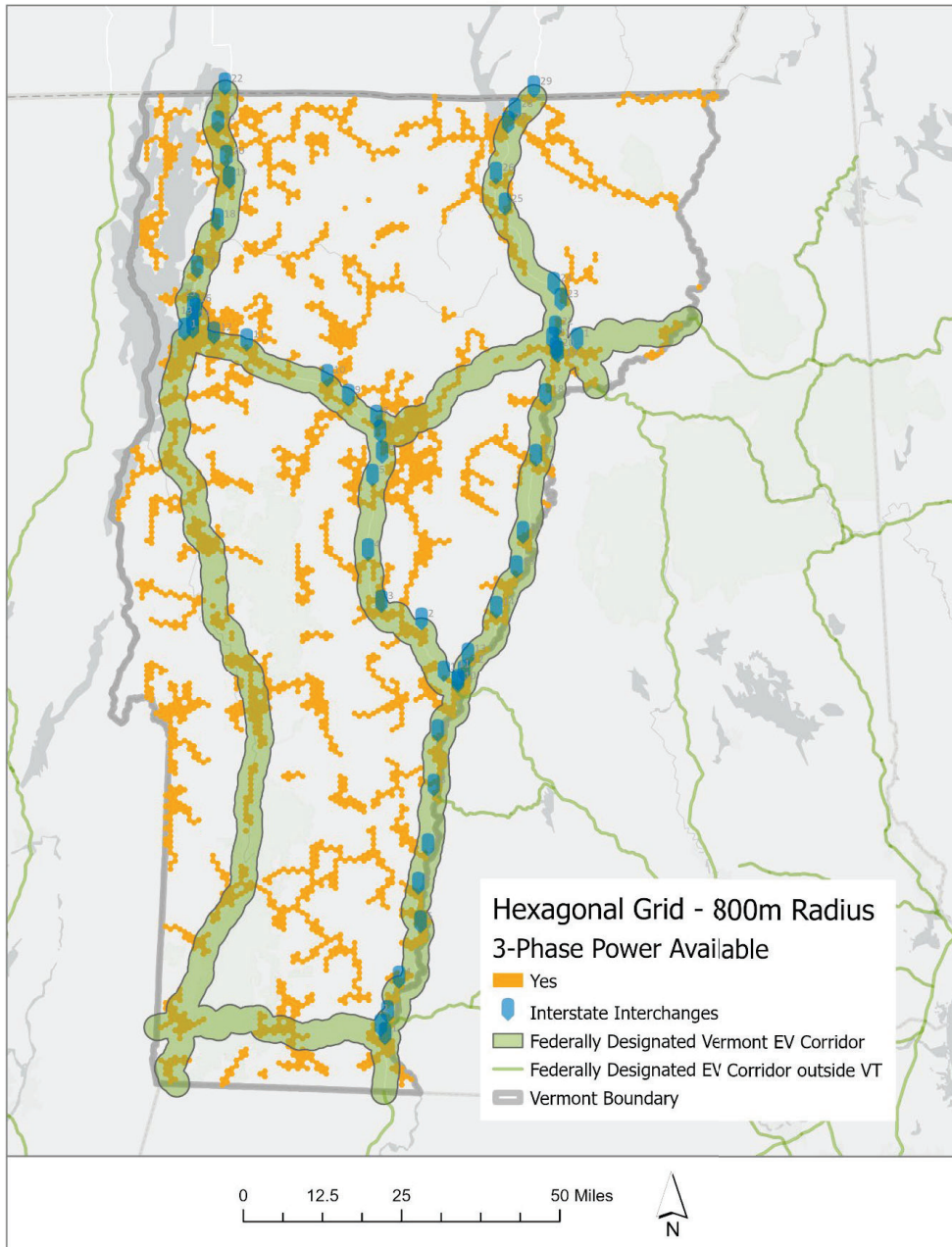
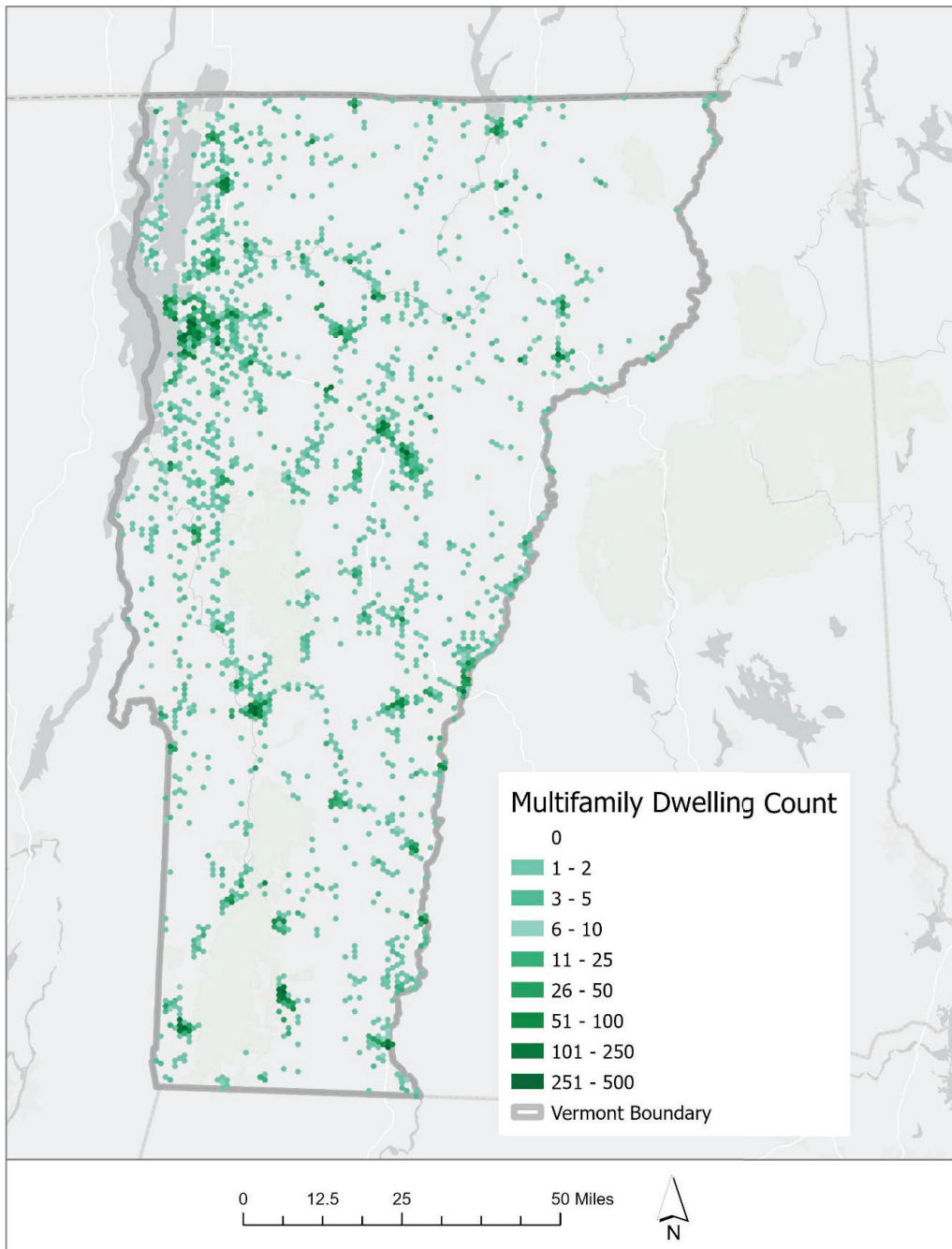




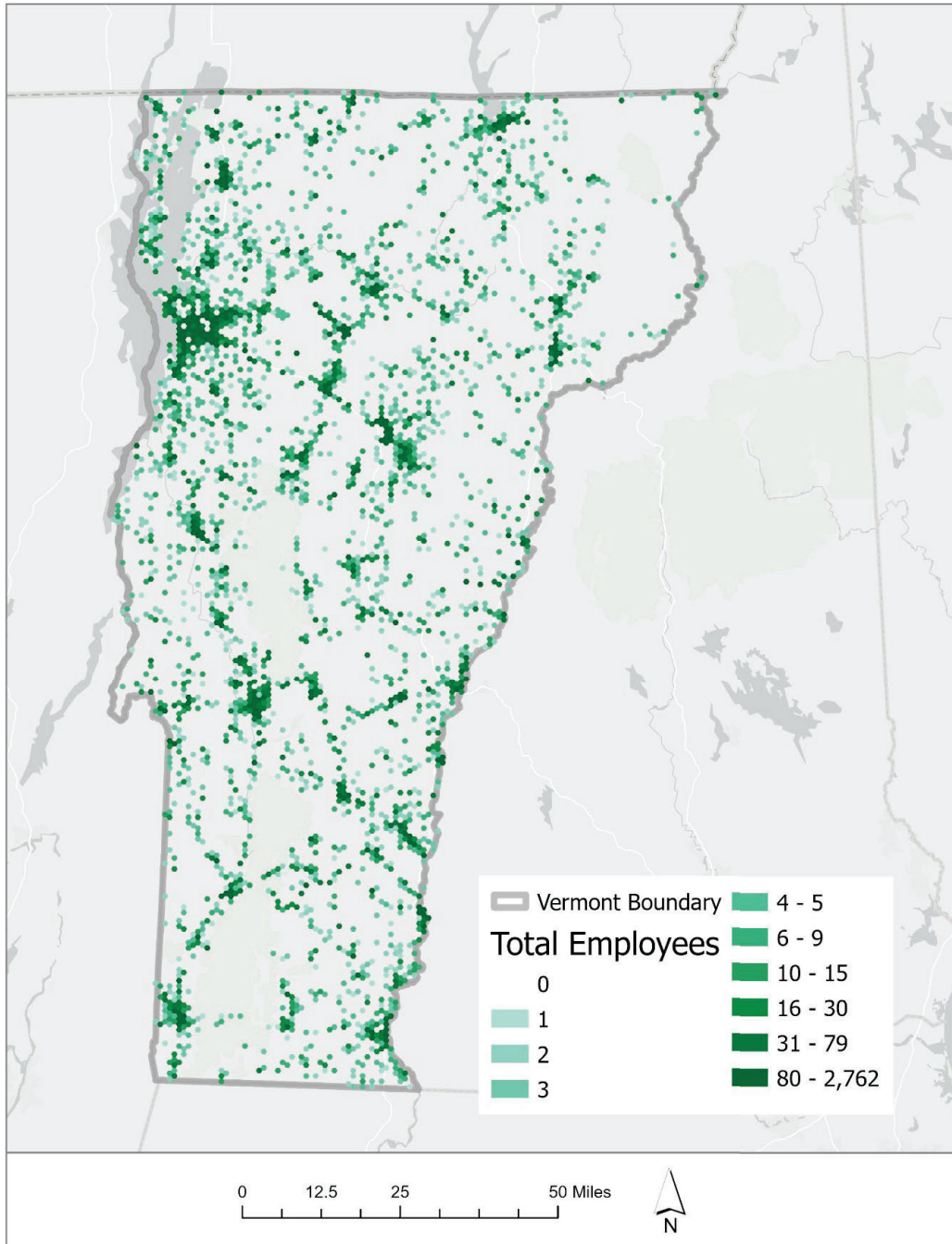
Figure 17 below assigned multifamily housing dwelling counts identified in the State of Vermont's enhanced 911 structures database to the same 800-meter hexagonal grid cells. Multifamily housing residents frequently have greater barriers to installing EV charging at home, particularly if they are renting as is often the case with multifamily housing. The statewide prioritization took this into account by assigning a higher score to areas with higher concentrations of multifamily housing.

Figure 17. Multifamily Dwelling Locations



Local employment is also an important consideration siting charging infrastructure, both to serve employee and customer transportation needs. Figure 18 below shows total employment estimates by 800 m grid cell. Additional weight was given to locations with retail employment, including convenience stores, as they are more likely to offer goods and services desired by travelers.

Figure 18. Employment Locations



Income and race are closely tied to disadvantaged and underserved areas that may require additional support to ensure equitable access to charging infrastructure. Figure 19 below assigns Federal Financial Institutions Examination Council (FFIEC) 2020 income categories by Census Tract to grid cells. Additional information on the FFIEC methodology and classifications is available at the reference footnote below.<sup>46</sup> Low-income cells were assigned a score of 1, moderate income 0.5, and middle income 0.25. Upper income cells were excluded from scoring for this factor.

Figure 19. Census Tract Income Categories

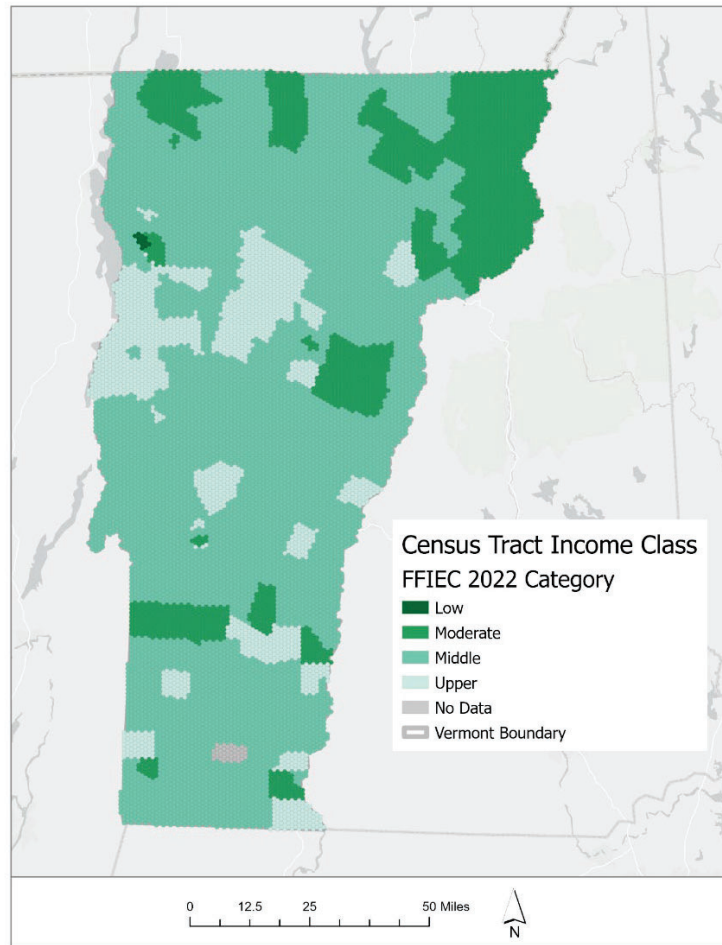


Figure 20 following presents a composite score for the number of non-white residents in each grid cell by apportioning 2020 US Census data at the block level to grid cells (which were generally smaller). The apportionment was weighted by the count of dwelling units in each grid cell. The BIPOC score was based on the square root of the estimated number of non-white residents in the grid cell divided by the square root of the maximum number across all cells in the state to better isolate areas with higher shares of non-white population.

<sup>46</sup> FFIEC. FFIEC Census Flat Files. April 2022. <https://www.ffiec.gov/censusapp.htm>

Figure 20. Black, Indigenous and People of Color Population Score

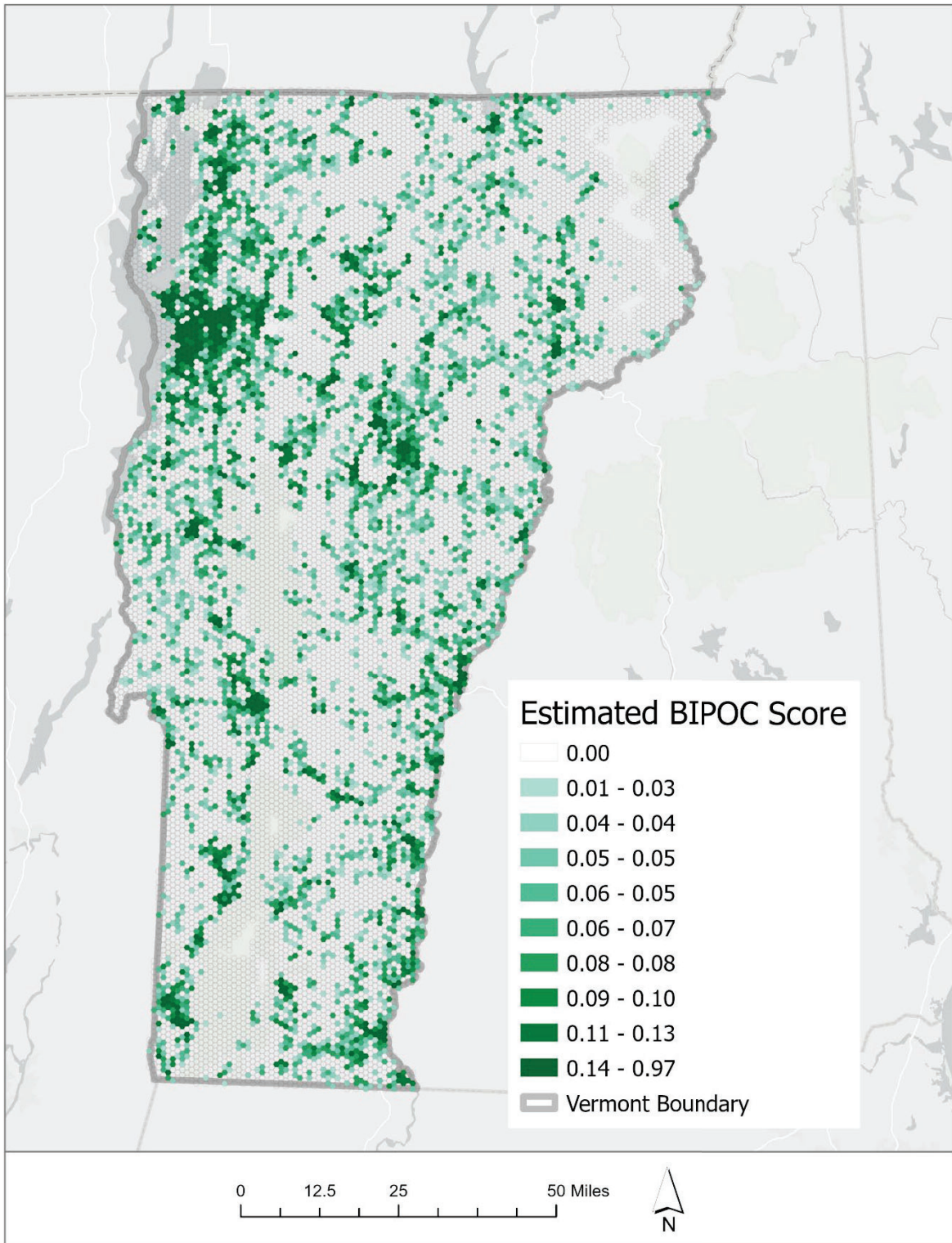


Figure 21 below identifies grid cells along roadways within 1 mile of a federally designated EV corridor, either within 1 mile of an interstate interchange, or 1 mile of a non-limited access highway.

Figure 21. Proximity to Federally Designated EV Corridor

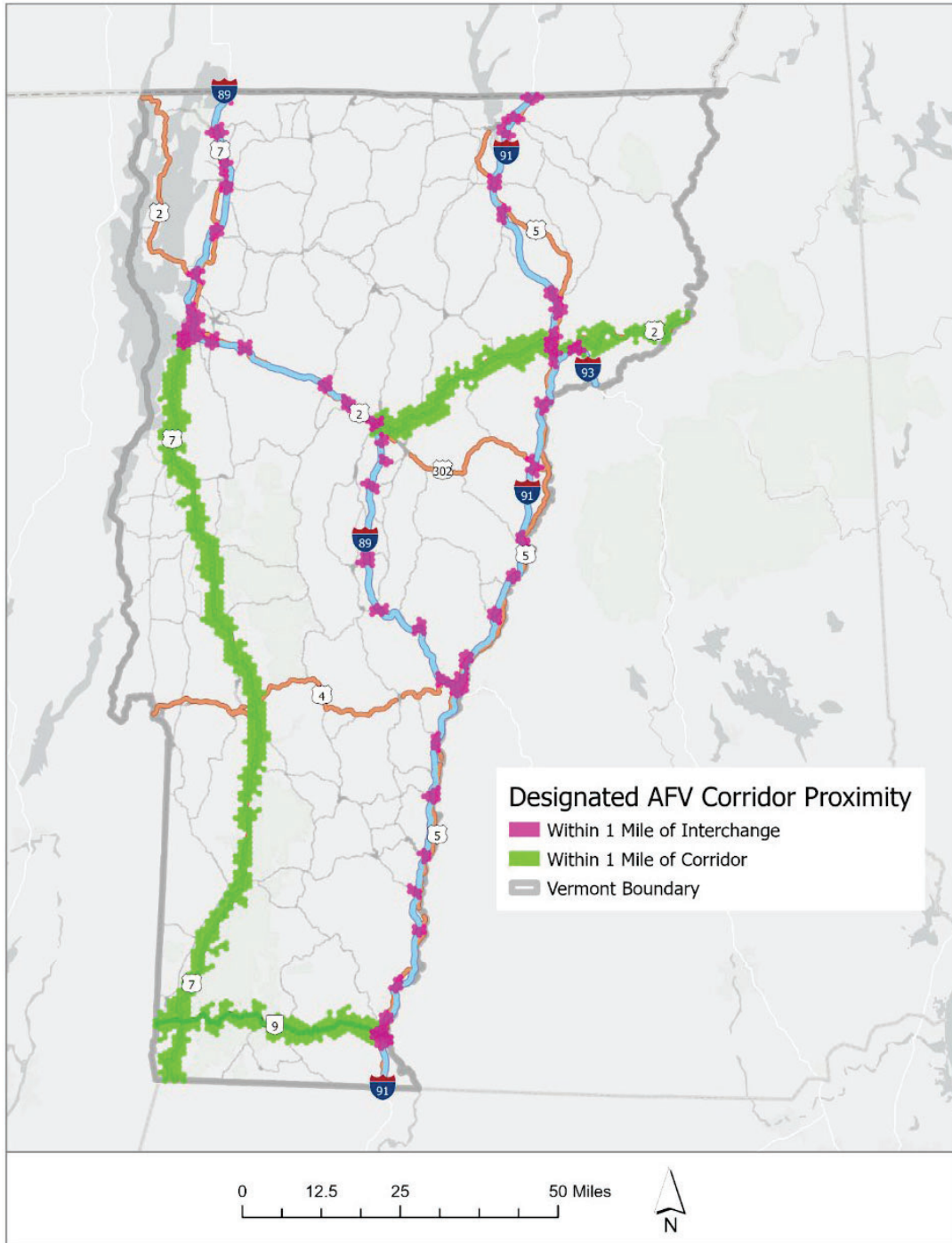


Figure 22 below summarizes the prioritization results for this initial EV charging deployment plan. The prioritization was limited to grid cells within 1 mile of corridors and offering 3-phase power. Additional prioritization factors were then normalized and combined to arrive at a single composite score. This prioritization was used to inform the plan recommendations in the following section and will be refined in future EV planning efforts as Vermont’s corridors are built-out to the federally required standards and the State gains greater flexibility on charging investments.

Figure 22. Initial EV Charging Location Prioritization Score

