

# Corridor EV Charging Infrastructure in Vermont

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PRESENTATION FOR SENATE TRANSPORTATION COMMITTEE, FEBRUARY 1, 2023

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# CAP – Pathway 1 – Light Duty Electrification Strategies

- 1) Technology Forcing ZEV Regulation (100% by 2035)
- 2) EV Purchase Incentives
  - a) New & used EVs and electric bicycles, designed for equity
  - b) Expand to fleets
  - c) Continue MileageSmart and Replace Your Ride
  - d) Vehicle Efficiency Purchase and Use Tax Adjustment
- 3) EV Charging Investment
  - a) Continue support for DCFC and Level 2
  - b) Public, workplace and multifamily priorities
  - c) Direct the PUC to consider EV charging rates
- 4) Transportation Climate Initiative (TCI)
- 5) EV and VMT reduction Outreach and Education

27,000 PEVs by 2025  
126,000 by 2030

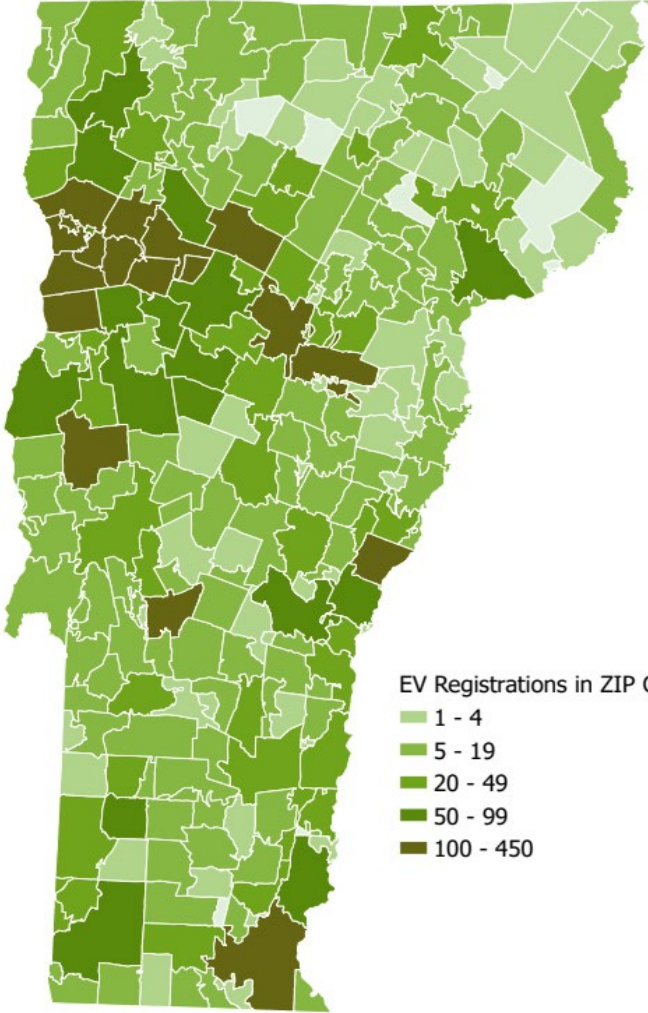
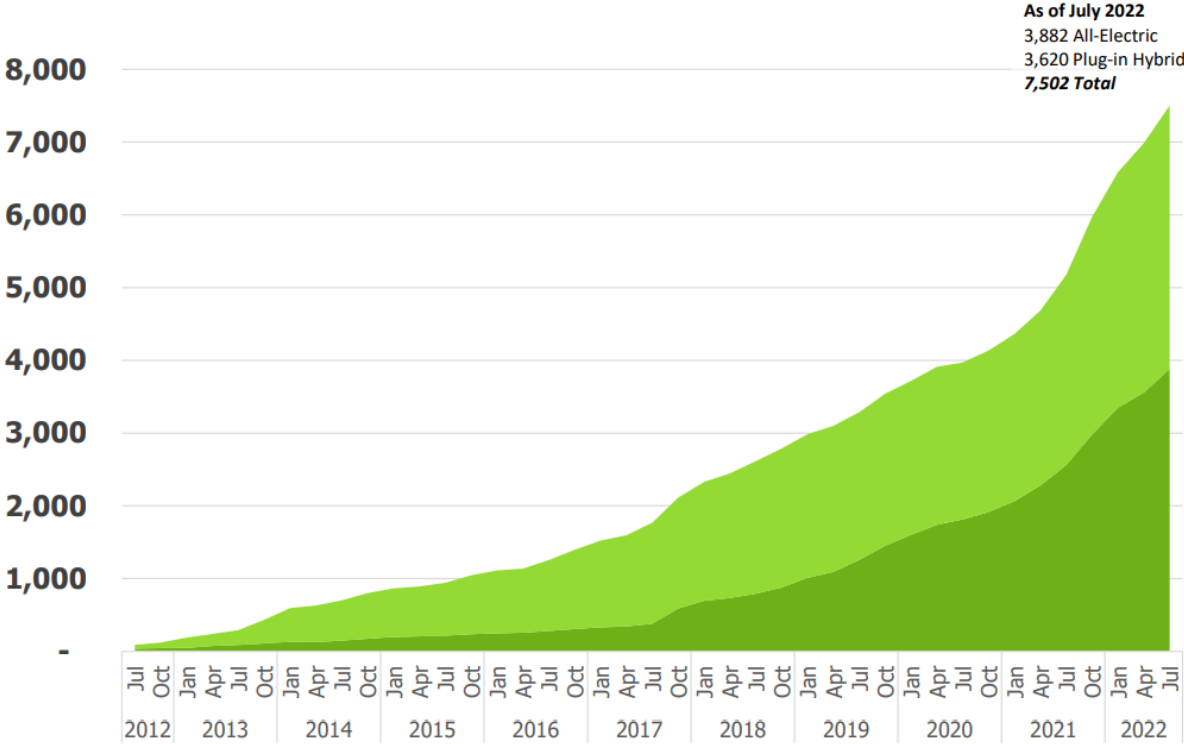
INITIAL VERMONT CLIMATE  
ACTION PLAN

Vermont Climate Council  
DECEMBER 2021

# EV Adoption in Vermont

## Vermont Electric Vehicle Registrations

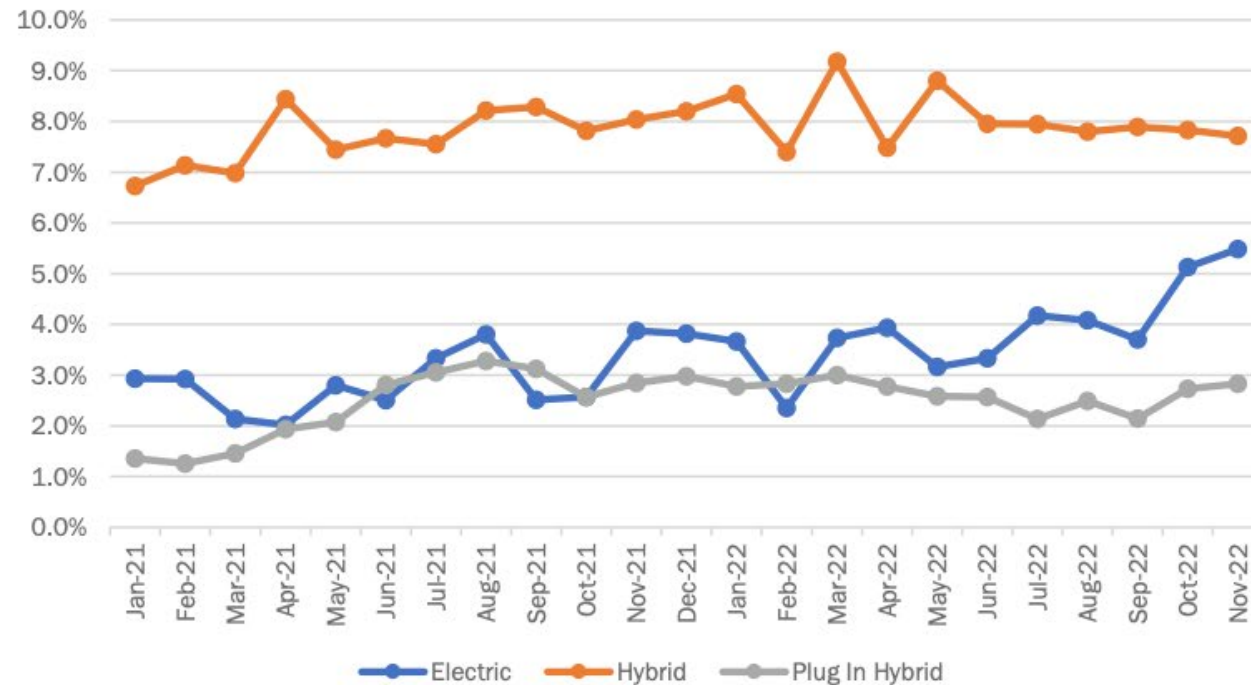
■ All-Electric Vehicles   ■ Plug-in Hybrid Electric Vehicles



# EV Adoption in Vermont

## HYBRID AND ELECTRIC VEHICLES

**Estimated Alternative Powertrain Market Share  
(includes hybrid and electric vehicles)**



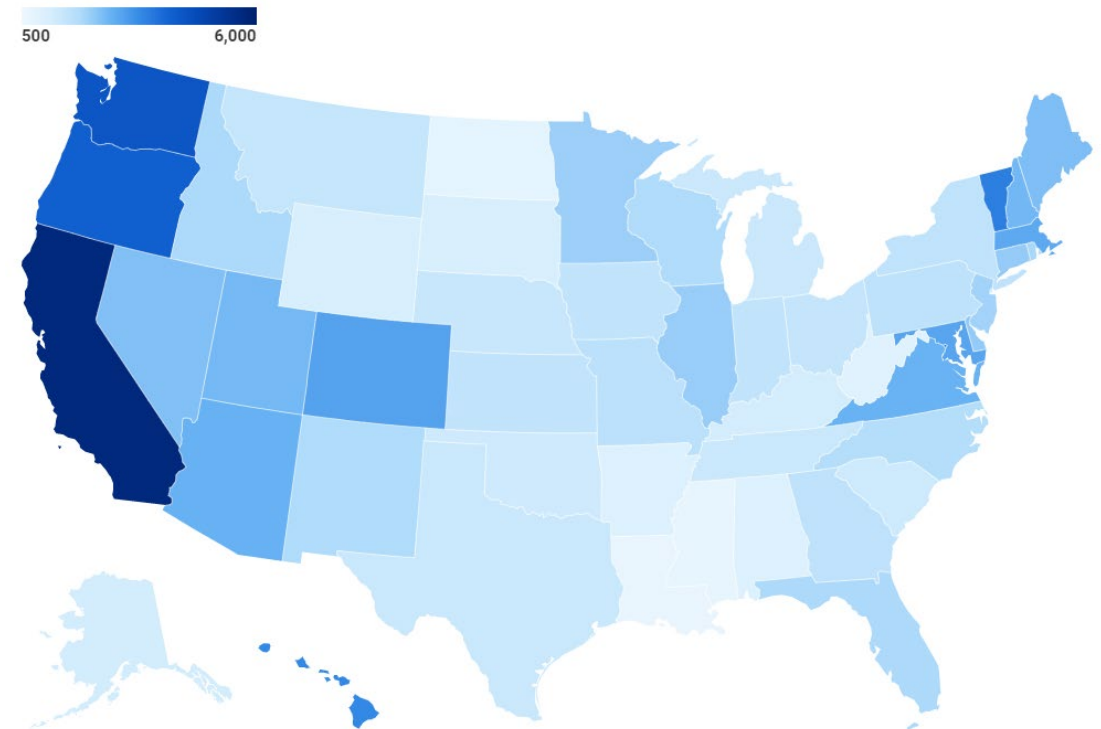
**Market Share by Engine Type  
(YTD '22 thru November)**

	YTD '21	YTD '22	
Hybrid	7.7%	8.1%	↑
Electric (BEV)	2.8%	3.9%	↑
Plug In Hybrid (PHEV)	2.4%	2.6%	↑

# EV Adoption in Vermont

- Vermont ranked 4<sup>th</sup> in nation for EV adoption
- 6.5% of sales for 2022 YTD, climbing to over 8%
- Inflation Reduction Act modifies federal tax credit to include automakers who had hit prior cap; introduces new commercial clean vehicle credit up to \$7,500 for light-duty and \$40,000 overall, and used PEV tax credits up to 30% or \$4,000; restarts EV charger tax credit; creates point-of-sale option for 2024
- Advanced Clean Cars II rules have some flexibility to allow for early compliance and other options
- Local utilities continue to offer stackable rebates

Electric and Hybrid Vehicles per 100,000 People



2021 data.

Map: Chris Gilligan • Source: USA Facts

U.S. News

# Charging Equipment

## Level 1 Charging

120V

5 miles range / hr



J1772



Tesla

## Level 2 Charging

240V

10-20 miles / hr



J1772



Tesla

## DC Fast Charging

480V

Up to 1,000 miles / hr



CCS



CHAdemo



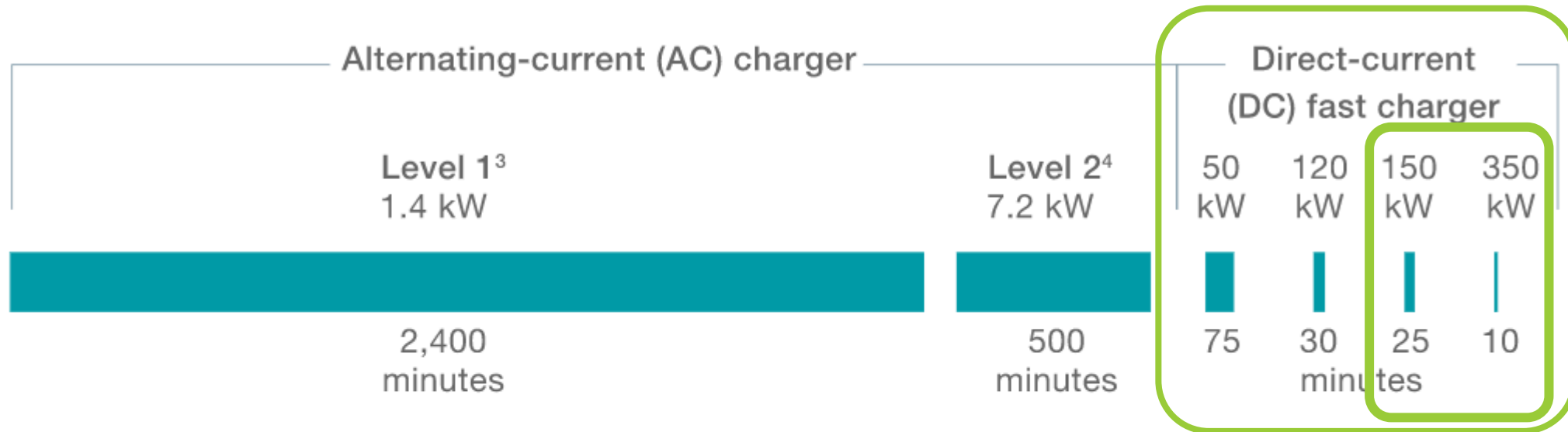
Tesla

Plug Types →



# Charging Equipment

Time to “fill up” a 60-kWh electric-vehicle (EV)<sup>1</sup> battery using different chargers<sup>2</sup>



<sup>1</sup>This assumes that the EV can charge at the higher kW direct-current fast-charging stations; most EVs today cannot charge faster than 100 kW.

<sup>2</sup>This assumes that the EV can charge at maximum speed during the entire charge. In reality, the charging speed varies.

<sup>3</sup>Level 1 equipment provides charging through a 120-volt AC plug; it generally refers to a household outlet.

<sup>4</sup>Level 2 equipment provides charging through a 240-volt AC plug and ranges from 16 to 40 amps. The most common is the 240-volt, 30-amp charger, which is 7.2 kW.

McKinsey&Company

[Mckinsey.com](https://www.mckinsey.com)

# Charging Equipment

## Differences between Community and Corridor Charging

- Cost of infrastructure
- Cost of charging
- Charging speed
- Trip purposes
- Dwell times

Location	Charge Time	Price	Level	Driver
Interstate Travel	<b>Travel</b> 20 min	\$\$\$\$	Fast Charging	Parked
Entertainment/ Shopping/ Recreation	<b>Public</b> 0.5 – 3 hours	\$\$\$	L2/L3	Parked
Work/Transit Parking/Airport	<b>Workplace</b> 4 – 8 hours	\$\$	L1/L2	Parked
At Home	<b>Residential</b> 8 – 10 hours	\$	L1/L2	Sleeping Parked



# Charging Equipment – Capital Costs

	<b>Level 1</b>	<b>Level 2</b>	<b>DC Fast Charging</b>
<b>Equipment Price</b>	\$30 - 900	\$600 - 9,000	\$15,000 - 150,000+
<b>Installation</b>	\$200 - 450+	\$2,000 - 12,000+	\$10,000 - 100,000+
<b>Total Capital Cost</b>	<b>\$230 - 1,350+</b>	<b>\$2,600 - 21,000+</b>	<b>\$25,000 - 250,000+</b>

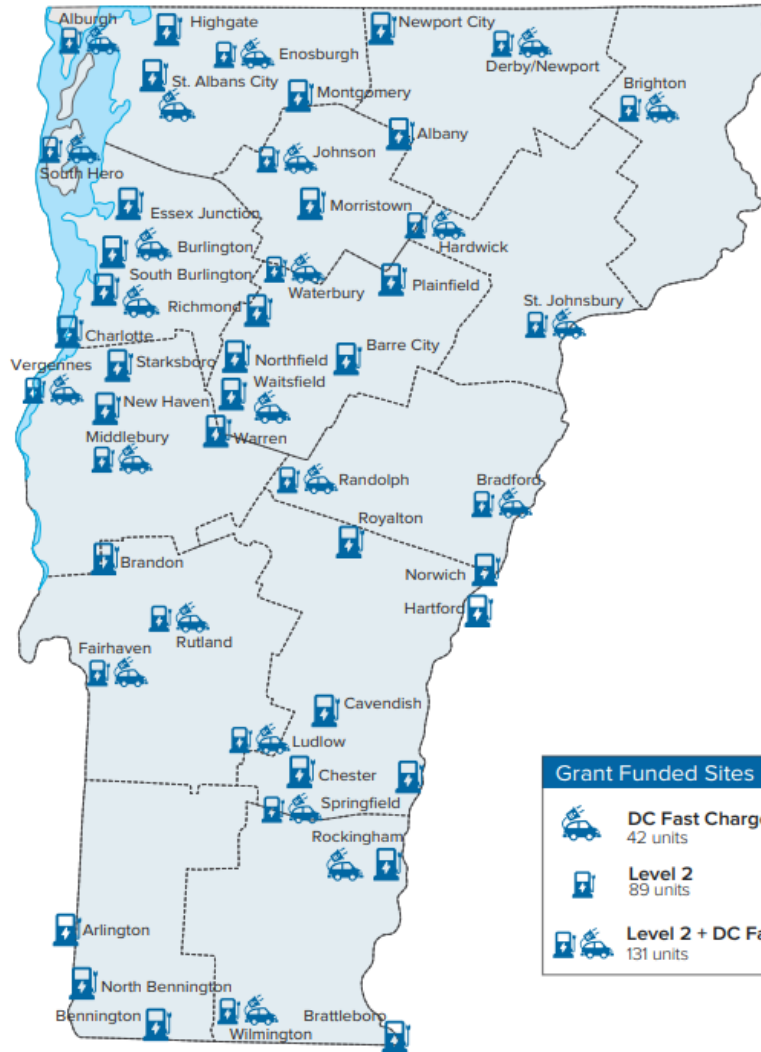
# Charging Equipment – Operating Costs

	<b>Level 1</b>	<b>Level 2</b>	<b>DC Fast Charging</b>
<b>Energy</b>	\$200 – 800+	\$200 – 2,500	\$500 – 15,000+
<b>Networking (optional)</b>	\$150 – 300	\$200 – 400	\$200 – 500+
<b>Maintenance</b>	\$200 – 400+	\$400 – 800	\$400 – 10,000+
<b>Total Annual Cost</b>	<b>\$550 - 1,500+</b>	<b>\$800 – 3,700+</b>	<b>\$1,100 - 25,500+</b>

# Funding Timeline

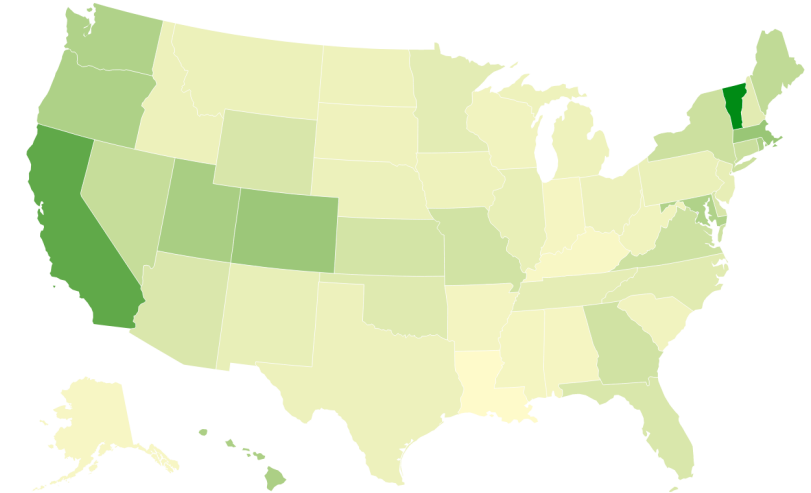
- 2014: DHCD and Dept of Environmental Conservation launch Electric Vehicle Supply Equipment (EVSE) Program with \$200k
- 2017: Volkswagen Settlement, \$2.8 million
- 2019: ~ \$1 million for 75 Level 2 + 5 DC Fast Chargers
- 2020: \$1.7 million to Blink for 11 locations
- 2021: \$750k in capital funds to Norwich Technologies for 6 locations
- 2022: \$1 million to residential charging for multiunit housing...

# Public EVSE Investments in Vermont



## Alternative Fueling Station Density Across the U.S.

EV Chargers Per 100,000 Residents  
8.3 139.7



Ranking based upon EV charger density per capita; a rank of 1 is the best, most-dense.  
Source: CoPilot • Created with Datawrapper

Grant Funded Sites	
	DC Fast Charge 42 units
	Level 2 89 units
	Level 2 + DC Fast Charge 131 units

Vermont has highest number of public chargers per capita in U.S.

139.7 charging ports per 100,000 people

# Annual EVSE Map

**17** locations under contract and in progress with Blink Charging and Norwich Technologies

Minimum 2 DC Fast Chargers, with Level 2 charger for redundancy

## New Station Locations

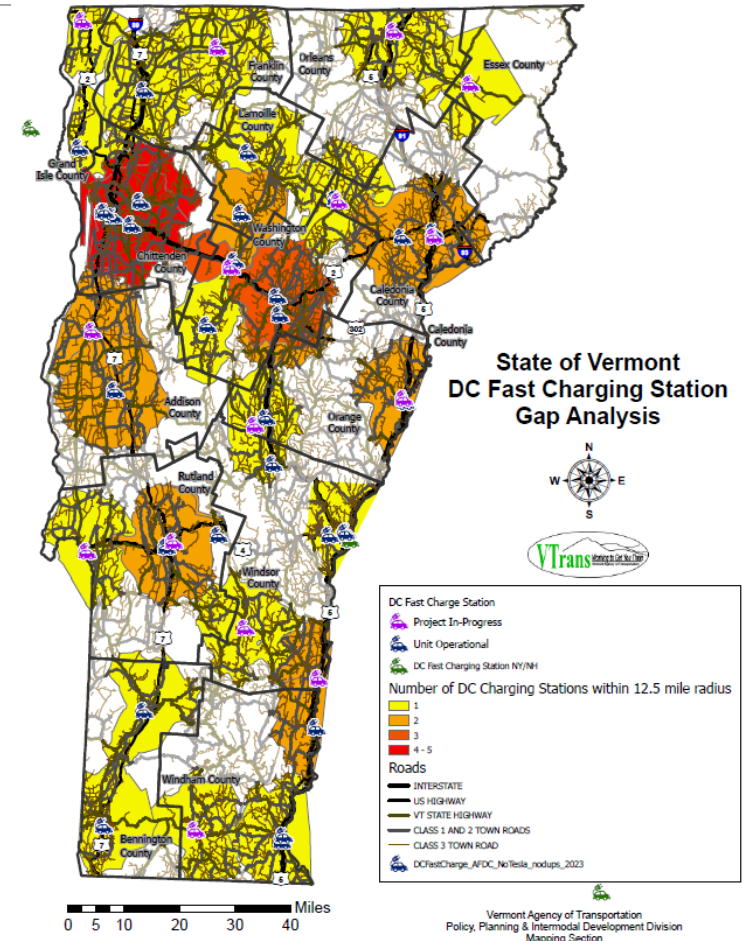
Waterbury, Bennington, Brattleboro, Royalton/Bethel, White River Junction, Killington, Hardwick, Hartford, Randolph, St. Johnsbury

## Challenges:

- Limited state funding
- Slow rollout of federal
- Site host agreements
- Electrical upgrades
- Supply chain issues
- Rural business case

## Private Investments:

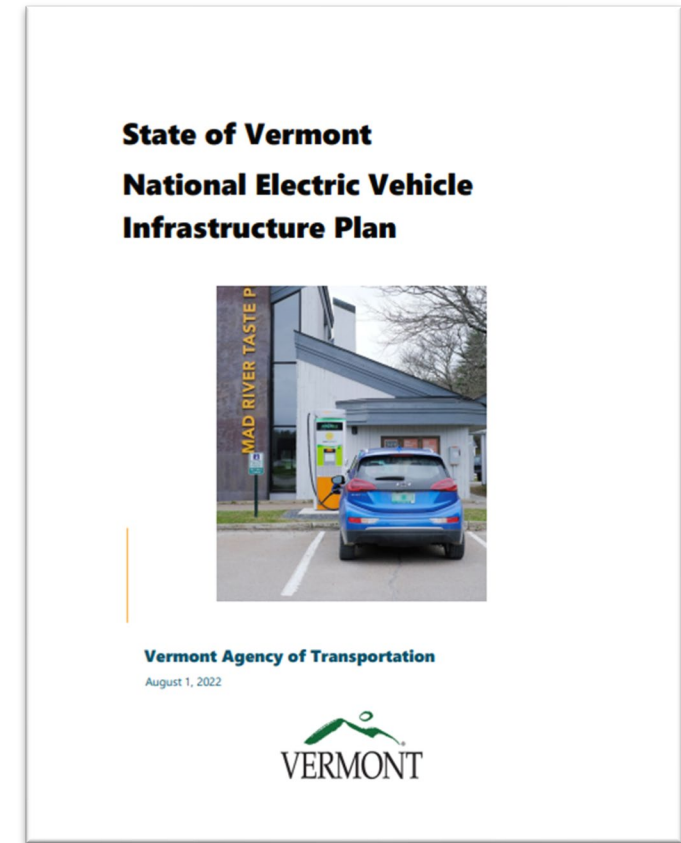
- GMP/utilities
- Auto Dealerships
- Convenience stores/gas
- Community Attractions



# EV Charging Infrastructure

**\$6.25 million in federal funds** authorized in SFY2023 for fast charging along highway corridors; **\$10 million in state general funds** for community charging

- **Vermont National Electric Vehicle Infrastructure (NEVI)** Plan approved in September 2022 by FHWA unlocks **\$21.2 million** over five years for corridor charging; annual plan update required
- **Inflation Reduction Act (IRA)** reinstates and expands EV charging tax credits to enable more projects throughout the state
- **Carbon Reduction Program** to allow more flexible investments on important, but non-designated corridors
- **NEVI “gap-filling” and competitive grants** to further build out corridors and communities alike
- **Medium- and heavy-duty electrification planning** and possible federal designations for electric freight corridors



# Timeline

February – July 2022: Guidance announced in February, Notice of Proposed Rulemaking in June; Outreach and plan development

July 2022: Vermont submitted EV Charging Plan to FHWA

August 2022: Proposed phaseout of existing waiver for EVSE from Buy America provisions of IJA

September 2022: FHWA approval of plan

Winter- Spring 2023: Public Engagement Plan

Updated Plan Due Annually

# NEVI Formula Program Guidance

- Priority given to EVSE along the interstates for corridor nominations, and investments to be made there first. (When fully “built out” as certified by FHWA, State may move onto other locations)
- New minimum requirements: 4 CCS ports of 150 kW each (600 kW total per site)
- 50 mile distance from the next charging location, but now only 1 mile from interstate exit or state highway intersection (prior radius was 5 miles)

## No guidance yet on the following:

- Minimum standards for equipment
- Buy America requirements
- Waiver or buildout certification process
- 10% for Gap-filling grants
- Competitive grant programs for Corridor and Community Charging



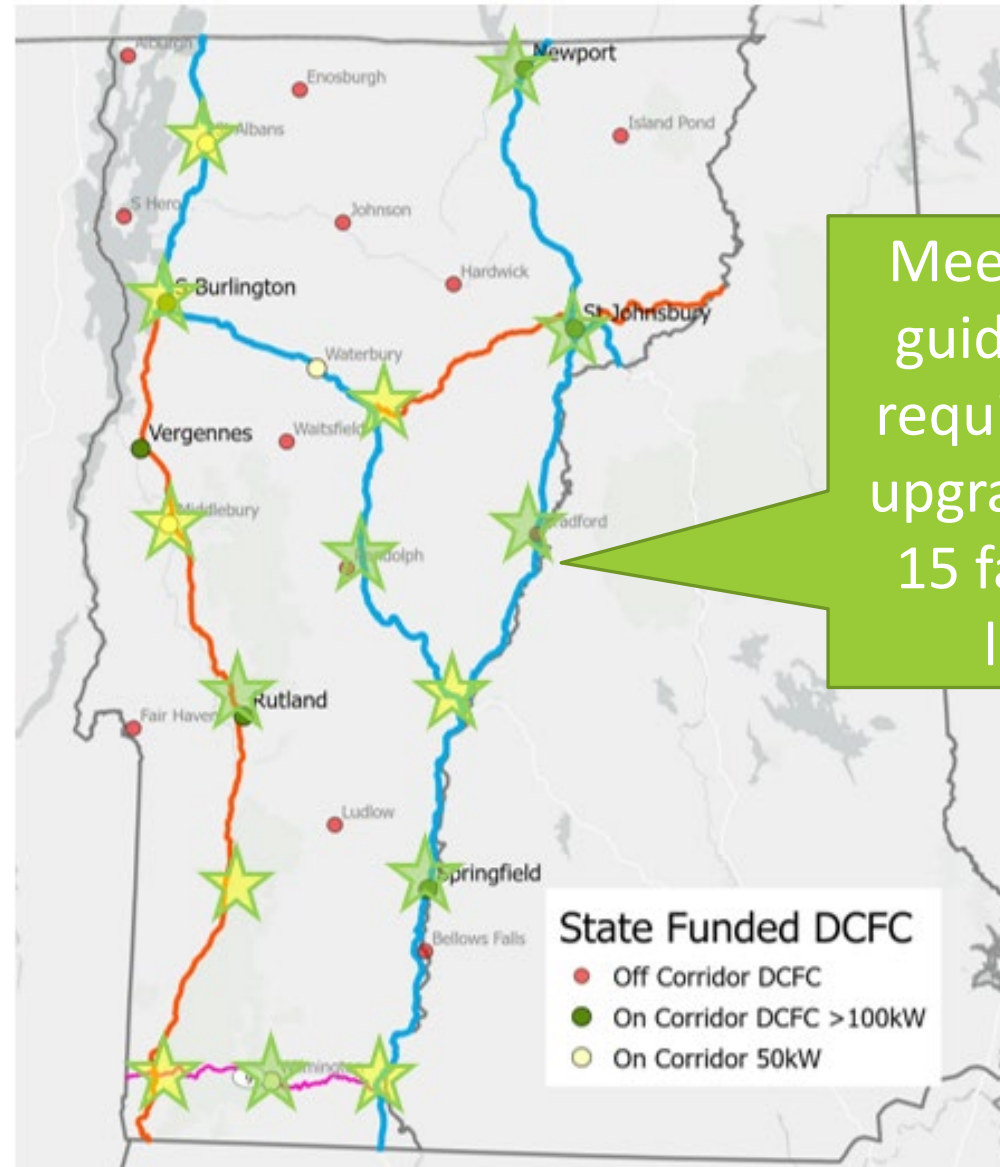




# National Electric Vehicle Infrastructure (NEVI) Plan

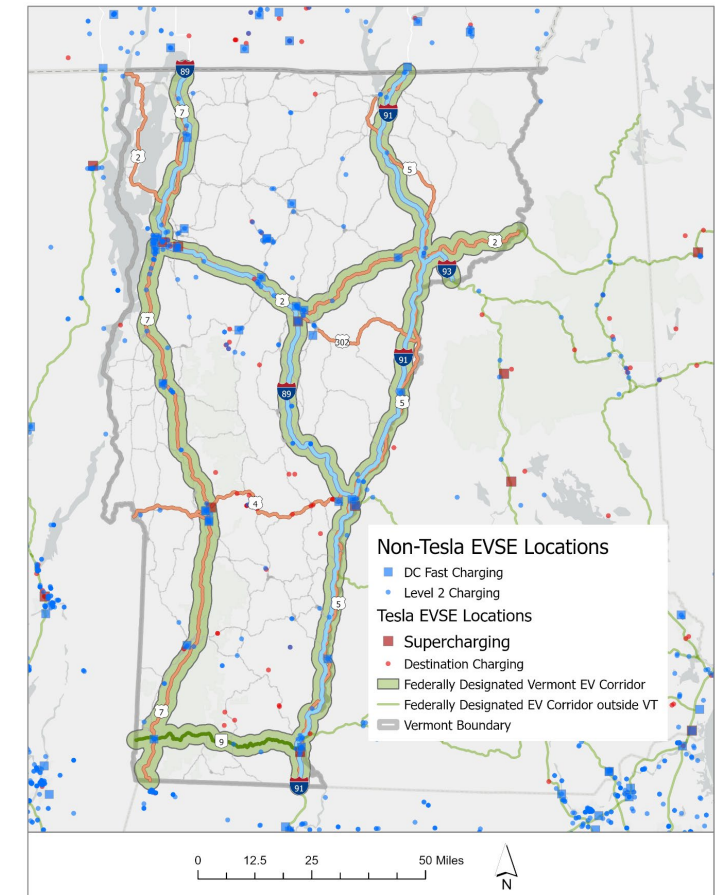
## Planned Upgrades in first phase:

- Bradford
- Derby/Newport
- Randolph
- Rutland
- St. Johnsbury
- Springfield
- Wilmington
- RFP(s) for remaining 8-10 sites



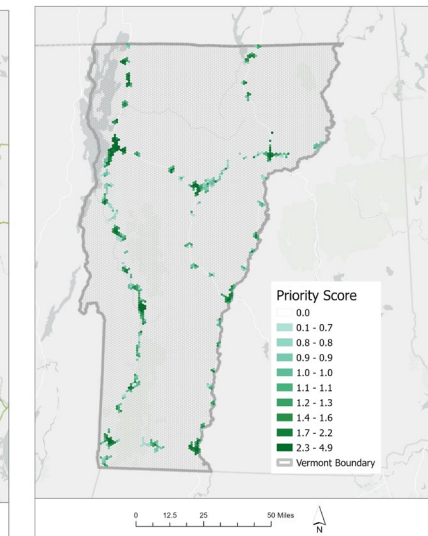
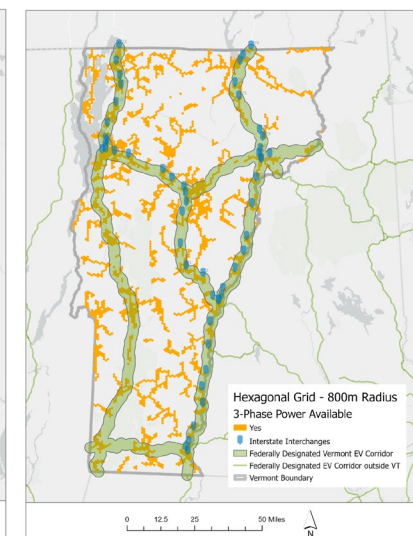
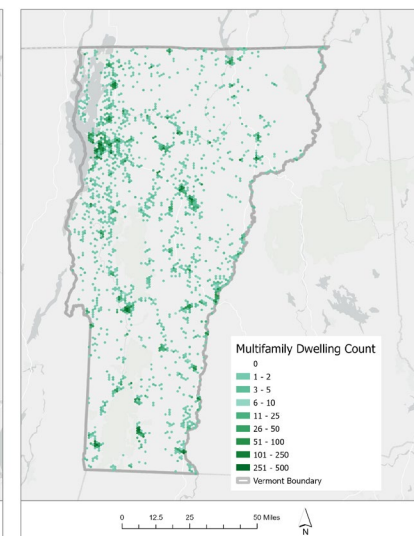
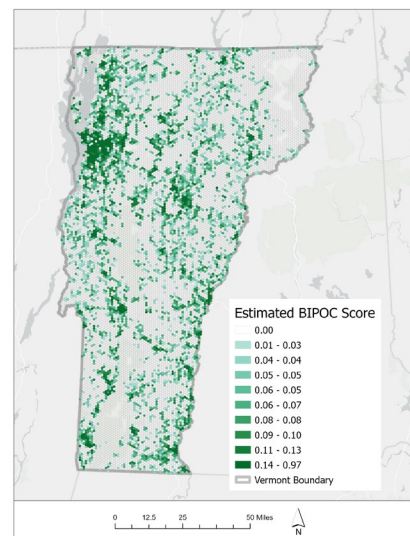
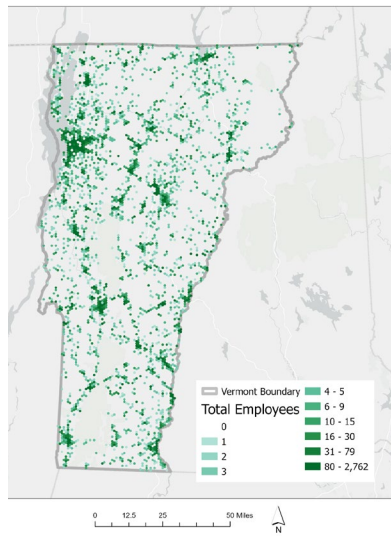
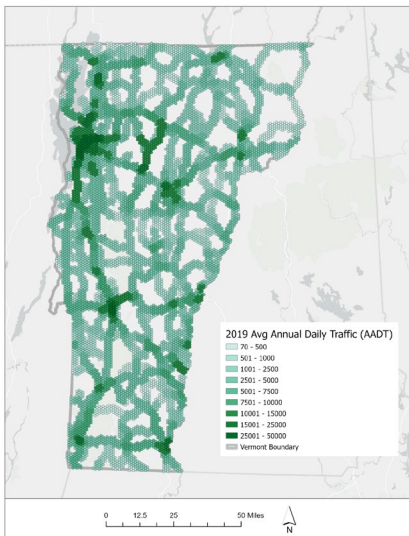
# General Location Prioritization Factors

- Highway traffic volumes
- Travel services and other employment
- Walkability
- Environmental justice factors related to income and race
- Multifamily housing units
- 3-Phase power availability
- Proximity to federally designated EV corridor
- Distance to qualifying EV charging location with four 150kW DCFC ports



# Prioritization Mapping

- Factors are mapped into hexagonal grid cells that are about ½ mile radius
- Quantities are normalized to allow combinations across different types of priorities
- Final priority score for initial NEVI plan is limited to eligible areas along federally designated EV corridors
- Future plans will likely expand on this as additional federal and State guidance develops



# Next Steps

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- Survey interest of property owners in participating in NEVI and other funding programs for public EVSE
- Contract to upgrade seven existing and planned locations to meet NEVI requirements
- Issue RFQ for entities qualified to install, own, and operate EV charging facilities
- Once final rules and Buy America provisions are known, issue RFPs for further buildout of Alternative Fuel Corridors
- Conduct Public Engagement beginning in March 2023 for NEVI and Carbon Reduction Programs, planning for off-corridor investments
- Work with VEIC and other partners on workforce development and diversity initiatives to ensure benefits of funding are shared
- Continue to evaluate and re-develop statewide plans, exploring new nominations for corridors



# Contact

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