

Exploring the Workforce Implications of Meeting Electric Vehicle Goals in the Vermont Climate Action Plan

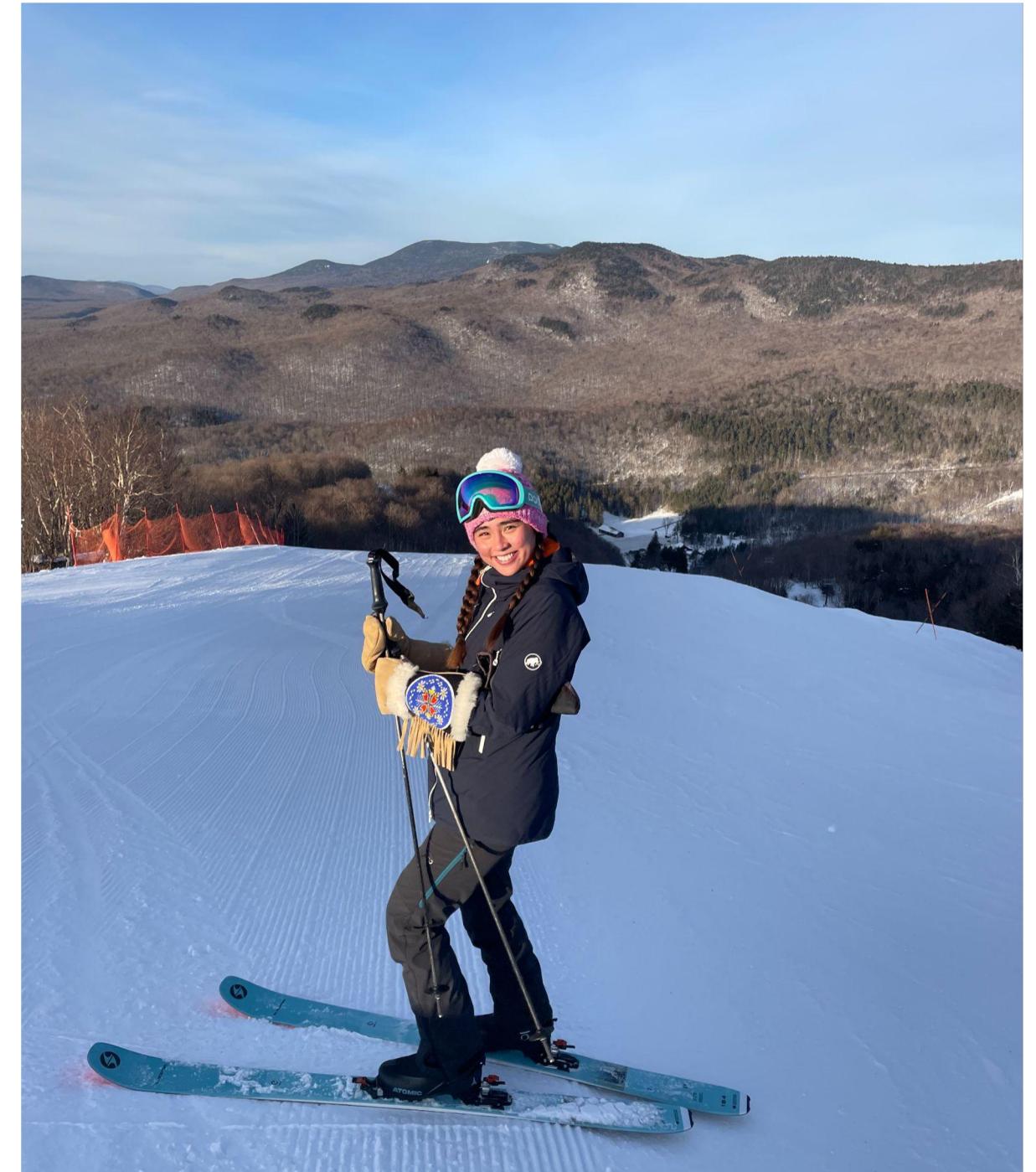
Una Darrell
EAN Summer Intern
August 2022



ENERGY ACTION NETWORK



About Me





Project Purpose

- Provide an overview of Vermont's progress electrifying transportation to meet climate goals
- Research and quantify the workforce implications both caused and needed by Vermont's transition to EVs
- Explore the consequences that result from these workforce shifts (ie. job enrichment, education)



The Importance of Workforce

- Understanding the workforce type and size needed to achieve the goals in the Vermont Climate Action Plan is key to success
- A variety of workforce development initiatives are underway, including an EAN Climate Workforce Network Action Team
- The team was interested in learning more about the workforce implications of achieving the rapid scale-up in EVs proposed in the VT CAP
- The Action Team's interest in learning more about the EV workforce was the basis for this Summer Internship research project



Policy Context in Vermont

- **Global Warming Solutions Act (GWSA):** Created legally binding greenhouse gas (GHG) emissions reduction targets for Vermont.
 - 2025: 26% below 2005 levels
 - 2030: 40% below 1990 levels
 - 2050: 80% below 1990 levels
- **Climate Action Plan (CAP):** Required by the GWSA, includes 26 pathways for action which outline the work needed to accomplish the GHG reduction requirements established in the GWSA.
- **Advanced Clean Cars II (ACC II):** Being implemented in Vermont, based on California's initiatives to reduce GHG emissions from gasoline vehicles, while increasing the number of zero-emission vehicles. Will result in 100% of all new vehicles sold in Vermont being zero-emission electric vehicles by 2035.



Where are we now with EVs in Vermont?

- 6,585 registered EVs at present
- Plug-in electric vehicles (PEVs) are registered in 96% of Vermont communities.
- The number of EVs in the state increased by 2,225 vehicles or 51% over the past year (as of 2/4/22)
- Vermont has a higher number of public chargers per capita than any other state in the U.S.



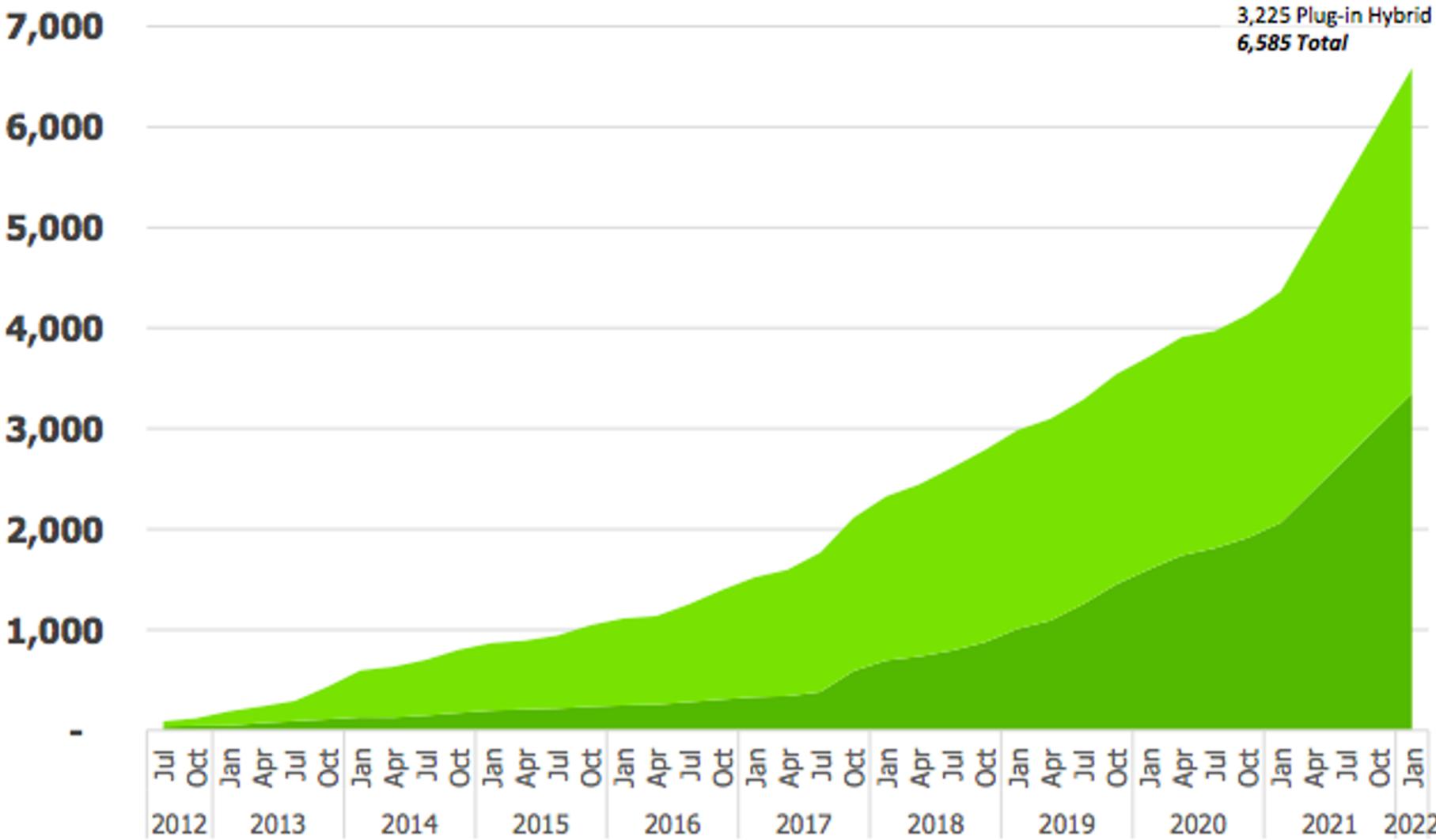


EV Registration Patterns and Targets

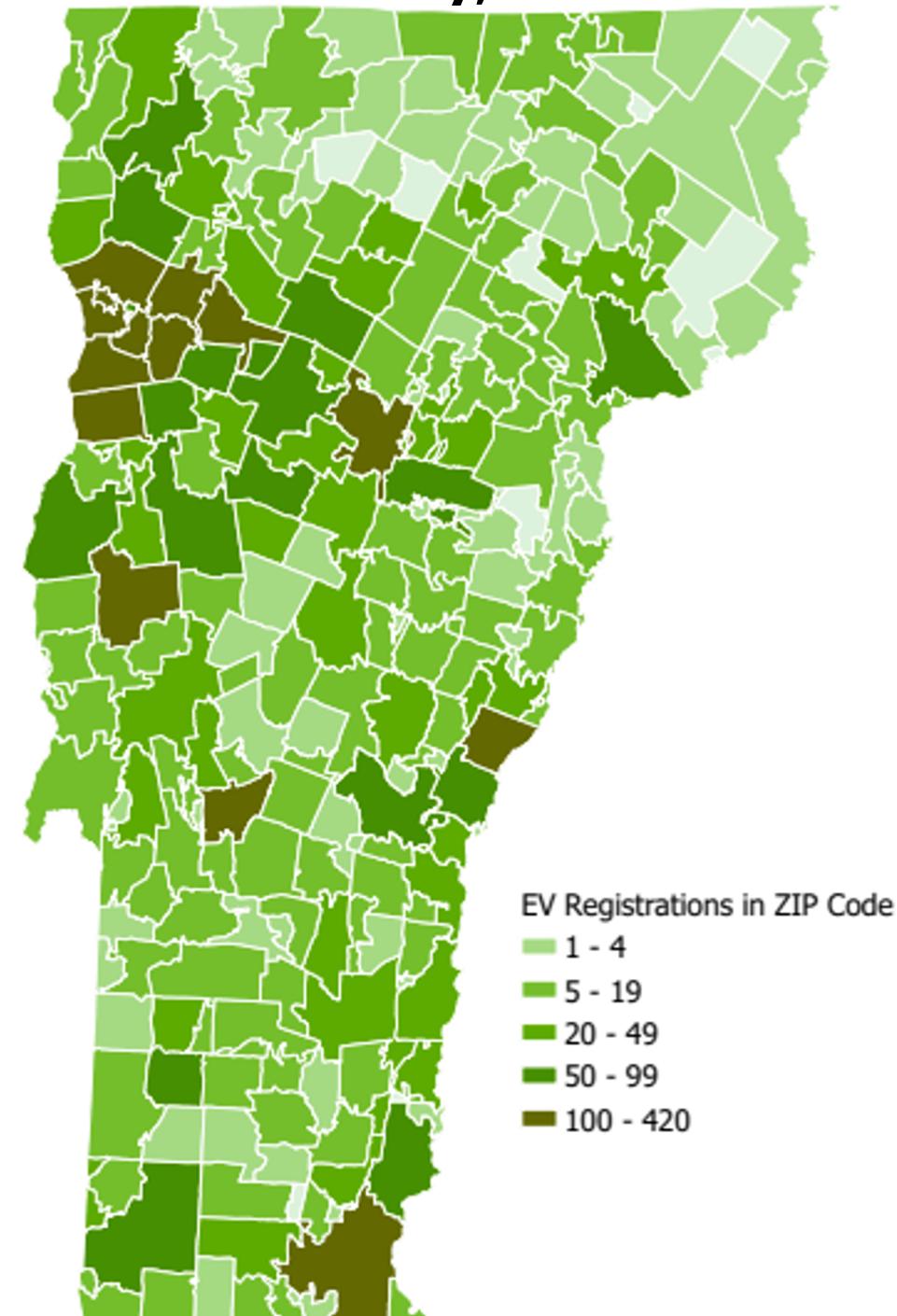
Vermont Electric Vehicle Registrations

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

As of January 2022
3,350 All-Electric
3,225 Plug-in Hybrid
6,585 Total



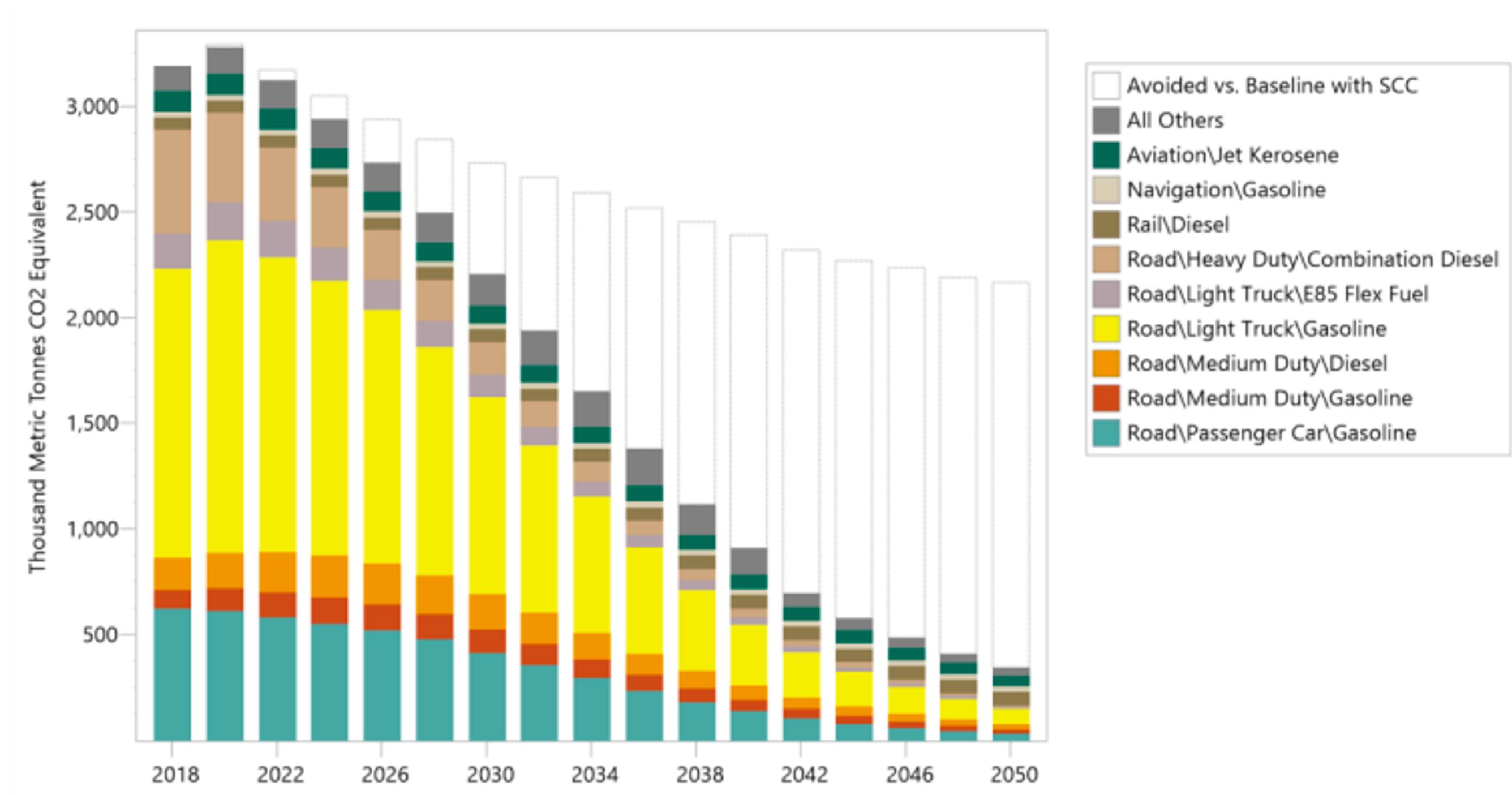
EVs Registered in Vermont as of January, 2022





However, there is still more work to be done...

Transportation Emissions Mitigation Scenario





What is Our Goal?

	End of 2025	End of 2030
Number of EVs in Vermont	27,000	126,000
EV Share of Vehicle Sales	17%	68%
EV Share of Vehicle Miles Traveled	5%	23%



How do we get there?

- A variety of factors are necessary to assist the rapid adoption and scale-up of EVs, including for example:
 - Trained and informed EV dealers and service companies;
 - Consumer awareness and acceptance;
 - Affordability, including availability of both used and new EVs; and
 - Sufficient charging infrastructure.
- Working towards these factors requires:
 - Funding, education/training systems, incentives, access to the technology, and the corresponding workforce



EV Workforce Areas of Focus

- The transition to EVs will affect many sectors, ranging from car dealerships and repair shops to gas stations and electric utilities
- To manage scope for this part-time, 10-week research project, the focus of the project was on workforce implications for:
 - Charging infrastructure
 - Auto repairs
 - Auto dealerships



EV Charging Infrastructure

- Growth within the EV fleet cannot occur without the needed infrastructure
- Developing convenient, well-located, affordable **charging infrastructure is essential**
- At-home charging is fairly straightforward while public, workplace, and DC Fast Charging involve: design, engineering, permitting, and installation.
- **Main takeaway:** While charging installation does require skill and labor, it is not expected to require a huge expansion in the workforce.



At-Home vs. Public/Workplace Charging

- **At Home:**

- Majority of EV-owners opt to install an at-home charger
- Allows EVs to be charged at home and overnight
- Level II chargers are the most common type

- **Public/Workplace:**

- For every ~20 additional EVs on the road, ~1 new public charger is needed
- Accessible on-the-go charging
- Typically Level II





Different Types of Charging

Level 1 Charging

120V
5 miles range / hr



Level 2 Charging

240V
10-20 miles / hr



DC Fast Charging

480V
Up to 1,000 miles / hr



Job Roles and Person Days Required for EV Charging Infrastructure

	At-Home Charging - Level 2 Chargers	Public and Workplace Charging - Level 2 Chargers	DC Fast Charger
Job Roles	Person Days per Charger		
Planning and Design		1.08	1.16
General Contracting		2.31	2.98
Utility Linework		0.75	0.75
Electrical Contracting		1.68	1.02
Electrician	0.50	2.31	3.86
Administrative Support		0.91	1.04
Legal		0.17	0.5
Other		0.67	0.92
Total Person Days	0.50	9.88	12.23

Estimated Effort by Job Role in Person-days for Electric Vehicle Charging Installations in Vermont

	At-home Charging - Level 2 Chargers		Public and Workplace Charging - Level 2 Chargers		DC Fast Chargers		All Charging Combined		
	2025 Goal - 4939 More	2030 Goal - 74,250 More	2025 Goal - 1411 More	2030 Goal - 3190 More	2025 Goal - 149 More	2030 Goal - 129 More			Number of Full Time Equivalents (FTE) if completed in one year
Job Roles	2025 Person Days	2030 Person Days	2025 Person Days	2030 Person Days	2025 Person Days	2030 Person Days	2025 Person Days	2030 Person Days	
Planning and Design			1,524	3,445	173	150	1,697	3,595	14
General Contracting			3,259	7,369	444	384	3,703	7,753	31
Utility Linework			1,058	2,393	112	97	1,170	2,490	10
Electrical Contracting			2,370	5,359	152	132	2,522	5,491	22
Electrician	2,470	37,125	3,259	7,369	575	498	6,304	44,992	180
Administrative Support			1,284	2,903	155	134	1,439	3,037	12
Legal			240	542	75	65	315	607	2
Other			945	2,137	137	119	1,082	2,256	9
Total Person Days	2,470	37,125	13,941	31,517	1,822	1,578	18,232	70,221	281
Number of Full Time Equivalents (FTE) if completed in one year	10	149	56	124	7	6	73	281	



EV Service and Repairs

- In addition to reducing fuel costs for EV owners, EVs require less service and repair than gasoline vehicles.
- Comparing operating costs, including cost per mile and maintenance costs, EV drivers in rural Vermont are expected to save roughly \$1,500 during the first year of ownership, and over \$21,000 over a 14-year lifetime of the vehicle (EAN, July 7, 2021)



How will this Impact Service and Repairs?

Key Assumptions:

- 1,580 Automotive Service Technicians and Mechanics in Vermont
- Vermont is adopting ACC II, the same regulatory track as California. By 2030, the goal is for 68% of vehicle sales to be EVs
- California is projecting a decline of about 52% in mechanic jobs

Main Takeaway: Applying California Air Resources Board's calculations of car mechanic jobs resulting from increased EV use, it is estimated that Vermont will lose an estimated 822 mechanic jobs between now and 2040, resulting in an estimated 758 mechanics remaining.



Some Implications of a Decline:

- Mechanics working on ICE are still expected to be needed in the future, because “the changes wouldn’t occur fast enough to trigger a sharp economic slowdown within the auto repair industry” (James Sallee, research associate at the Energy Institute at University of California, Berkeley’s Haas School of Business).
- That said, increased use of EVs is expected to change the skills needed by auto mechanics.
 - EV maintenance requires familiarity with EV computerized features and sensors (Lopez, 2022)
 - Such changes may shift auto repair jobs to more computer-based skills, potentially enhancing worker satisfaction and possibly leading to increased wages



Automobile and Truck Dealers

- Vermont has 97 licensed new auto and truck dealers which employ between 20 and 55 individuals per dealership
- It will be important for Vermont auto and truck dealers to **be familiar with how EVs operate and the issues on consumers' minds when considering an EV**
- The training of sales people typically occurs at individual dealerships and it is becoming increasingly apparent that **the ability to sell EVs is key**
- In addition, **new business models** are developing for selling EVs
 - MYEV.com is a new EV software platform that allows consumers to learn about, buy, and sell EVs via the internet. Such approaches could have significant implications for traditional “bricks and mortar” dealerships.



New EV Business Model Example:

MYEV.com

BUY SELL RESEARCH FOR DEALERS ABOUT CALL US | SIGN IN

Your Location — Boston, MA

Reset all

Select Make / Model

LOCATION RADIUS

VEHICLE TYPE

VEHICLE CONDITION

YEAR

PRICE

MILEAGE

RANGE

SELLER TYPE

POWER KW

DRIVETRAIN

SPEED (0-60)

SEATING CAPACITY

Sort by Relevance

3248 EVs for sale near Boston, MA

2017 BMW 3 SERIES

Price: \$22,990 Mileage: 32,088 Location: Nationwide

2014 TESLA MODEL S

Price: \$35,490 Mileage: 66,450 Location: Nationwide

2017 CHEVROLET VOLT

Price: \$15,490 Mileage: 35,518 Location: Nationwide

2018 PORSCHE PANAMERA

Price: \$132,900 Mileage: 25,567 Location: Boston, MA

ALL OF OUR CARS COME CARVANA CERTIFIED

2015 NISSAN LEAF

Price: \$10,990 Mileage: 37,953 Location: Nationwide

2018 NISSAN LEAF

Price: \$21,900 Mileage: 32,778 Location: Nationwide

- Connects consumers to different types of EVs, across multiple types and models
- Helps consumers assess which type and model are well matched to their travel patterns, budget, and personal preferences



Dealers

- Dealers' ability to advise consumers on selecting the right EV and selling large amounts of EVs (quickly) will affect the ability of Vermont to achieve the rapid-scale up in EVs that is needed
 - A key opportunity (and challenge) facing dealers will be keeping up with industry knowledge and new sales processes as the EV market continues to develop and transform in Vermont
- **Main takeaway:** Dealers are expected to continue to be needed. AND new internet-based business models are developing, indicating the role of traditional dealers may change. However, the workforce implications of such changes are not yet clear at this early stage of EV market development in Vermont.



In Summary

- Vermont's workforce is expected to experience **losses and gains** across different sectors as a result of scaling up EV use.
- Whether there is an increase in workforce size or not, retraining will be needed across the vehicle industry to achieve a level of fluency and familiarity with EVs
- There is the possibility that training and skills needed for future EV repair workers may result in job expansion/enrichment
 - Job expansion occurs when: a wider range of activities become available to a worker; there is a decrease in the number and/or regularity of monotonous tasks; new skills are needed and training is available and provided for those skills; and wages increase.



Thank you!

Questions and Comments?

Una Darrell
(917) 940-5779
unadarrell@gmail.com