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

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EAN Summer Intern
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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

**EV Registrations in ZIP Code**
- 1 - 4
- 5 - 19
- 20 - 49
- 50 - 99
- 100 - 420

**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?

<table>
<thead>
<tr>
<th></th>
<th>End of 2025</th>
<th>End of 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of EVs in Vermont</strong></td>
<td>27,000</td>
<td>126,000</td>
</tr>
<tr>
<td><strong>EV Share of Vehicle Sales</strong></td>
<td>17%</td>
<td>68%</td>
</tr>
<tr>
<td><strong>EV Share of Vehicle Miles Traveled</strong></td>
<td>5%</td>
<td>23%</td>
</tr>
</tbody>
</table>
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.
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
● 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**

### Job Roles and Person Days Required for EV Charging Infrastructure

<table>
<thead>
<tr>
<th>Job Roles</th>
<th>At-Home Charging - Level 2 Chargers</th>
<th>Public and Workplace Charging - Level 2 Chargers</th>
<th>DC Fast Charger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and Design</td>
<td>1.08</td>
<td>1.16</td>
<td></td>
</tr>
<tr>
<td>General Contracting</td>
<td>2.31</td>
<td>2.98</td>
<td></td>
</tr>
<tr>
<td>Utility Linework</td>
<td>0.75</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Electrical Contracting</td>
<td>1.68</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>Electrician</td>
<td>0.50</td>
<td>2.31</td>
<td>3.86</td>
</tr>
<tr>
<td>Administrative Support</td>
<td>0.91</td>
<td>1.04</td>
<td></td>
</tr>
<tr>
<td>Legal</td>
<td>0.17</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.67</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td><strong>Total Person Days</strong></td>
<td>0.50</td>
<td>9.88</td>
<td>12.23</td>
</tr>
</tbody>
</table>
## Estimated Effort by Job Role in Person-days for Electric Vehicle Charging Installations in Vermont

<table>
<thead>
<tr>
<th>Job Roles</th>
<th>At-home Charging - Level 2 Chargers</th>
<th>Public and Workplace Charging - Level 2 Chargers</th>
<th>DC Fast Chargers</th>
<th>All Charging Combined</th>
<th>Number of Full Time Equivalents (FTE) if completed in one year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and Design</td>
<td>2025 Person Days</td>
<td>1,524</td>
<td>3,445</td>
<td>173</td>
<td>150</td>
</tr>
<tr>
<td>General Contracting</td>
<td>2025 Person Days</td>
<td>3,259</td>
<td>7,369</td>
<td>444</td>
<td>384</td>
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<tr>
<td>Utility Linework</td>
<td>2025 Person Days</td>
<td>1,058</td>
<td>2,393</td>
<td>112</td>
<td>97</td>
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<tr>
<td>Electrical Contracting</td>
<td>2025 Person Days</td>
<td>2,370</td>
<td>5,359</td>
<td>152</td>
<td>132</td>
</tr>
<tr>
<td>Electrician</td>
<td>2,470</td>
<td>37,125</td>
<td>3,259</td>
<td>7,369</td>
<td>575</td>
</tr>
<tr>
<td>Administrative Support</td>
<td>2025 Person Days</td>
<td>1,284</td>
<td>2,903</td>
<td>155</td>
<td>134</td>
</tr>
<tr>
<td>Legal</td>
<td>240</td>
<td>542</td>
<td>75</td>
<td>65</td>
<td>315</td>
</tr>
<tr>
<td>Other</td>
<td>945</td>
<td>2,137</td>
<td>137</td>
<td>119</td>
<td>1,082</td>
</tr>
<tr>
<td>Total Person Days</td>
<td>2,470</td>
<td>37,125</td>
<td>13,941</td>
<td>31,517</td>
<td>1,822</td>
</tr>
<tr>
<td>Number of Full Time Equivalents (FTE) if completed in one year</td>
<td>10</td>
<td>149</td>
<td>56</td>
<td>124</td>
<td>7</td>
</tr>
</tbody>
</table>
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:

- 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’ 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.
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.
Questions and Comments?

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