EV Everywhere: Drive Electric Vermont
PEV Case Study

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EV Roadmap 9
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This presentation does not contain any proprietary, confidential, or otherwise restricted information
DOE’s Case Study Objective

- Provide an example of plug-in electric vehicle (PEV) support activities beyond urban clusters
- Demonstrate how small and medium-sized communities can increase PEV uptake and charging infrastructure deployment in their regions
- Small and midsize towns in the United States, with populations of 50,000 or less, are often ideal PEV communities due to their typically shorter driving distances

Study conducted by: Energetics, Vermont Energy Investment Corporation and Idaho National Laboratory
Drive Electric Vermont (DEV) Organization

• Formed in 2012 via a MOU between
  – State of Vermont Agency of Transportation
  – State of Vermont Agency of Natural Resources
  – State of Vermont Public Service Department
  – Vermont Energy Investment Corporation (VEIC) – (nonprofit)

DEV Goal

• Increased use of electric transportation through policy development, education and outreach, and infrastructure development

DEV Defined Measures of Success

• Number of PEVs registered in the state
• Availability of workplace and public charging infrastructure
• Number of people aware of PEV options and considering them for vehicle purchases
• State and local policy support (e.g., building codes)
Did DEV Obtain Their Goal?

- Total PEV monthly registration growth 12.6 X in 42 months
PEV Registrations In High PEV Penetration Areas

- Registrations not as high as some warm weather metro areas - BUT
- PEV (battery electric vehicle (BEV) & plug-in hybrid electric vehicle (PHEV)) registrations as percentage of all 2014 registered vehicles

<table>
<thead>
<tr>
<th></th>
<th>PHEV</th>
<th>BEV</th>
<th>Total PEV</th>
<th>% BEV of PEV</th>
<th>% of All 2014 Registered Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vermont</td>
<td>176</td>
<td>55</td>
<td>231</td>
<td>24</td>
<td>PHEV: 0.45, BEV: 0.14, Total: 0.59</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>115</td>
<td>61</td>
<td>176</td>
<td>65</td>
<td>PHEV: 0.14, BEV: 0.08, Total: 0.22</td>
</tr>
<tr>
<td>Atlanta Metro</td>
<td>621</td>
<td>6,711</td>
<td>7,332</td>
<td>92</td>
<td>PHEV: 0.19, BEV: 2.03, Total: 2.22</td>
</tr>
<tr>
<td>Los Angeles Metro</td>
<td>16,559</td>
<td>9,489</td>
<td>26,048</td>
<td>36</td>
<td>PHEV: 1.52, BEV: 0.87, Total: 2.38</td>
</tr>
<tr>
<td>Portland Metro</td>
<td>544</td>
<td>979</td>
<td>1,523</td>
<td>64</td>
<td>PHEV: 0.48, BEV: 0.87, Total: 1.35</td>
</tr>
<tr>
<td>San Diego Metro</td>
<td>1,840</td>
<td>2,185</td>
<td>4,025</td>
<td>54</td>
<td>PHEV: 1.05, BEV: 1.25, Total: 2.30</td>
</tr>
<tr>
<td>Austin Metro</td>
<td>272</td>
<td>409</td>
<td>681</td>
<td>60</td>
<td>PHEV: 0.22, BEV: 0.33, Total: 0.54</td>
</tr>
</tbody>
</table>

Data from Argonne National Laboratory
## PEV Registrations In Cold Weather Areas

### PEV Share and Mix in Cities with Greater than 5% Peak Frigid January Temperature

<table>
<thead>
<tr>
<th>City</th>
<th>% PEVs of All Registrations</th>
<th>% BEVs of PEVs</th>
<th>Peak Frigid %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vermont</strong>*</td>
<td>0.59%</td>
<td>23.8%</td>
<td>40%</td>
</tr>
<tr>
<td>Detroit</td>
<td>0.59%</td>
<td>6.7%</td>
<td>17%</td>
</tr>
<tr>
<td>Spokane</td>
<td>0.48%</td>
<td>50.0%</td>
<td>13%</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>0.34%</td>
<td>36.3%</td>
<td>7%</td>
</tr>
<tr>
<td>Boston</td>
<td>0.30%</td>
<td>45.3%</td>
<td>7%</td>
</tr>
<tr>
<td>Indianapolis</td>
<td>0.30%</td>
<td>44.3%</td>
<td>19%</td>
</tr>
<tr>
<td>Chicago</td>
<td>0.28%</td>
<td>47.2%</td>
<td>24%</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>0.26%</td>
<td>36.3%</td>
<td>11%</td>
</tr>
<tr>
<td>Dayton</td>
<td>0.25%</td>
<td>24.4%</td>
<td>13%</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>0.24%</td>
<td>35.3%</td>
<td>47%</td>
</tr>
<tr>
<td>Columbus</td>
<td>0.23%</td>
<td>33.8%</td>
<td>11%</td>
</tr>
<tr>
<td>Bloomington IL</td>
<td>0.19%</td>
<td>57.1%</td>
<td>20%</td>
</tr>
<tr>
<td>Springfield IL</td>
<td>0.19%</td>
<td>25.0%</td>
<td>20%</td>
</tr>
<tr>
<td>Cleveland</td>
<td>0.14%</td>
<td>24.2%</td>
<td>10%</td>
</tr>
<tr>
<td>Jackson MI</td>
<td>0.14%</td>
<td>21.1%</td>
<td>24%</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>0.14%</td>
<td>37.6%</td>
<td>16%</td>
</tr>
<tr>
<td>South Bend</td>
<td>0.14%</td>
<td>37.6%</td>
<td>20%</td>
</tr>
</tbody>
</table>

*Burlington peak frigid %.

Data from Argonne National Laboratory
BEV And PHEV Models Registered In Vermont

- As of January 2016, there were a total of 248 registered BEVs and 865 registered PHEVs in Vermont (Vermont Department of Motor Vehicles)

- PHEVs 2.5 X’s more popular than BEVs
PEV Ownership By Community Size

![Bar chart showing the percentage of PEV penetration per capita across different community sizes. The chart indicates that communities with populations greater than 25,000 have the highest PEV penetration per capita, followed by communities with populations between 10,000 and 25,000, 5,000 and 10,000, 1,000 and 5,000, and finally communities with populations less than 1,000.](chart.png)
PEV Market Penetration Growth By Community Size

![Graph showing PEV market penetration growth by community size over the years 2013 to 2015.]
Charging Infrastructure Increases

- EVSE and DCFC Public Units Deployed in Vermont

ChargePoint Level 2 EVSE in Stowe
Public Infrastructure Type By Charging Network

Data provided by:
ChargePoint, Evgo and Green Mountain Power

Green Mountain Power Freedom Station in Williston
EVSE Fees By Community, Network & Structure

Free Charging by Community Size - % Units

- Level 1
- Level 2
- DCFC
- Total

Fee Types
- Energy Charge
- Flat Fee
- Access Fee
- Plus Hourly
- Hourly
- Monthly
Number Of EVSE Venues and Charging Locations

- Hospital
- Parking (long term)
- Leisure
- Education
- Hotel
- Dealership
- Workplace
- Parking (short term)
- Retail

Number of EVSE Installations

- Level 1
- Level 2
- DCFC
DEV Program Research

- Vermont Energy Investment Corporation surveyed a number of areas, including:
  - Identified the primary awareness and interest mechanisms for PEVs
  - The critical factors that ultimately influence the purchase of PEVs and installation of charging infrastructure
- Opinions were asked of over 1,000 PEV owners / leasers / enthusiasts and over 80 EVSE site operators
- Responses received from 71 PEV owners / leasers / enthusiasts and 23 charging site operators
Creating PEV Awareness Mechanisms

1. Work environment
2. News venues
Creating EVSE Awareness Mechanisms

1. News venues
2. Electric utilities
Why Purchase / Lease A PEV?

Principal reasons to purchase a PEV
1. Environmental benefits
2. Save on gasoline
3. Energy independence

Principal reasons to lease a PEV
1. Environmental benefits
2. Save on gasoline
3. Energy independence
Why Install EVSE?

Critical factors for installing EVSE
1. Green image
2. Customer amenity
3. Environmental benefits
Expanding PEV and EVSE Presence In Small To Mid-Size Communities

- State and Local Policy:
  - Initially focus on comprehensive regional plans
    - Lays the foundation for PEVs and why they should be supported at the state and local levels
    - Identify and target the support of high-level state officials

- Central Hub and Point of Contact:
  - Establish an umbrella organization over all PEV-related activities
    - Serves as single point-of-contact for technical support and information

- Early and Broad Stakeholder Involvement:
  - Multiple stakeholders must be targeted and involved from the beginning of a PEV program to maximize
    - Support, participation and ownership
    - Maximizes breadth of communication distribution channels
Expanding PEV and EVSE Presence: cont’d

• Establish Tracking Mechanisms:
  – Establish robust measures for tracking PEV sales and EVSE installations to gauge progress and encourage enthusiasm

• Auto Dealers:
  – Work with to ensure PEV and charging infrastructure awareness
  – Partner as much as possible to support their PEV sales, including development of innovative incentive programs

• EVSE Charging Infrastructure:
  – Develop PEV charging infrastructure
  – It may initially require government and/or utility ratepayer support given the current low profitability potential

• Incentives: (Dollars are always nice)
  – Aggressively pursue incentives and grants through a variety of sources (e.g., state, utilities, settlement funds, and foundations) to support the purchase of PEVs and installation of EVSE
Expanding PEV and EVSE Presence: cont’d

• Outreach and Education:
  – Develop website information, social media, advertising, and events
  – Maximize leveraging of existing events (e.g., National Drive Electric Week) to reduce logistical costs

• Clean Cities and EV Everywhere:
  – Coordinate with and leverage the resources of state/local Clean Cities Coalitions and EV Everywhere in order to:
    • Augment technical assistance, stakeholder identification and participation, consumer education and outreach
    • Take advantage of incentives with a strong focus on workplace charging

• Cultural and Climatic Factors:
  – Be cognizant of state and local cultural and climatic factors that may positively or negatively impact acceptance of PEVs and establishment of recharging infrastructure
DEV Program Future Plans in 2016

- A new round of consumer/dealer incentives (Dollars are always nice)
  - Greater quantities and at higher incentive levels, to be distributed on an as-needed basis to support more rapid use of available funds

- Continuation of the marketing campaign
  - Placing greater emphasis on search engine optimization techniques to drive “organic” visits to the DEV website

- Utilization of a consumer survey to develop new campaign themes and measure the effectiveness of the distribution channels
For publications and general PEV and charging infrastructure information, visit http://avt.inl.gov