Charging Infrastructure: What, Where, and How Many?

• Moderator:
  • Andrew (Drew) Frye, Program Manager of Grid Edge Technology and Electric Vehicle Strategy, Tennessee Valley Authority

• Speakers:
  • Patty Readinger, Manager, Government Affairs & Public Policy, Electrify America
  • Colin Mellor, Eastern Regional Lead, Environmental Policy Unit, North Carolina Department of Transportation
  • Claus Daniel, Director, Sustainable Transportation Program, Oak Ridge National Laboratory
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Andrew (Drew) Frye, Program Manager of Grid Edge Technology and Electric Vehicle Strategy, Tennessee Valley Authority
drive electric Tennessee Stakeholders

The following Key Contributors and participating organizations attended events and developed & reviewed key deliverables over the past several months.

Key Contributors:

- Atlas Public Policy
- Bridgestone
- BYD
- CDE Lightband
- ChargePoint
- City of Nashville
- City of Knoxville
- City of Chattanooga
- Cummins Filtration
- Draft Agency
- General Motors
- Greenlots
- GRIDSMART
- Local Motors
- Nissan
- Schneider Electric
- Sierra Club
- SoftServe
- Southern Alliance for Clean Energy (SACE)
- Southeast Energy Efficiency Alliance
- Stantec
- Tennessee Automotive Association
- University of Tennessee – Knoxville
- Vanderbilt University
- Volkswagen

Participants:

- Department of Environment & Conservation
- TDOT Department of Transportation
- Oak Ridge National Laboratory
- TVA
- Tennessee Tech
- TENNESSEE CLEAN FUELS
- KUB Knoxville Utilities Board
- MLGW
- CARTA
- EBP
The following Name and Vision define who we are and our outlook on Tennessee’s transportation sector. The Mission describes, at a high level, how we will achieve the vision.

**Vision:** Driving Tennessee to become an electric transportation leader in the Southeast

**Mission:** Collaboratively pursuing initiatives that will significantly increase EV adoption from 5,000 EVs today to 200,000 EVs by 2028, guided by shared principles that benefit all residents of Tennessee
Opportunity Areas and Goals

Contributors established four Opportunity Areas to categorize actions described in a Roadmap. **Opportunity Areas** are aligned with **Goals** and contain various Initiatives with individual Projects.

<table>
<thead>
<tr>
<th>1</th>
<th>Driving Charging Infrastructure Availability</th>
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<tbody>
<tr>
<td><strong>Goals</strong></td>
<td>Develop a charging infrastructure that enables Tennessee residents to (1) drive and charge an EV in their daily lives (home, work, and public charging) or (2) access electric public transit options</td>
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<th>2</th>
<th>Driving Awareness</th>
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<td><strong>Goals</strong></td>
<td>Increase awareness and first-hand experience of the benefits of driving an EV such that the majority of vehicle owners are aware of EVs when they begin their next purchasing process</td>
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<th>3</th>
<th>Driving Innovative &amp; Supportive Policies</th>
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<tr>
<td><strong>Goals</strong></td>
<td>Create consistent, innovative, and supportive policies across Tennessee at the state, county, city, and utility levels, inclusive of incentives, electricity rates, planning standards, and other policies and programs</td>
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<th>4</th>
<th>Driving EV Availability, Offerings &amp; Innovation</th>
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<tbody>
<tr>
<td><strong>Goals</strong></td>
<td>Make EV models viable, accessible, and comparable purchasing alternatives to traditional vehicles</td>
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Driving Charging Infrastructure Availability

The following three Initiatives support the Driving Charging Infrastructure Availability Opportunity Area:

<table>
<thead>
<tr>
<th>Driving Charging Infrastructure Availability</th>
<th>Initiative to guide coordinated future EVSE efforts including a statewide needs assessment, benchmarking, and strategic planning projects</th>
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<tbody>
<tr>
<td>EV Infrastructure Coordination &amp; Planning</td>
<td>Initiative to install public EVSE, focusing on areas identified in the EV Infrastructure Coordination &amp; Planning Initiative</td>
</tr>
<tr>
<td>EV Infrastructure Build-Out</td>
<td>Initiative to ensure the usefulness and functionality of all installed EVSE on an ongoing basis, preventing disrepair</td>
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Patty Readinger, Manager, Government Affairs & Public Policy, Electrify America
Our transformational opportunity: the largest single investment ever made in infrastructure, education and awareness, and access to drive ZEV adoption

Our Mission

Electrify America will be a catalyst for promoting ZEV adoption by offering transformative, customer-centric infrastructure and energy management solutions.

Our Company

Electrify America is a subsidiary of Volkswagen Group of America created to implement the $2 billion ZEV Investment Commitment. We have recruited talent from across diverse industries.

Our Approach

Electrify America is a data-driven company committed to increasing the use of ZEV technology.
Cycle 1 investment will create a robust DC charging network linking U.S. highways and major metropolitan areas

- **42 states**
- **17 large metros**
- **86 metros***
- **484 stations**
- **2000+ DCFC**
- **2800+ Level 2s**

Station spacing:
- Average: 70 miles*
- Maximum: 120 miles

Chargers per site:
- Average: 5
- Minimum: 4 Maximum: 10

Charging speed
- 3 to 20 miles per minute

* Highway sites in MSAs with more than 500,000 population

*48 miles in California
Cycle 2 investments will be made in 18 metropolitan areas across the country:

- Seattle MSA
- Bremerton MSA
- Olympia MSA
- Portland MSA
- Las Vegas MSA
- Boulder MSA
- Chicago MSA
- Baltimore MSA
- Miami MSA
- Boston MSA
- Washington D.C. MSA
- Atlanta MSA
- Philadelphia MSA
- New York MSA
- Bridgeport MSA
- Honolulu MSA
Challenges to investment persist

1. **Permitting Delays**
   
   Current construction bottlenecks in many areas of the country, especially California, are due to lengthy permitting durations.

2. **Lack of ZEV Vehicles and Users**
   
   The higher purchase cost associated with a ZEV vs. an ICE vehicle remains a barrier to wider ZEV adoption.

3. **Need for Education & Awareness Efforts**
   
   Focused investment to raise consumer education and awareness is needed by all sectors to educate and encourage ZEV adoption.

4. **ZEV Consideration Remains Low**
   
   ![](chart.png)

   - **2014**
     - Haven't; won't
     - Haven't; maybe some day
     - Idea occurred; no steps taken
     - Already own; lease
     - Info gathered; not serious
     - Actively shopped
   - **2017**
States and cities can create policy environments to encourage ZEV adoption and investment

- Sending Long-Term Signal to Market
- Reducing PEV Operational Costs
- Improving Economic Viability of EVSE
- Improving PEV and EVSE Planning
- Increasing Awareness and Education
- Reducing Upfront Costs

Analysis by NASEO and Cadmus found sending a long-term signal to the market and reducing upfront costs were the most powerful policy tools to drive ZEV adoption.

PEV Policy Evaluation Rubric: https://naseo.org/Data/Sites/1/pevpolicyrubricmethodology_naseo.pdf
We look forward to continued collaboration to drive ZEV adoption

Thank you
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Colin Mellor, Eastern Regional Lead, Environmental Policy Unit, North Carolina Department of Transportation
Executive Order No. 80
North Carolina’s Commitment to Address Climate Change and Transition to a Clean Energy Economy

The State of North Carolina will strive to accomplish the following by 2025:

a. Reduce statewide greenhouse gas emissions to 40% below 2005 levels

b. Increase the number of registered, zero-emission vehicles (ZEVs) to at least 80,000

c. Reduce energy consumption per square foot in state-owned buildings by at least 40% from fiscal year 2002-2003 levels
FHWA & NCDOT
Designated EV Recharging Corridors

Interstate Routes
- EV Signage Ready
- EV Signage Pending
- EV Not Signage Ready
- DC Fast Charging Stations
- County Boundaries
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Claus Daniel, Director, Sustainable Transportation Program, Oak Ridge National Laboratory
The DOE National Transportation Research Center is the portal to Oak Ridge National Laboratory for everything automotive, truck, and mobility sciences.
Three Driving Forces Transforming All of Mobility

**Automated Vehicles**
Navigate and travel without the need for human guidance

**Connected Vehicles**
Communicate with other vehicles, surrounding infrastructure, and traffic controllers

**Electric Vehicles**
Propelled using batteries and electric motors or hybrid gasoline-electric
Consortium Mission:
To involve key stakeholders from the public and private sectors to assess, develop, and deploy new intelligent mobility innovations in Tennessee
Questions

Thanks to 240+ colleagues, our partners, and

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