Welcome to the TEINA Advisory Group Meeting #4

To maximize our time together, we will utilize the meeting procedures below.

- **WebEx meeting lines** will open 5 minutes ahead of start time to allow participants to log-in early and be connected by meeting time.

- **At the beginning of each session**, please type your name in the chat box to "sign-in" to the meeting.

- **Meetings will be recorded for note taking purposes.**

- **Mute phones when not speaking** to help reduce excess background noise.

- **During conversations**, please feel free to use the chat box to ask questions and provide comments in addition to verbal comments.
Agenda

• Welcome
• Public Comment
• Implication of Modeling Results
• Policy Recommendations
• Draft Report Comments
• Priorities for Implementation
• Public Comment
• Next Steps
Roll Call Introductions – AG Members

Amanda Pietz, ODOT
Greg Alderson, PGE
Thomas Ashley, Greenlots
Philip Barnhart, Emerald Valley EV Assoc.
Chris Chandler, Central Lincoln PUD
Marie Dodds, AAA
Judge Liz Farrar, Gilliam County
Ingrid Fish, City of Portland
Stu Green, City of Ashland

Jamie Hall, General Motors
Zach Henkin, Cadeo Group
Joe Hull, Mid-State Electric Cooperative
Juan Serpa Muñoz, EWEB
Vee Paykar, Climate Solutions
Cory Scott, PacifiCorp
Jairaj Singh, Unite Oregon
Charlie Tracy, Oregon Trail Electric Co-op
Dexter Turner, OpConnect
Roll Call Introductions – Project Team

Mary Brazell, ODOT
Zechariah Heck, ODOT
Jessica Reichers, ODOE
Wayne Kittelson, Kittelson
Chris Bame, Kittelson
Stacy Thomas, HDR
Alexander Nelson, HDR
Chris Nelder, RMI

Britta Gross, RMI
Shenshen Li, RMI
Lynn Daniels, RMI
Rhett Lawrence, Forth
Eric Huang, Forth
Public Attendees and Comment Details

Share name in chat and “yes” if you intend to provide verbal public comment.

Team will share written public comment received a day prior to the meeting at the meeting:

Zechariah.HECK@odot.state.or.us
TEINA Modeling Results

Oregon’s Transportation Electrification Infrastructure Needs Assessment (TEINA)

Evaluate future charging infrastructure needs of light-duty vehicles and other modes of electric transportation.

Recommend policies and implementation priorities to accelerate charging infrastructure.

Zero-Emission Vehicles Goals

- 50,000 (2020)
- 250,000 (2025)
- 1,100,000 (2030)
- 2,500,000 (2035)

90% of new vehicle sales
50% of new vehicle sales
Future Infrastructure Scenarios

**Base Case**
- Anticipates life as if the pandemic never happened
- Proxy for what “business as usual” might have been

**Rapid Recovery**
- Economy returns to previous vigor by the end of 2021
- Anticipates herd immunity to the pandemic is achieved sometime in 2021
- Proxy for an optimistic outlook

**Slow Recovery**
- Economic activity remains depressed through the end of 2024
- Anticipates difficulty in achieving herd immunity to the pandemic
- Proxy for a pessimistic outlook
Nine Use-Cases Studied

- Urban LDV (Light-Duty Vehicle)
- Rural LDV
- Corridor LDV
- Local Commercial & Industrial Vehicles
- Buses (School and Transit)
- TNC (Transportation Network Company)
- Long-Haul Trucking
- Micro-mobility
- Disadvantaged Communities
Modeling Methodology Overview

**Step 1: Vehicle Forecast**
Project OR total number of registered vehicles (or VMT) for each use case and each scenario

**Step 2: ZEVs Forecast**
Project OR total number of ZEVs (or electric VMT) for each use case and each scenario

**Step 3: Chargers Assessment**
Evaluate charging infrastructure need to support ZEV adoption for each use case and each scenario

**Step 4: Disaggregation**
Allocate the chargers to county or census tract level for each use case and each scenario
TEINA Modeling Optimization
# TEINA Modeling Results

**TEINA Results: Number of Chargers Needed (Business As Usual Scenario)**

<table>
<thead>
<tr>
<th>Category</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban LDV</td>
<td>2,000</td>
<td>8,000</td>
<td>39,000</td>
<td>84,000</td>
</tr>
<tr>
<td>Rural LDV</td>
<td>1,000</td>
<td>5,000</td>
<td>22,000</td>
<td>49,000</td>
</tr>
<tr>
<td>Corridor LDV</td>
<td>400</td>
<td>2,000</td>
<td>3,900</td>
<td>6,100</td>
</tr>
<tr>
<td>Local Commercial</td>
<td>10</td>
<td>371</td>
<td>949</td>
<td>1,836</td>
</tr>
<tr>
<td>Buses</td>
<td>15</td>
<td>893</td>
<td>3,318</td>
<td>7,407</td>
</tr>
<tr>
<td>TNC</td>
<td>0</td>
<td>23</td>
<td>193</td>
<td>216</td>
</tr>
<tr>
<td>Long-Haul Trucking</td>
<td>0</td>
<td>39</td>
<td>219</td>
<td>690</td>
</tr>
<tr>
<td>Disadvantaged Communities</td>
<td>100</td>
<td>600</td>
<td>2,700</td>
<td>6,000</td>
</tr>
<tr>
<td><strong>Total Number of Chargers</strong></td>
<td>3,525</td>
<td>16,926</td>
<td>72,279</td>
<td>155,249</td>
</tr>
<tr>
<td><strong>Increase Over 2020 Level</strong></td>
<td>480%</td>
<td>2,050%</td>
<td>4,404%</td>
<td></td>
</tr>
</tbody>
</table>
TEINA Modeling Results

Chargers available need to increase nearly 5-Fold

3,525 16,926 72,279 155,249

2020 2025 2030 2035

Growth in public chargers needed over the next 15 years to meet Oregon's 2035 goal.
### TEINA Modeling Results

**TEINA Results: Light Duty Vehicle Chargers Needed, by Type of Charger (Business As Usual Scenario)**

<table>
<thead>
<tr>
<th></th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workplace Level 2</td>
<td>7,022</td>
<td>32,405</td>
<td>70,429</td>
</tr>
<tr>
<td>Public Level 2</td>
<td>4,472</td>
<td>20,611</td>
<td>44,785</td>
</tr>
<tr>
<td>Public DC Fast Charge (DCFC)</td>
<td>4,411</td>
<td>14,875</td>
<td>29,639</td>
</tr>
</tbody>
</table>

LDV includes: Urban, Rural, Corridor, TNC, Disadvantaged Communities
Micro-Mobility

In 2035, micro-mobility
- Accounts for 25% of urban trips (from 3% today)
- Accounts for 5% of rural trips (from 0% today)

Resulting in 9,400 fewer public chargers (LDV)

Largely served by home 110V outlets
- Broader adoption will require a visible presence of charging at work and public destinations (parks, beaches, museums, …)

Reduction in number of required LDV chargers due to Micro-Mobility
Implications of Analysis for Oregon

**Urban and Rural LDV**
- EVs grow from 33,579 (Dec 2020) to 250,000 in 2025 (192,000 urban + 58,000 rural)
- Chargers grow from 523 DCFC today to 4,411 in 2025 (1406 rural, 880 urban,…); plus 4,500 public L2 and 7,000 workplace
- 90% home charging decreases over time to 60% (2035) as more public charging becomes available and as EV adoption grows in MUDs

**Corridor LDV**
- 2,000 corridor DC fast-chargers required by 2025
- A near-term priority focus is needed on corridor charging (including rural and key destinations)

**TNC (Transportation Network Company)**
- ~15% electric by 2025, 90% electric by 2030, 100% by 2035
- 22% of TNC drivers have access to home charging in 2025
- ~10% of charging needs can leverage urban, corridor chargers

**Disadvantaged Communities (inherent bias in vehicle registrations)**
- 25% chargers added for equity-> by 2035, # chargers/capita = non-disadvantaged communities
Implications of Analysis for Oregon (cont'd)

**Local Commercial & Industrial Vehicles**
- 21% of MDVs are electric by 2035
- 90% depot charging (10% en route), decreasing to 50% depot (2035)

**Buses (School and Transit)**
- In 2035, 75% of the market and 90% of new sales are electric (demand management strategies)
- By 2025, 234 eTransit and 720 eSchool Buses
- Assumed L2 charging for school buses and 60kW charging for transit buses

**Long-Haul Trucking**
- EV growth in Oregon begins 2025-2030
- 1/3 of VMT from out-of-state (CA Advanced Clean Truck Rule 2024-2035)
Questions & Discussion
Overview of Policy Recommendations and Infrastructure Implementation Priorities
This is not a comprehensive set of all stakeholders addressing infrastructure in transportation electrification.
Overall Infrastructure Goals

1. Rapid Deployment of Electric Vehicle Charging Infrastructure
2. Equitable and Accessible Infrastructure
3. User-Friendly, Convenient, Safe and Consistent Charging Experience
4. Lower Electric Fueling Costs for Consumers and Fleets
5. Utility Engagement in Electric Vehicle Charging Statewide
6. Foundational Policies and Resources
Support rapid deployment of EV charging infrastructure

- Develop a statewide ZEV Infrastructure Deployment Strategy
Ensure EV charging infrastructure is equitable and accessible to all Oregonians

- Rural and disadvantaged community investments
- "Charging Deserts" investments – urban and rural
- Enable Charge Ahead charging access
- EVSE at state and federal properties
Ensure the public charging experience is user-friendly, convenient, safe, and consistent

- Public input re: standards for charging experience
- Consistent signage and labeling
Ensure that EV charging offers all consumers the benefit of lower electric fueling costs

- Working groups: utilities, charging providers, stakeholders
- Charging infrastructure incentives
- Appropriate rates for charging
- Streamline EVSE permitting
Ensure utilities are positioned for rapid expansion of EV charging statewide

- Make-Ready investments for LDV charging
- Rate design adjustments
- Workgroups to address
  - DCFC locations
  - Long-term grid impacts
- System resiliency recommendations
Develop foundational policies and provide resources to support stakeholders to build and benefit from a ZEV future

- Educational and technical assistance
- EV-ready building codes and parking ordinances
- Skilled, local workforce
- Public charging options for micro-mobility
Near-Term Priority Policy Initiatives

- ZEV Infrastructure Deployment Strategy
- Target Equity in Charging
- EV-Ready Building Codes
- Statewide Education & Assistance
- State Lead By Example
ZEV Infrastructure Deployment Strategy

• 2 to 5 year focus, including opportunities for targeted state investment.
Target Equity in Charging

• Ensure charging access for those eligible for Charge Ahead rebate.
• Incentivize workplace charging at employers, emphasizing women and minority-owned businesses and similar groups.
• Incentivize investment in charging deserts in rural areas.
EV-Ready Building Codes

• Update Oregon’s building codes and parking ordinances to make them Electric Vehicle ready
Statewide Education & Assistance

- Create proactive outreach program that is comprehensive, hands-on, and targets high priority markets.
- Fact sheets, technical resource documents, and website content.
- Serve as an initial point of contact, referring individuals to utilities and other resources.
- Provide guidelines and model processes for streamlining permitting.
State Lead By Example

• Lead by example: install charging at state buildings and offices, for employees and visitors
Key Infrastructure Implementation Priorities

1. Focus on light-duty Zero-Emission Vehicle charging infrastructure: Urban, Rural, Corridor

2. Support on-site depot charging for public and private fleet electrification

3. Plan for and support medium and heavy-duty Zero-Emission Vehicle charging
Light-duty Infrastructure Priorities

**Corridor**
- Expand Oregon’s DCFC network across federal and state highways in a phased approach

**Rural**
- Prioritize rural corridor with DCFC
- Level 2: tourism “charge and shop”, destination, communities
- Federal, state, county, other public lands

**Urban**
- Prioritize DCFC “hubs” – MUD, TNC uses
- Shared L1 and L2 “community” charging sites
- Address costs: equity concern if rely on DCFC
- Prioritize workplace charging at large and women/minority-owned employers
Fleet Depot Charging – Public and Private

LDV – First Focus
Accelerate public/private LDV fleet ZEV adoption by incentivizing on-site public and private fleet charging

Local & Commercial Delivery
- Pilots
- Incentivize shorter routes
- Plan for shorter-range MD trips between major urban centers

Transit & School Bus
- Pilots
- Incentives for EV bus transition
- Utility and transit partnerships
- Educational and technical resources for e-bus operators
  - Transit
  - School bus
Long-Haul Trucking & MHD Public Charging

• Pilots
• Engage with long-haul trucking stakeholders
• Foster support for needed on-site fleet depot charging infrastructure

• Incentives for public charging on long-haul routes
  – Work with utilities on advanced planning for needed public charging infrastructure
Next Steps

Follow through on policy recommendations

Examples:
Utility/stakeholder working groups; statewide educational and technical assistance

ZEV Infrastructure Deployment Strategy

Prioritize near-term actions

Define Charging Deserts, refine implementation targets for next 2 – 5 years

Follow-up Studies

Hydrogen

Micro-mobility

TEINA addendums for stakeholder planning purposes
Advisory Group Discussion
Other Draft Report Comments?
Public Comment
Feedback and Report Timelines

Comments of Draft Report due to Zechariah Heck
Zechariah.Heck@odot.state.or.us

TEINA Final Report

Tuesday
MAY
18

Wednesday
JUNE
30
Thank you!