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

WebEx Navigation

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:

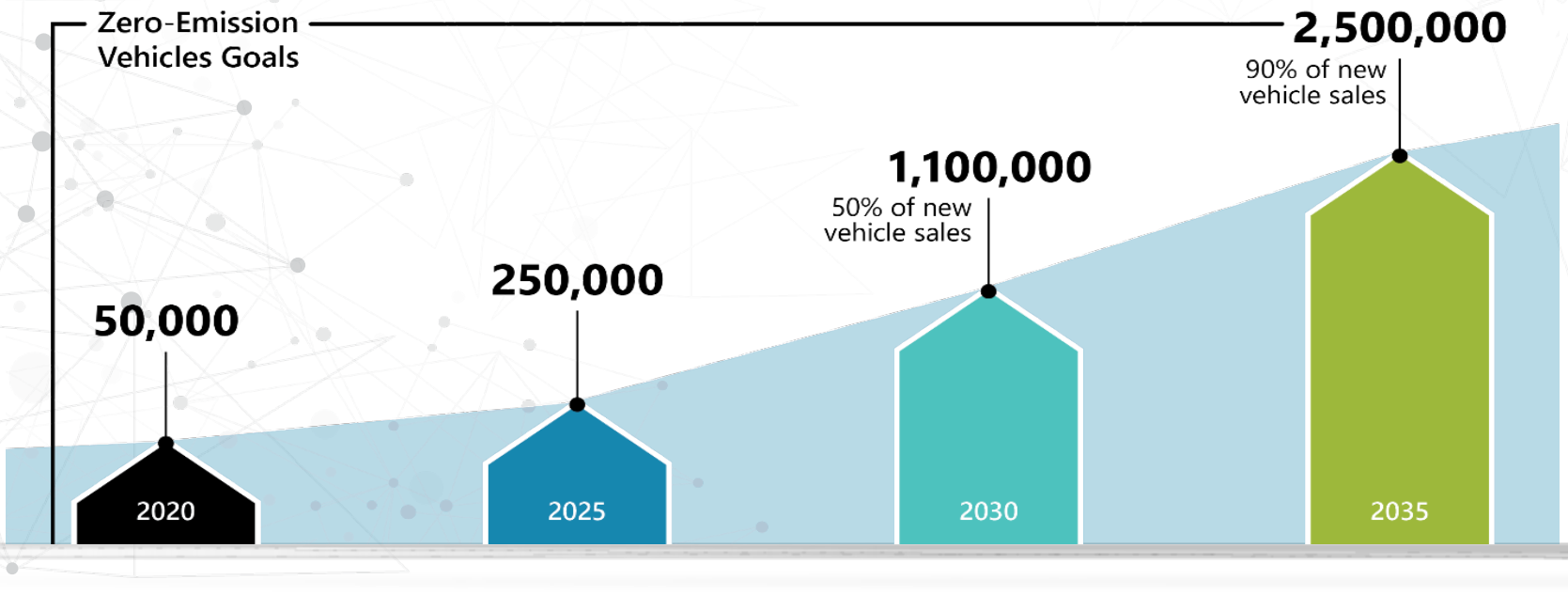
Zechariah.HECK@odot.state.or.us

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.



Future Infrastructure Scenarios

SCENARIO 1

Base Case

- Anticipates life as if the pandemic never happened
- Proxy for what "business as usual" might have been

SCENARIO 2

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

SCENARIO 3

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

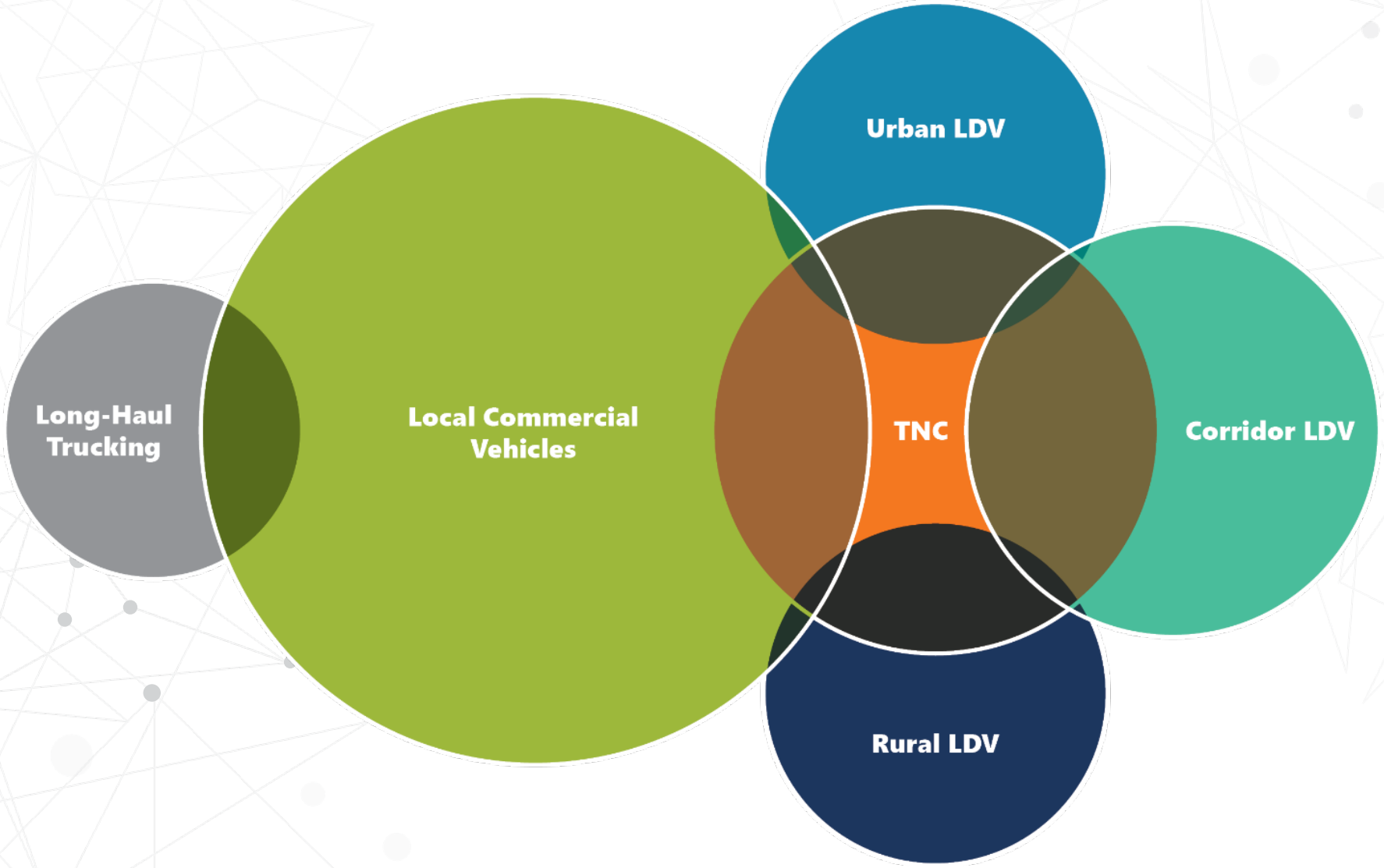
Step 3
Chargers Assessment

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



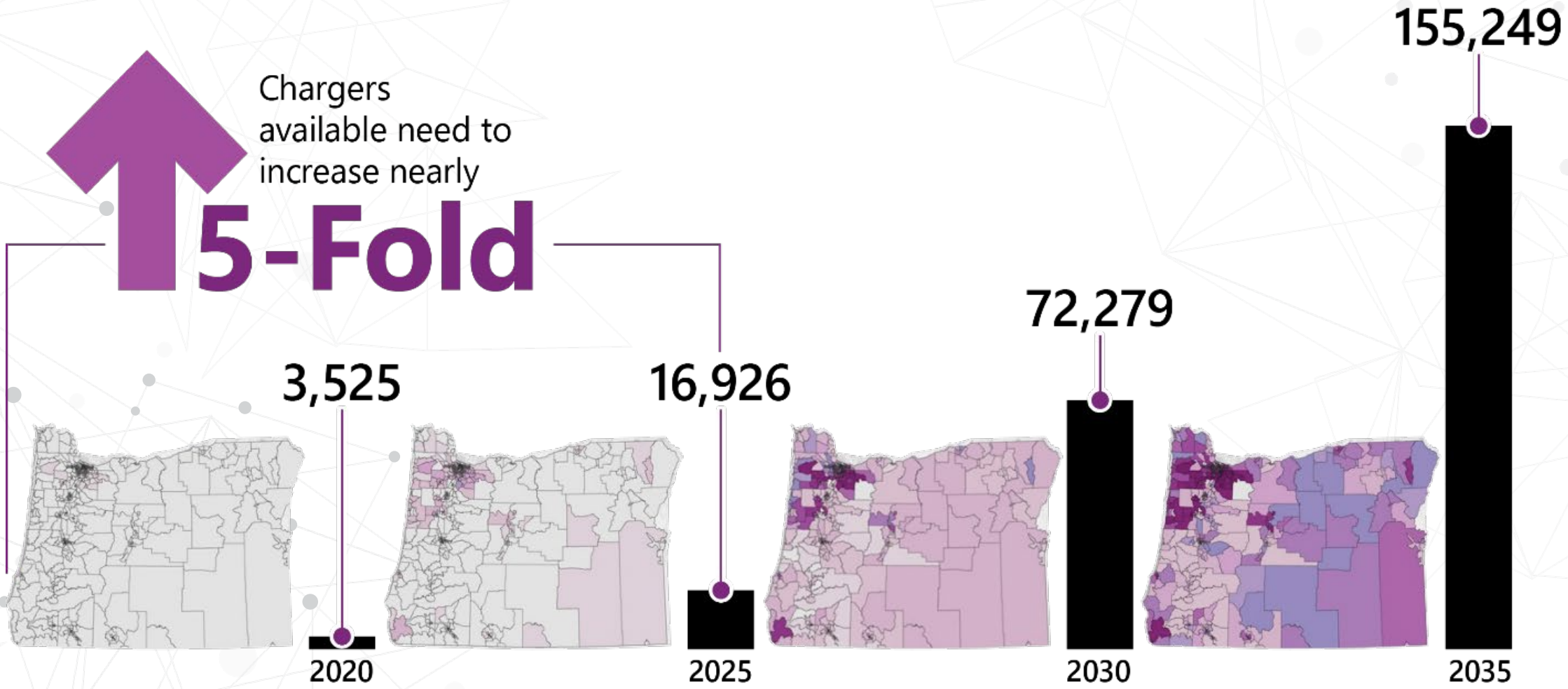
TEINA Modeling Results

TEINA Results: Number of Chargers Needed (Business As Usual Scenario)	2020	2025	2030	2035
Urban LDV	2,000	8,000	39,000	84,000
Rural LDV	1,000	5,000	22,000	49,000
Corridor LDV	400	2,000	3,900	6,100
Local Commercial	10	371	949	1,836
Buses	15	893	3,318	7,407
TNC	0	23	193	216
Long-Haul Trucking	0	39	219	690
Disadvantaged Communities	100	600	2,700	6,000
Total Number of Chargers	**3,525**	**16,926**	**72,279**	**155,249**
Increase Over 2020 Level		480%	2,050%	4,404%

TEINA Modeling Results

Chargers available need to increase nearly

5-Fold



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)	2025	2030	2035
Workplace Level 2	7,022	32,405	70,429
Public Level 2	4,472	20,611	44,785
Public DC Fast Charge (DCFC)	4,411	14,875	29,639

LDV includes: Urban, Rural, Corridor, TNC, Disadvantaged Communities

Micro-Mobility

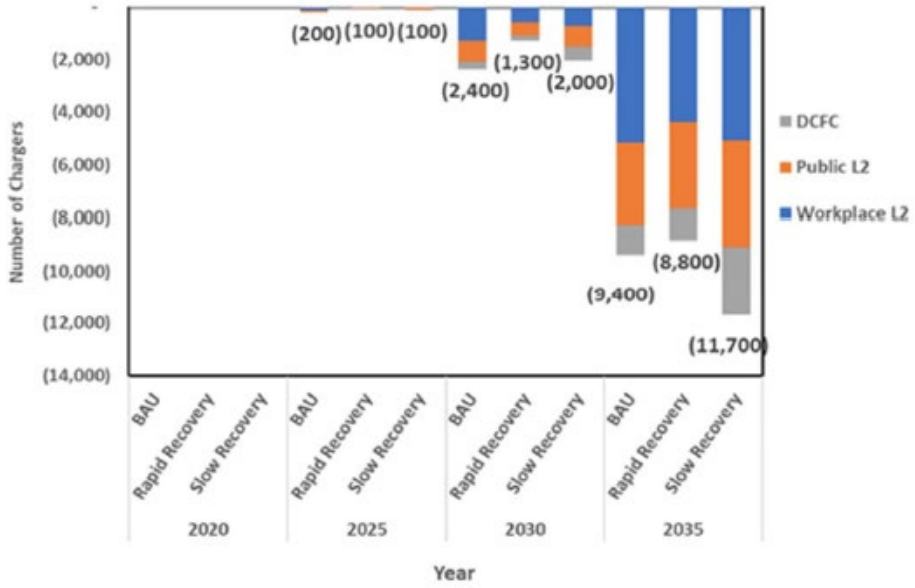
In 2035, micro-mobility

- 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

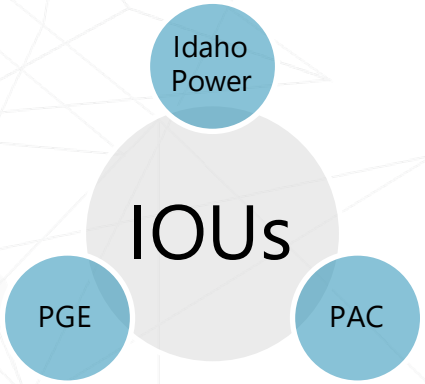
Long-Haul Trucking

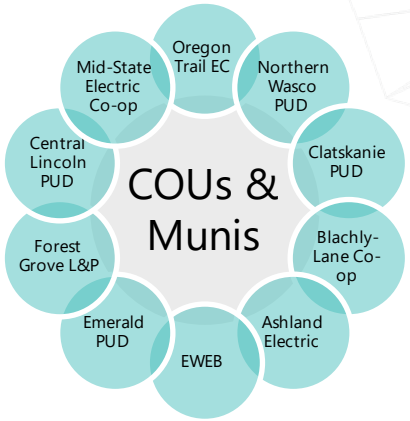
- EV growth in Oregon begins 2025-2030
- 1/3 of VMT from out-of-state (CA Advanced Clean Truck Rule 2024-2035)

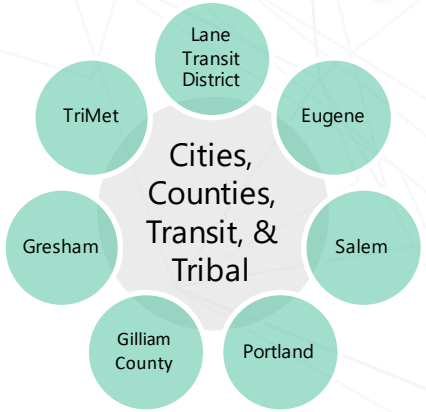
Questions & Discussion

Overview of Policy Recommendations and Infrastructure Implementation Priorities

Infrastructure – Key Players

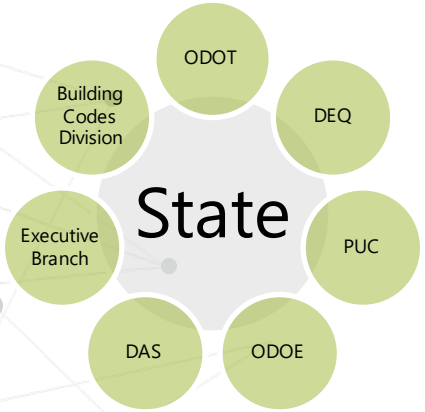


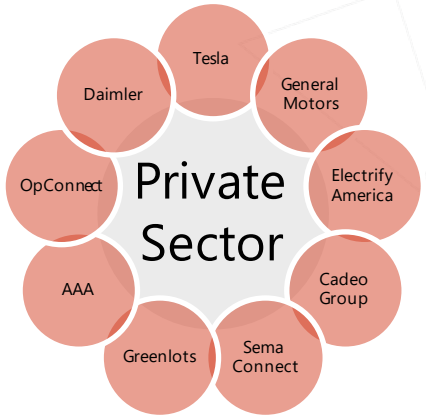




ZEViWG

OEVC





This is not a comprehensive set of all stakeholders addressing infrastructure in transportation electrification.

Overall Infrastructure Goals

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

5 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

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

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

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

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

Tuesday
MAY 18

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

Wednesday
JUNE 30

TEINA Final Report

Thank you!