

Welcome to the TEINA Advisory Group Meeting #3

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.

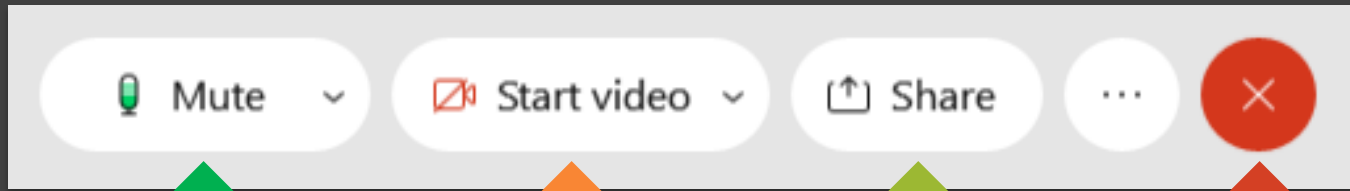


Agenda

- **Welcome**
- **Modeling Results Highlights**
- **Listening Sessions Summary**
- **Policy Orientation**
- **Small Group Breakouts**
- **Public Comment**
- **Next Steps**



WebEx Navigation

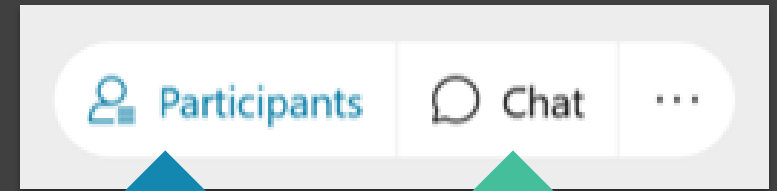


Mute
Unmute

Start/
Stop
Video

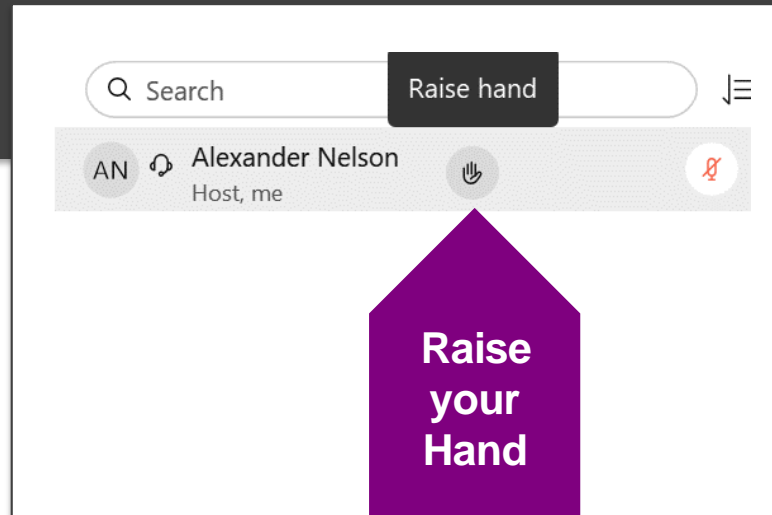
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a Chat



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your
Hand

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*

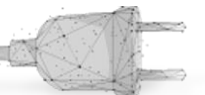
Vee Paykar, *Climate Solutions*

Cory Scott, *PacifiCorp*

Jairaj Singh, *Unite Oregon*

Charlie Tracy, *Oregon Trail Electric Co-op*

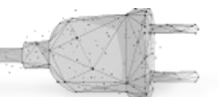
Dexter Turner, *OpConnect*



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*
Kelly Yearick, *Forth*
Eric Huang, *Forth*
Whit Jaimeson, *Forth*



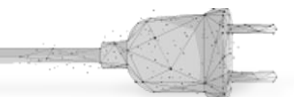
Public Attendees and Comment Details



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

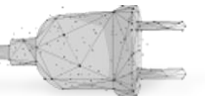
Team will share written public
comment received a day prior
to the meeting at the meeting:

Zechariah.HECK@odot.state.or.us



TEINA Modeling Results

- Oregon Transportation Electrification Goals Review
- Future Infrastructure Scenarios Recap
- Modeling Results by Use Case
 - Urban e-LDVs
 - Rural e-LDVs
 - Transit and School Buses
 - TNCs



Oregon Transportation Electrification Goals

Oregon light-duty Zero Emission Vehicle Goals in the Base Case (SB

1044)

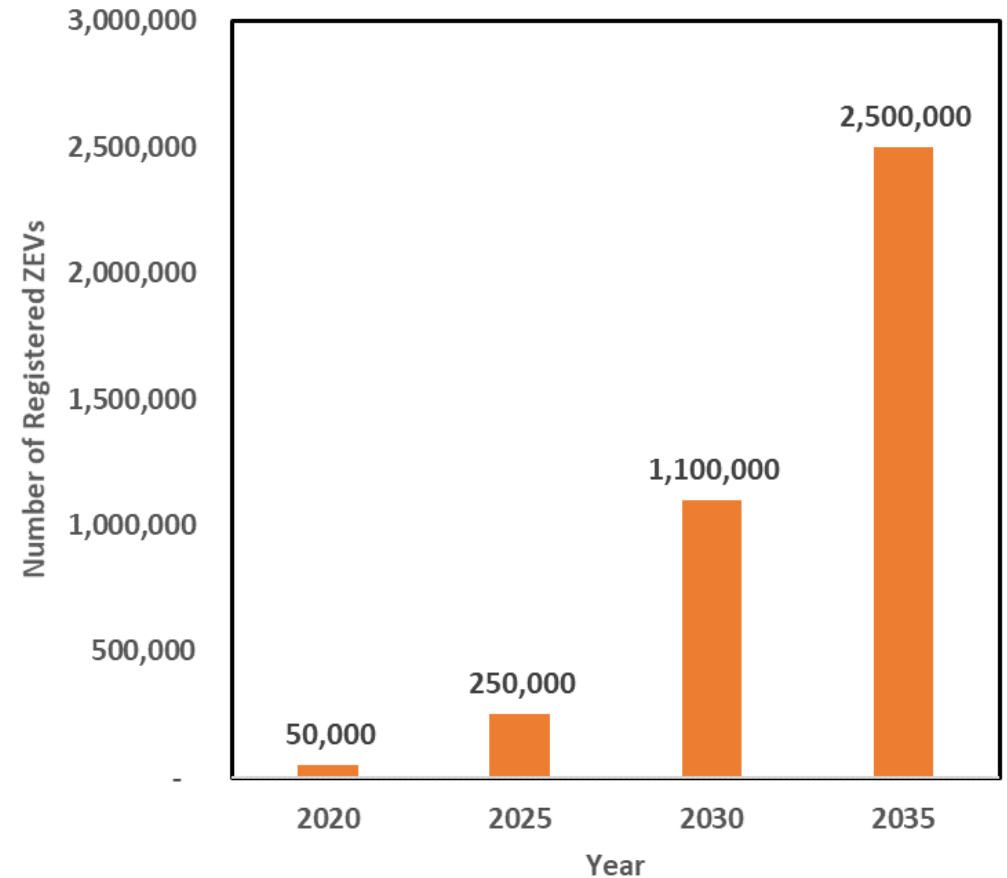
2020 50,000 ZEVs

2025 250,000 ZEVs

2030 25% registered LDVs &
50% annual new ZEV sales

2035 90% annual new ZEV sales

Oregon's ZEV Goals



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

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

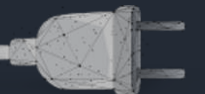
Evaluate charging infrastructure need to support ZEV adoption for each use case and each scenario

Step 4: Disaggregation

Allocate the chargers to county or census tract level for each use case and each scenario



Modeling Results by Use Case



Urban e-LDVs Infrastructure Need

Shares of Different Chargers

| BAU | | Slow Recovery | |
|--------------|-----|---------------|-----|
| Workplace L2 | 55% | Workplace L2 | 45% |
| Public L2 | 33% | Public L2 | 35% |
| DCFC | 12% | DCFC | 20% |

Key Metrics by 2035



ZEVs

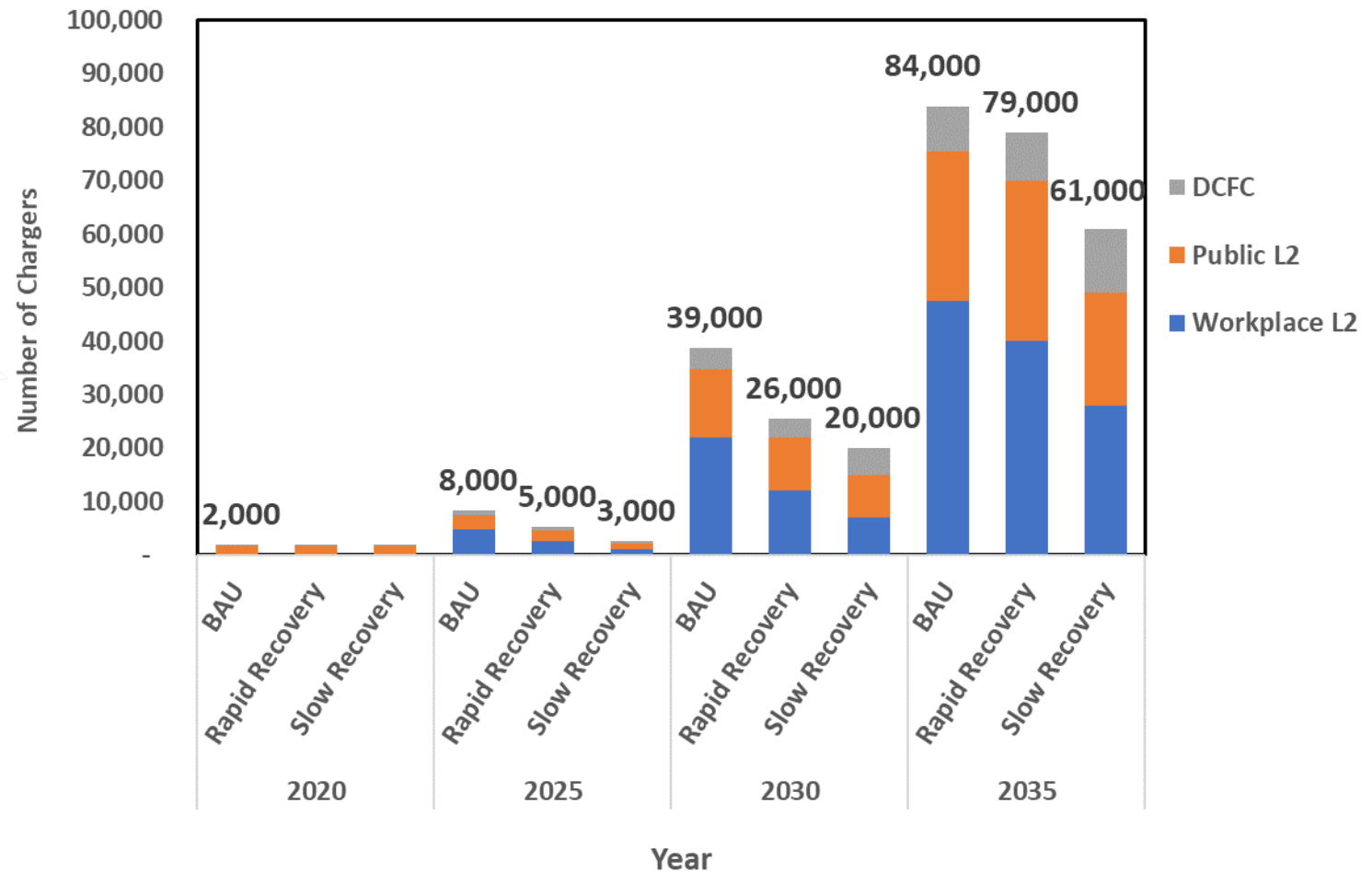
L2 Port 25 ~ 35
DCFC 100 ~ 200



People

L2 Port 40 ~ 70
DCFC 300 ~ 400

Total number of chargers for Urban e-LDVs



Rural e-LDVs Infrastructure Need

Shares of Different Chargers

BAU vs. Slow Recovery

| BAU | | Slow Recovery | |
|--------------|-----|---------------|-----|
| Workplace L2 | 40% | Workplace L2 | 32% |
| Public L2 | 31% | Public L2 | 33% |
| DCFC | 28% | DCFC | 35% |

Key Metrics by 2035



ZEVs

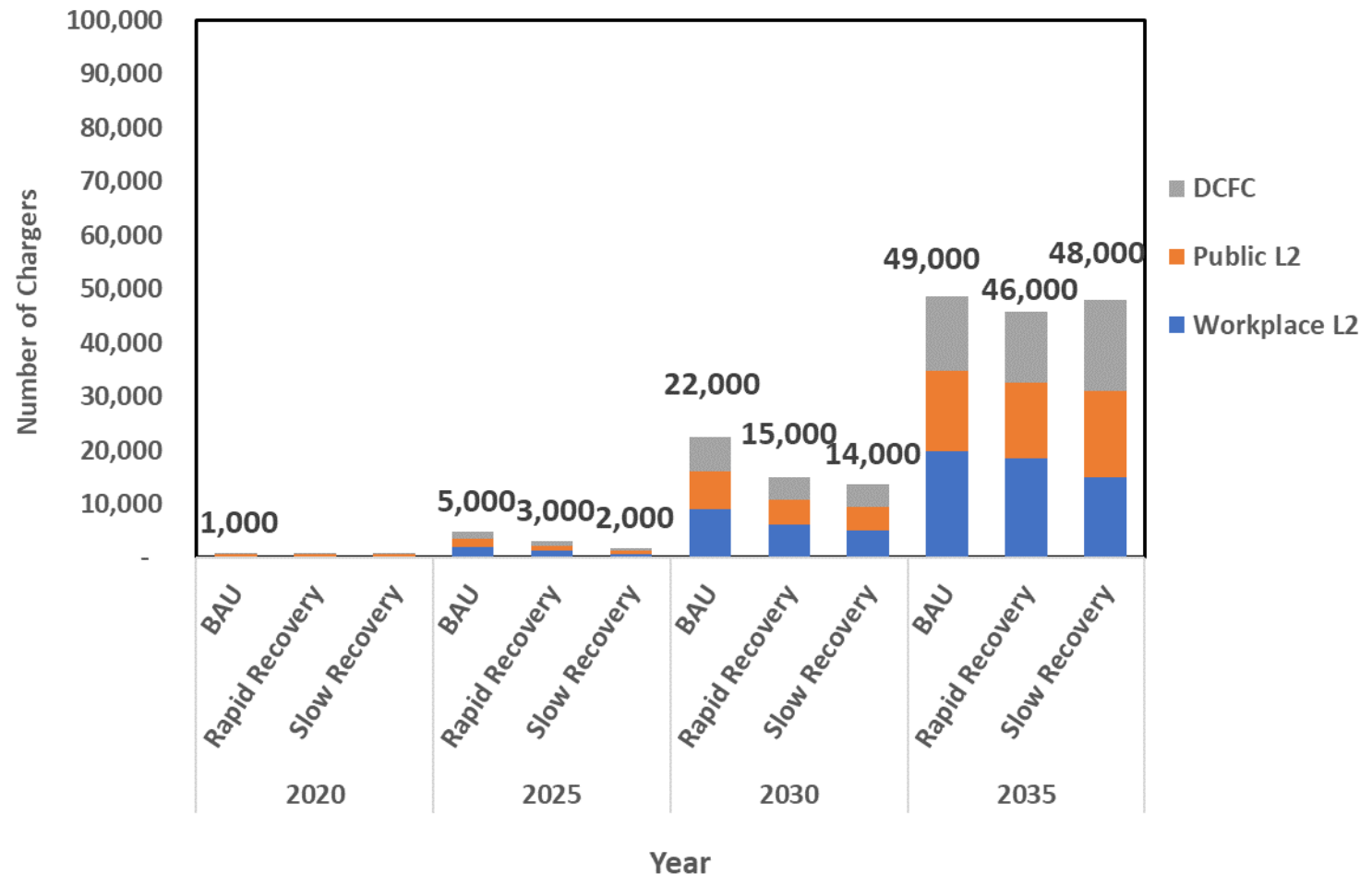
L2 Port 15 ~ 25
DCFC 35 ~ 45



People

L2 Port 50 ~ 60
DCFC 100 ~ 150

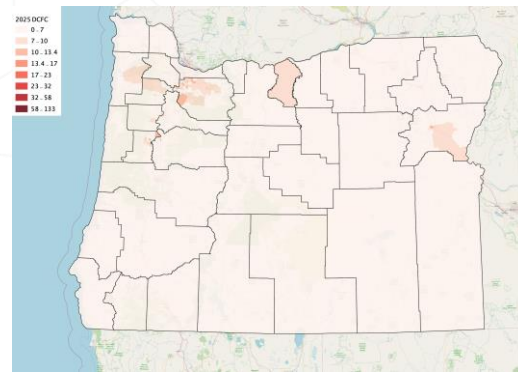
Total number of chargers for Rural e-LDVs



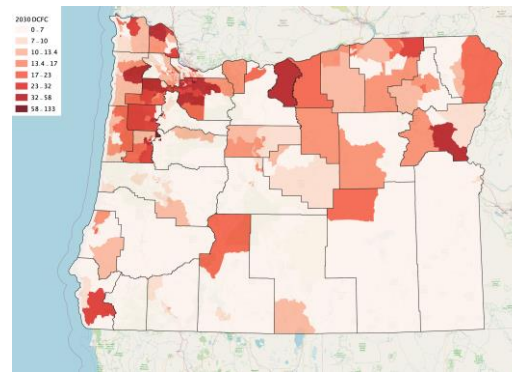
Urban & Rural e-LDVs Infrastructure Distribution By Census Tract (DCFC in BAU Scenario)



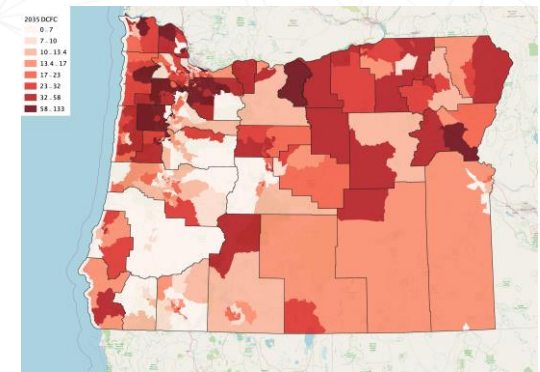
2020



2025



2030



2035

Transit And School Buses Infrastructure Need

Shares of Different Chargers

BAU by 2035

School Bus L2 85%

Transit Bus DCFC 28%

BAU by 2035

School Bus L2 90%

Transit Bus DCFC 10%

Key Metrics by 2035 (BAU)

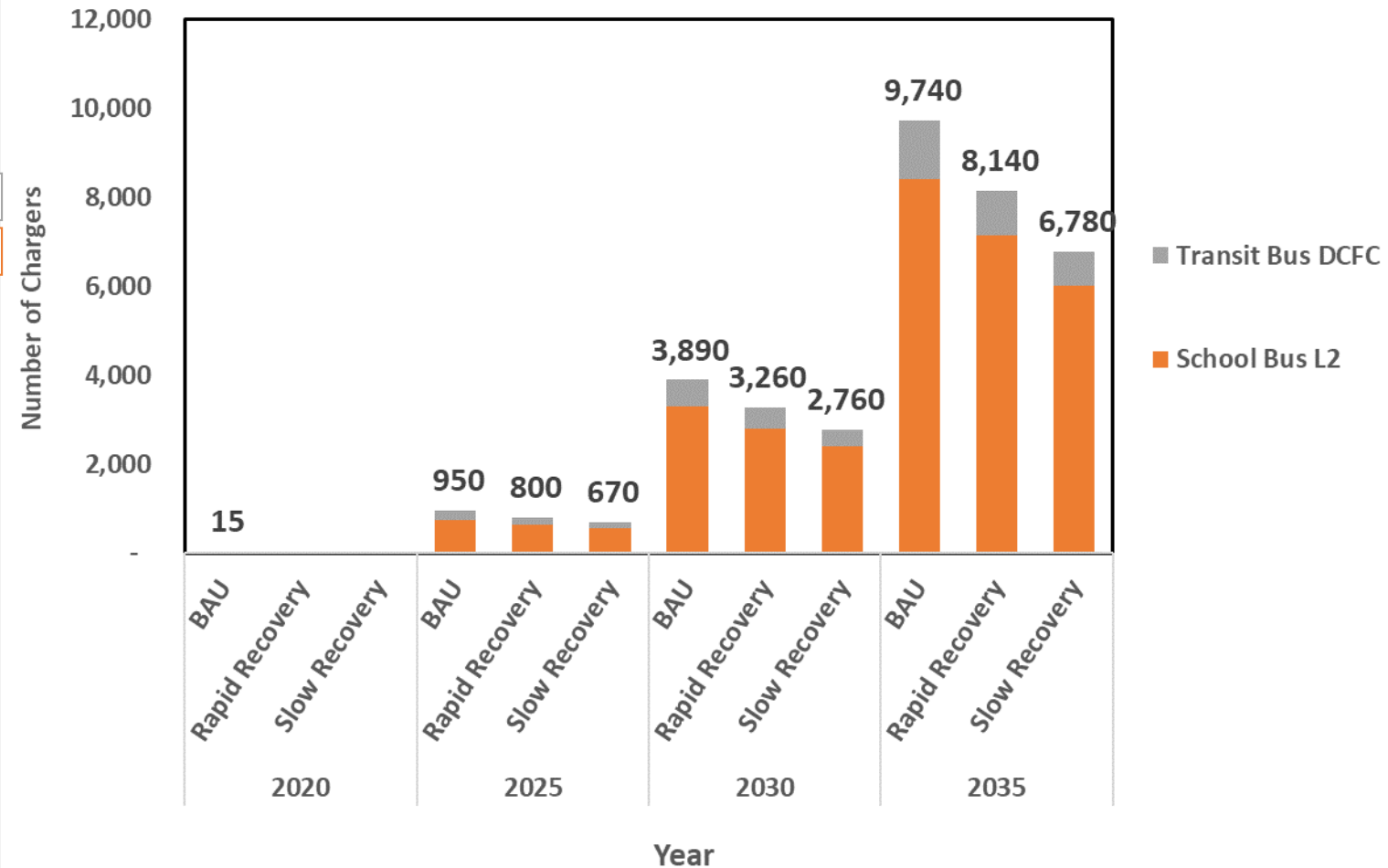
School buses/L2 Port 1

Transit buses/Bus DCFC 2

Students/L2 Port ~ 90

People/Bus DCFC ~ 400

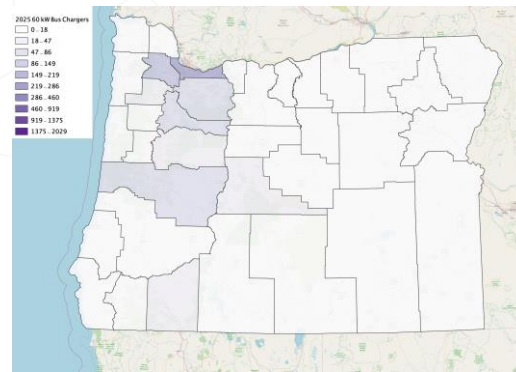
Total number of chargers for e-buses



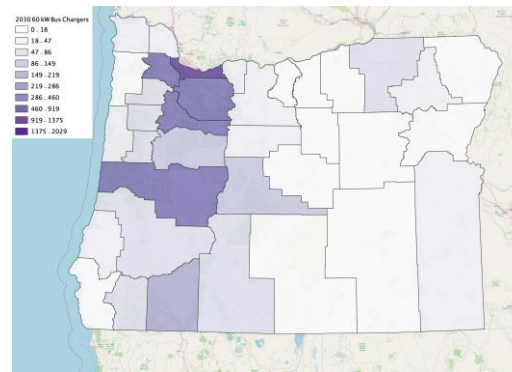
Buses Infrastructure Distribution (DCFC in 2020 Fast Recovery)



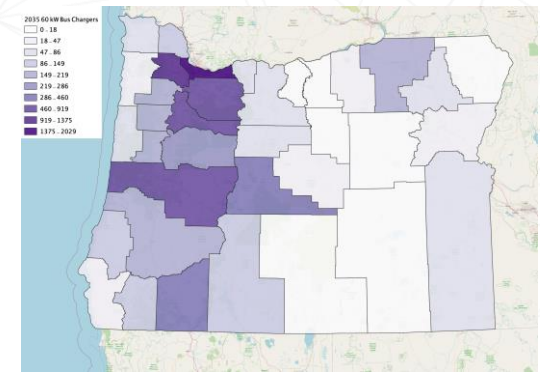
2020



2025



2030



2035

TNCs Public Infrastructure Need

Today in Oregon, TNC demand is treated as part of the public charging demand, so no TNC-dedicated stations have been announced yet

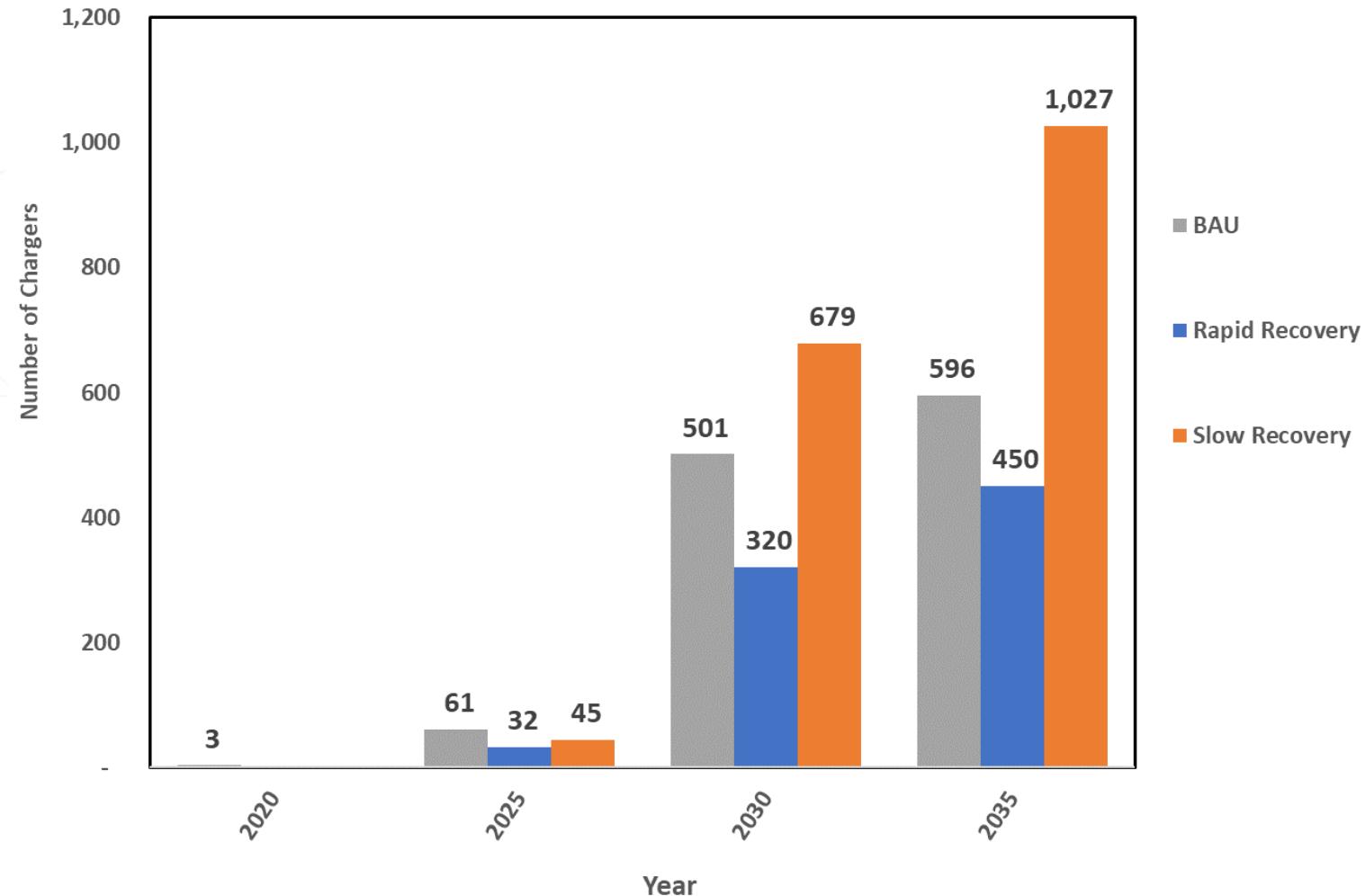
Key Metrics by 2035 (BAU)

44% electricity comes from home chargers

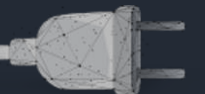
ZEV/DCFC = 15

Synergy is the key!




Total number of chargers for TNCs




Questions & Discussion



Listening Sessions

-  EV Drivers and Advocates
-  Transit Agencies and Providers
-  EV Service Providers
-  Micro-mobility Company Representatives
-  Rural Representatives
-  Workplace Charging Venues
-  Transportation Networking Companies

-  Freight/Delivery Representatives
-  Historically Underserved Community Representatives
-  Developers, Multi-unit Dwelling (MUD) Owners, Property Managers
-  Farming/Ranching Representatives
-  Original Equipment Manufacturers and EV Dealers

Five Key Themes

Upfront Costs

The costs associated with the vehicles, electrical upgrades, and chargers can be a barrier to adoption.

Charging at Multi-Unit Dwellings

MUD residents need to experience the benefits of convenient, reliable, and affordable charging to accelerate adoption.

Public Charging Network

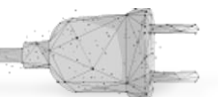
A functional statewide public charging network combined with well-defined, visible signage will create awareness of charging locations, make longer trips possible, help combat range anxiety, and accelerate EV adoption.

Public Charging User Experience

Creating a more positive and equitable user experience at public charging stations is important.

Availability of Vehicle and Equipment

Transit agencies, school districts, farmers, and freight operators are unable to exclusively adopt EVs now due to lack of or limited supply of EVs and equipment.



Individual Sessions



EV Drivers and Advocates

- Address range anxiety
- Standardized charging/user experience



Transit Agencies and Providers

- Lack of equipment
- High upfront costs



EV Service Providers

- Streamline permitting processes
- Difficulties with installing at MUDs
- Address demand charges



Micro-mobility Company Representatives

- Policies supporting safety; safe road conditions
- Secured storage and parking

Individual Sessions (cont.)



Rural Representatives

- Ability to travel long distances
- Availability of EV trucks and SUVs



Workplace Charging Venues

- Keeping up with demand is challenging – but future need is uncertain (Work-at-home long-term)
- Employees overstaying time on chargers



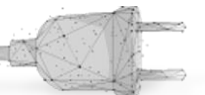
Transportation Networking Companies

- Issues at charging stations – broken chargers, faulty card readers, queues
- More chargers needed where people gather – retail, grocery stores



Freight/Delivery Representatives

- Charging and power capacity
- High costs of vehicles and infrastructure



Individual Sessions (cont.)



Historically Underserved Community Representatives

- Charging access for MUD residents
- Education and awareness



Developers, Multi-unit Dwelling (MUD) Owners, Property Managers

- Retrofit challenges/high costs
- EV-ready incentives



Farming/Ranching Representatives

- Reliability and charging time
- Cost-effectiveness



Original Equipment Manufacturers and EV Dealers

- Incentives/rebates drive adoption
- Range anxiety

Overview of Policy Recommendations for TEINA Advisory Group

Policy Categories

Enable

Policies that remove barriers to deployment of electrification infrastructure with the lowest difficulty of execution and implementation for the State of Oregon and other entities in the near term. This will enable local jurisdictions and key stakeholders to implement charging infrastructure.

Accelerate

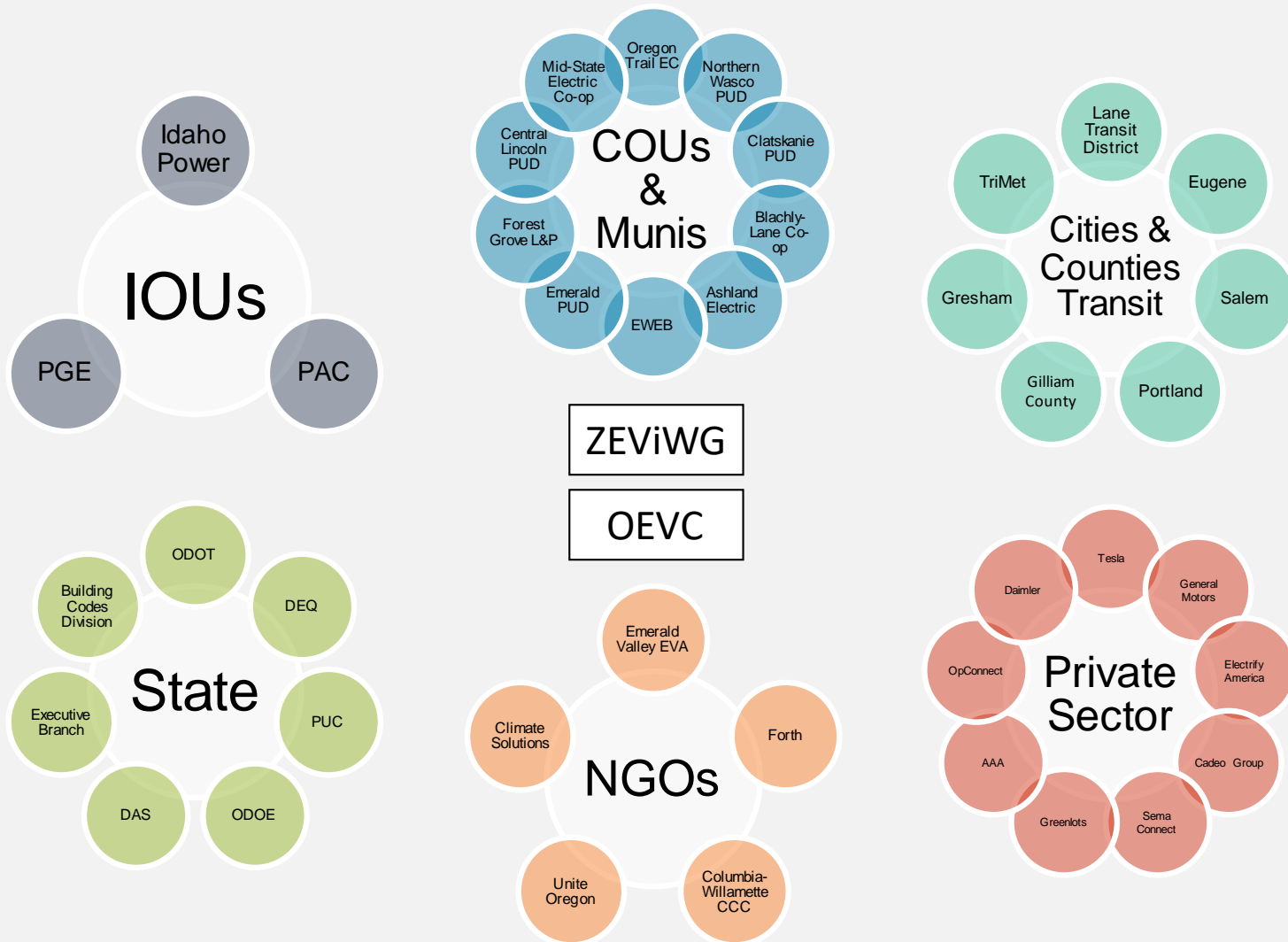
Policies that could speed up the deployment of electrification infrastructure with medium difficulty of execution and implementation for the key players over the medium term. This will allow the State to put in place a conducive environment for charging infrastructure deployment and give other entities the time to develop the appropriate systems.

Drive

Policies that might take longer or be more difficult to implement, but could rapidly accelerate the deployment of electrification when done. This will allow the State to influence charging infrastructure deployment at specific areas that local jurisdictions and the market will not be able to provide for.



Infrastructure – Key Players



- Many players are active in expanding charging infrastructure
- Most players are acting separately
- No overall ZEV charging infrastructure strategy

Important Relationships

- Oregon PUC actively driving transportation electrification plans of the IOUs
- Forth is a critical connector between stakeholders, working closely with public utilities
- ZEVWG and OEVC are coordinating bodies, with emphasis on state agencies

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

Common Themes from Listening Sessions

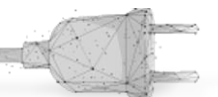
**Upfront costs
for both
vehicles and
charging
infrastructure**

**Charging at
Multi-Unit
Dwellings
(MUDs)**

**Statewide
Public
Charging
Network**

**Public
Charging
User
Experience**

**Availability of
Vehicles and
Equipment**



Enable

Investigate and develop standards for consistent EVSE user experience, reliability, and redundancy

Theme(s) Addressed

Public Charging User Experience
Public Charging Network

Use Cases Impacted

Urban LDV
Rural LDV
Corridor LDV
Disadvantaged Communities
TNCs

Enable

State directs and incentivizes public utilities to use Clean Fuels revenue to fund public DCFCs and Level 2 EVSE in areas with relatively high population densities

Theme(s) Addressed

Upfront Costs
Public Charging Network
User Experience

Use Cases Impacted

Urban LDV
Rural LDV
Corridor LDV
Disadvantaged Communities
TNCs

Enable

State directs and encourages Public Utility Commission (for IOUs) and public utilities/their governing bodies to pursue additional DCFC deployment through innovative rate design that mitigates demand charge impacts

Theme(s) Addressed

Upfront Costs
Public Charging Network
Public Charging User Experience

Use Cases Impacted

Rural LDV
Corridor LDV
Long Haul Trucking

Accelerate

State incentives
for public EVSEs

Theme(s) Addressed

Upfront Costs
Public Charging Network
Public Charging User Experience

Use Cases Impacted

Urban LDV
Rural LDV
Disadvantaged Communities
TNCs

Accelerate

State adoption of long-term EV-readiness requirements and Reach Codes for local municipalities

Theme(s) Addressed

Charging at Multi-Unit Dwellings

Use Cases Impacted

Urban LDV

Disadvantaged Communities

Micromobility

Drive

State funds infrastructure deployment on State-owned property

Theme(s) Addressed

Upfront Costs
Public Charging Network
Public Charging User Experience

Use Cases Impacted

Urban LDV
Rural LDV
Corridor LDV
Disadvantaged Communities
Local & Commercial Industrial Vehicles
Transit/School Buses
Long Haul Trucking

Drive

Require X% of parking spaces be EV-ready by 202x

Theme(s) Addressed

Charging at Multi-Unit Dwellings

Use Cases Impacted

Rural LDV

Disadvantaged Communities

TNCs

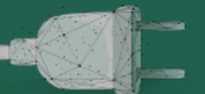
| | Urban LDV | Rural LDV | Corridor LDV | Disadvantaged communities | Local commercial & industrial vehicles | Transit & school bus | TNCs | Long-haul trucking | Micro-mobility |
|---|-----------|-----------|--------------|---------------------------|--|----------------------|------|--------------------|----------------|
| Consistent EVSE user experience & reliability/redundancy | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ |
| State encourage utilities develop rates to mitigate demand charge impacts on DCFCs | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| State incentivizes public utilities to use Clean Fuels revenue to support or fund public DCFCs and Level 2 EVSE | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | |
| State provides funding or low/no interest financing for public EVSEs | ✓ | ✓ | | ✓ | | | ✓ | | |
| State adoption of long-term EV-readiness requirements & Reach codes | ✓ | | | ✓ | | | ✓ | | ✓ |
| State funded infrastructure deployment on State property | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| Require certain % of parking spaces to be EV-ready by 202x | ✓ | ✓ | | ✓ | | | ✓ | | |



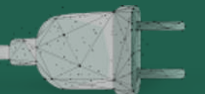
Breakout Sessions

What are your reactions to the list of policy recommendations you've been presented with? What's missing from that list overall, and what is problematic?

- How about your specific use cases? What else should be included to address those specific needs (within the scope of what TEINA can do)?



Public Comment



Next Steps

Provide any additional comments on policy recommendations *by March 15*

Next (last) AG Meeting *on May 11*

- Review Draft Final Report

