EV COUNCIL

INTERAGENCY ELECTRIC VEHICLE COORDINATING COUNCIL

Washington Transportation Electrification Strategy

Update for the Joint Transportation Committee

JUNE 20, 2023

Steven Hershkowitz
TRANSPORTATION ELECTRIFICATION POLICY LEAD

COMMERCE - ENERGY DIVISION

Hannah Thonet and Ben Shapiro
PROJECT MANAGERS

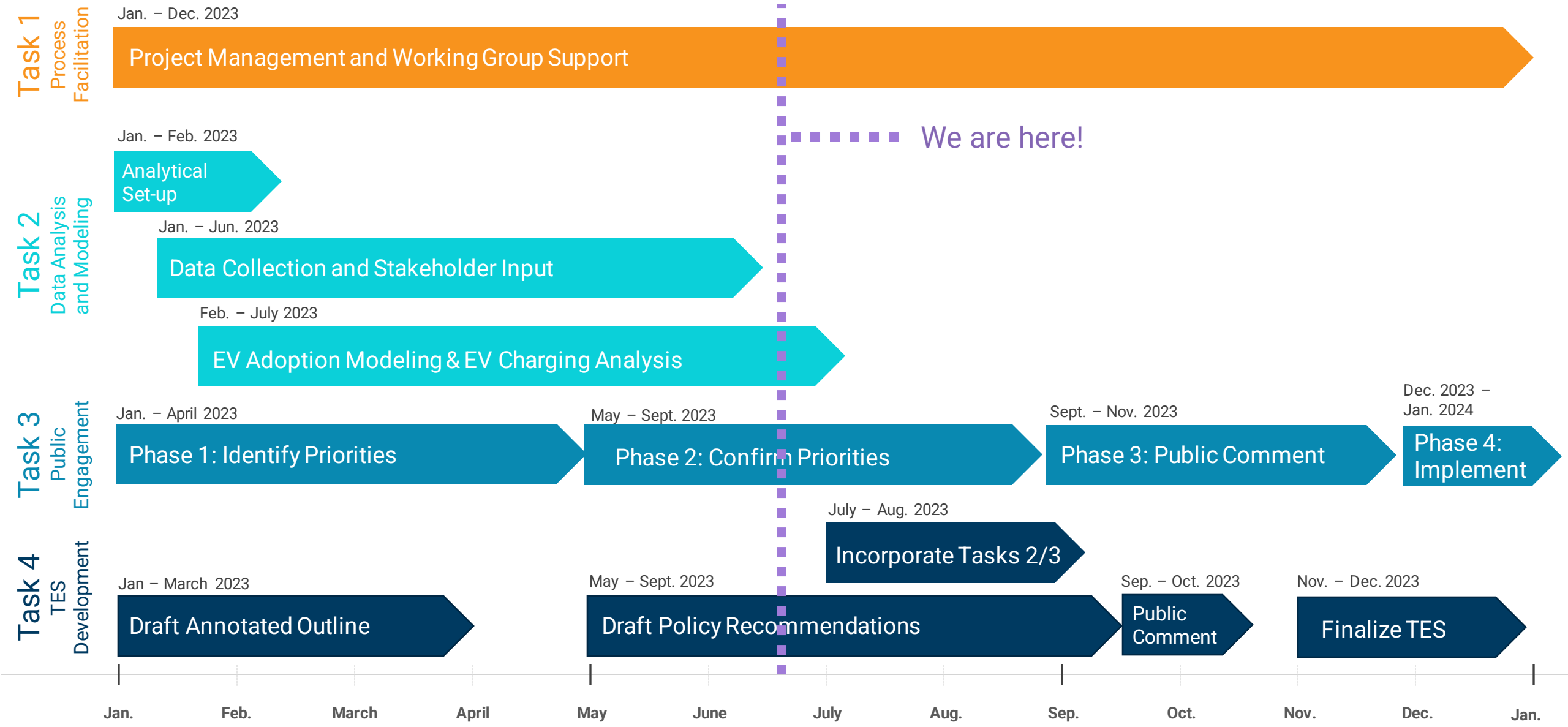
RMI

Move Ahead WA creates electric vehicle planning effort

- Sets 2030 target for 100% new passenger EV sales
- Creates EV Council to develop a Transportation Electrification Strategy (TES)
- Strategy must include recommended actions to meet 2030 target
- Due Dec. 31, 2023

The TES is our clean vehicles action plan

1. Implementation roadmap for equitably achieving our 2030 climate objectives:
    - Reaching 2030 EV target
    - Ensuring 40% of benefits reach overburdened communities and vulnerable populations
2. Addressing gap remaining to meet 2030 emissions limit
    - Strategic actions for transportation emission reductions through:
        - Reducing vehicle miles travelled to make transportation energy more efficient
        - Non-road sectors including aviation, marine, rail, and agricultural/yard vehicles
        - Clean fuels, including green hydrogen and synthetic drop-in fuel
        - Early retirement of gasoline and diesel vehicles


Task 1
Process Facilitation
Jan. – Dec. 2023
Project Management and Working Group Support
We are here!
Task 2
Data Analysis and Modeling
Jan. – Feb. 2023
Analytical Set-up
Jan. – Jun. 2023
Data Collection and Stakeholder Input
Feb. – July 2023
EV Adoption Modeling & EV Charging Analysis
Task 3
Public Engagement
Jan. – April 2023
Phase 1: Identify Priorities
May – Sept. 2023
Phase 2: Confirm Priorities
Sept. – Nov. 2023
Phase 3: Public Comment
Dec. 2023 – Jan. 2024
Phase 4: Implement
Task 4
TES Development
July – Aug. 2023
Incorporate Tasks 2/3
Jan – March 2023
Draft Annotated Outline
May – Sept. 2023
Draft Policy Recommendations
Sep. – Oct. 2023
Public Comment
Nov. – Dec. 2023
Finalize TES
Jan.
Feb.
March
April
May
June
July
Aug.
Sep.
Oct.
Nov.
Dec.
Jan.

Draft Modeling Outputs

Preliminary outputs from modeling efforts

The analysis conducted for the TES leverages two distinct models

EV Adoption Model

- "Stock rollover" model
- Focus: Class 1-8 on-road vehicles
- Explores various policy / economic scenarios + sensitivities

"How many EVs do we expect over time? What types?"

EV Charging Needs Analysis

- Estimation of EVSE* required to charge given number of EVs
- Home, workplace, depot, public charging needs for diff. vehicles
- Based on local trip data

"How many chargers will we need for these EVs?"

*EVSE: Electric Vehicle Supply Equipment (i.e., EV chargers)

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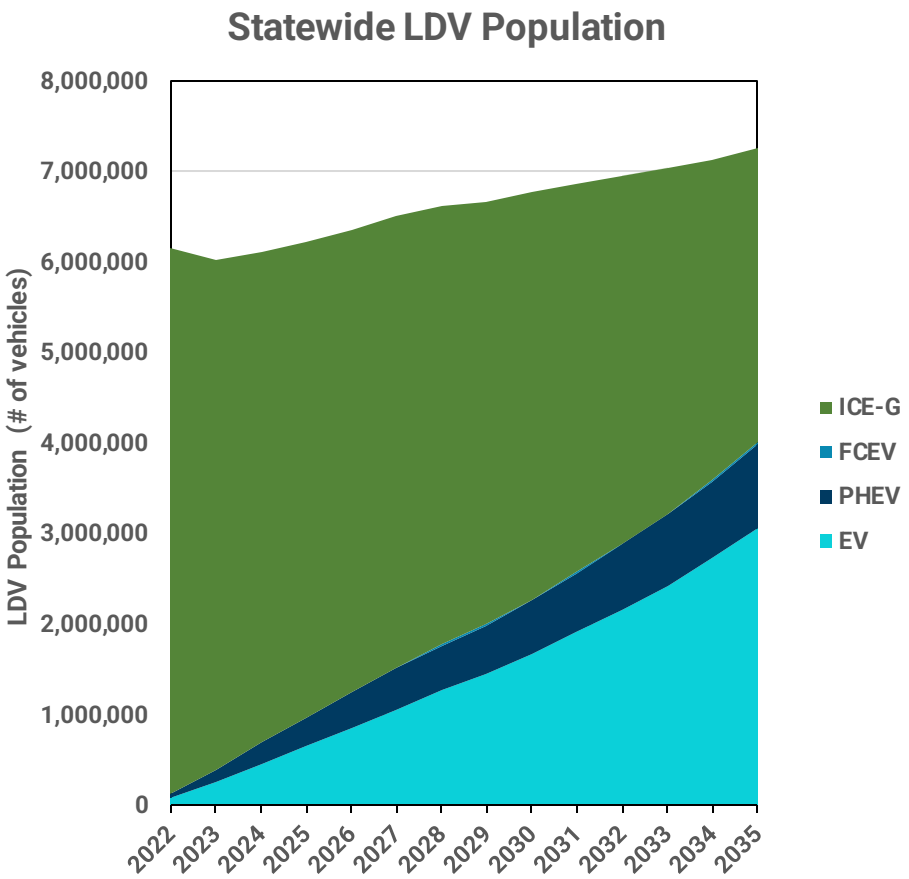
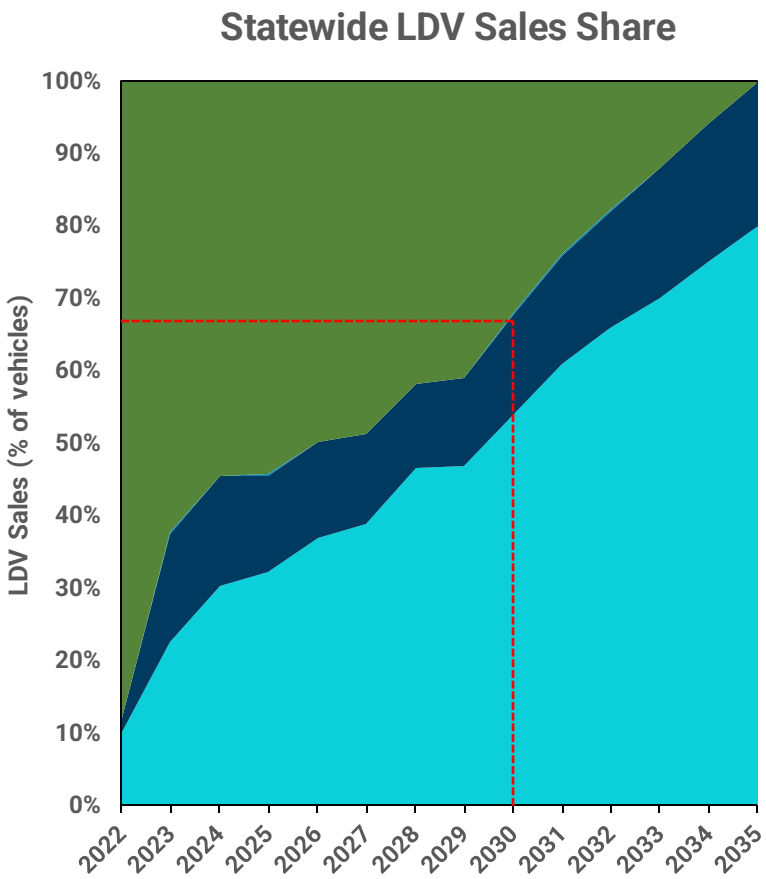
Draft Results: Light-duty ZEV Adoption

Baseline Scenario

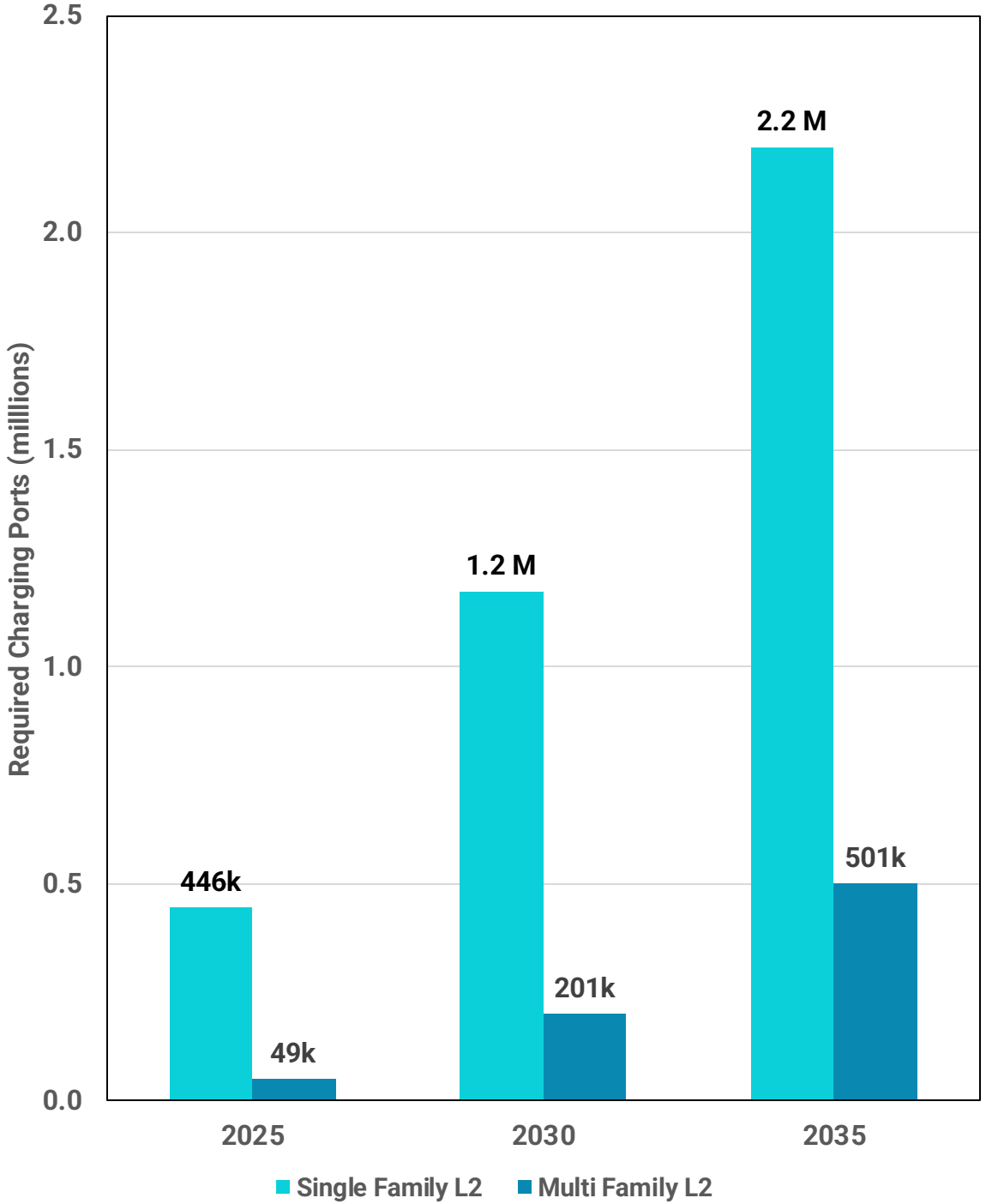




- **ZEV sales share reaches 100% by 2035, as per Advanced Clean Cars II**
- **Under baseline policy and economics, <u>2030 sales target is not met</u>**

	LDV Population		Sales Share	
	2030	**2035**	**2030**	**2035**
ICE	4.5 million	3.3 million	32%	0%
FCEV	8,000	9,800	0.2%	0%
PHEV	0.6 million	0.9 million	14%	20%
EV	1.7 million	3.1 million	54%	80%
Total	**6.8 million**	**7.3 million**	**100%**	**100%**

FCEV: Fuel Cell Electric Vehicle | **PHEV**: Plug-in Hybrid Electric Vehicle | **ICE-G**: Gasoline Internal Combustion Engine Vehicle | **EV**: Battery Electric Vehicle



Projected Light-Duty Charging Needs - Residential

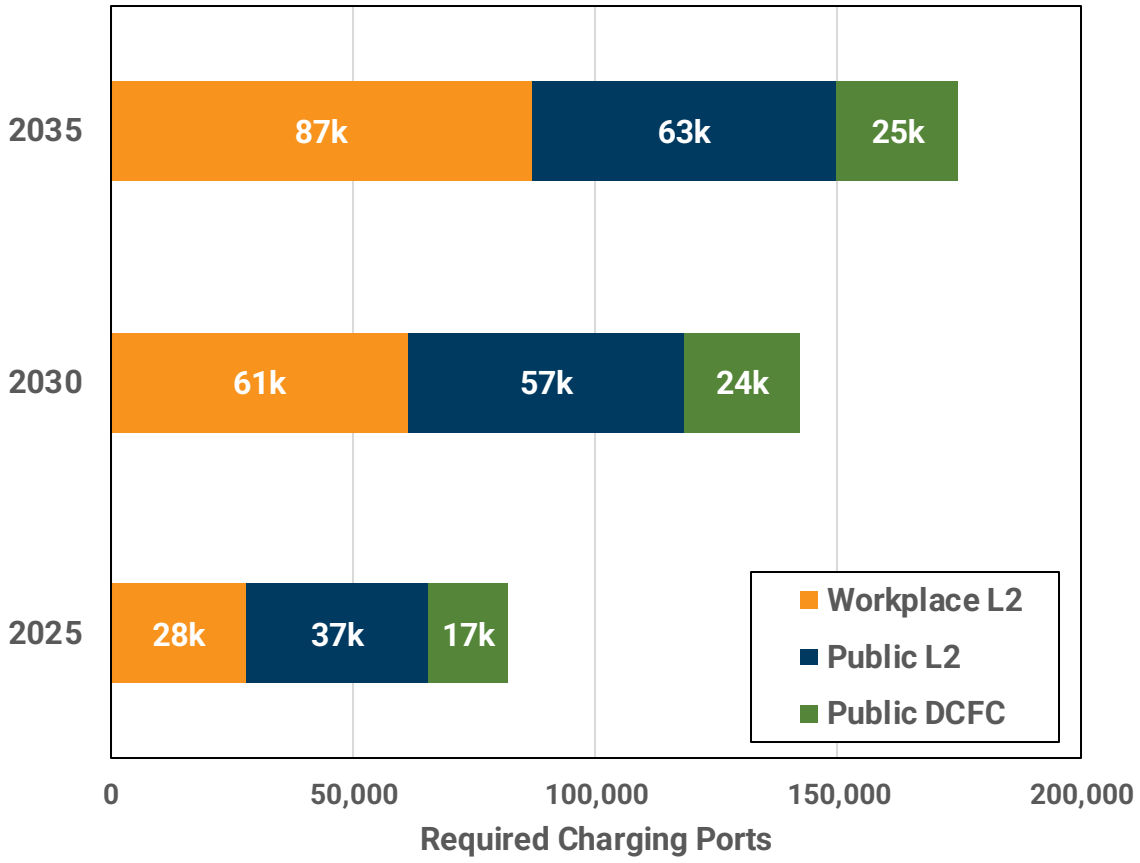
- **Baseline scenario projects ~2.7 million residential charging ports needed by 2035**
- **Majority L2 charging at single family homes, with growing share of multi-family home L2 charging**
- **Prioritizing multi-family charging improves equity of charging access, reduces public charging costs**

L2: Level 2 EV Charger (model assumes power level of 7.2 kW)

Projected Light-Duty Charging Needs – Non-Residential

Baseline Scenario

- **Order of magnitude increase in public charging required rapidly**
  - ~3,500 public L2, ~900 DCFC ports today
  - **~11x** and **18x** increase required by 2025, respectively
- **Growing ratio of EV:EVSE over time, as utilization rate increases**
- **Modeled non-residential network largely made up of L2 ports**
  - Assuming more DCFC usage reduces total ports; likely increases costs



Work L2: 7.2 kW
Public L2: 19 kW
Public DCFC: 150 kW

DCFC: Direct Current Fast Charger | **L2**: Level 2

Additional EV adoption scenarios cover a range of potential market and policy dynamics

Baseline	Strong Electrification Technology	Strong Electrification Policy	Strong VMT Policy	Worst Case	Best Case Climate Aligned
• What might EV adoption look like under current policy and baseline economics*?	• How much greater electrification and/or lower costs do we get if technology develops faster than expected?	• How much greater electrification and/or lower costs do we get with more supportive policies?	• How much greater adoption, lower costs, and/or additional social benefits do we get with successful VMT-limiting policies and actions?	• What is the worst case for electrification and/or costs if the tech and policy environment is unfavorable?	• What is the best case for electrification and/or costs if all factors line up towards stronger climate alignment?

*Baseline economics here indicates reasonable / middle-of-the-road outlooks on cost trajectories.

Next Steps for TES Analysis

Modeling Enhancements and Areas for Refinement

Build out additional scenarios and sensitivities

Refine inputs + assumptions

Distill insights to inform policy recommendations

Include outputs for school + transit buses, motorcycles

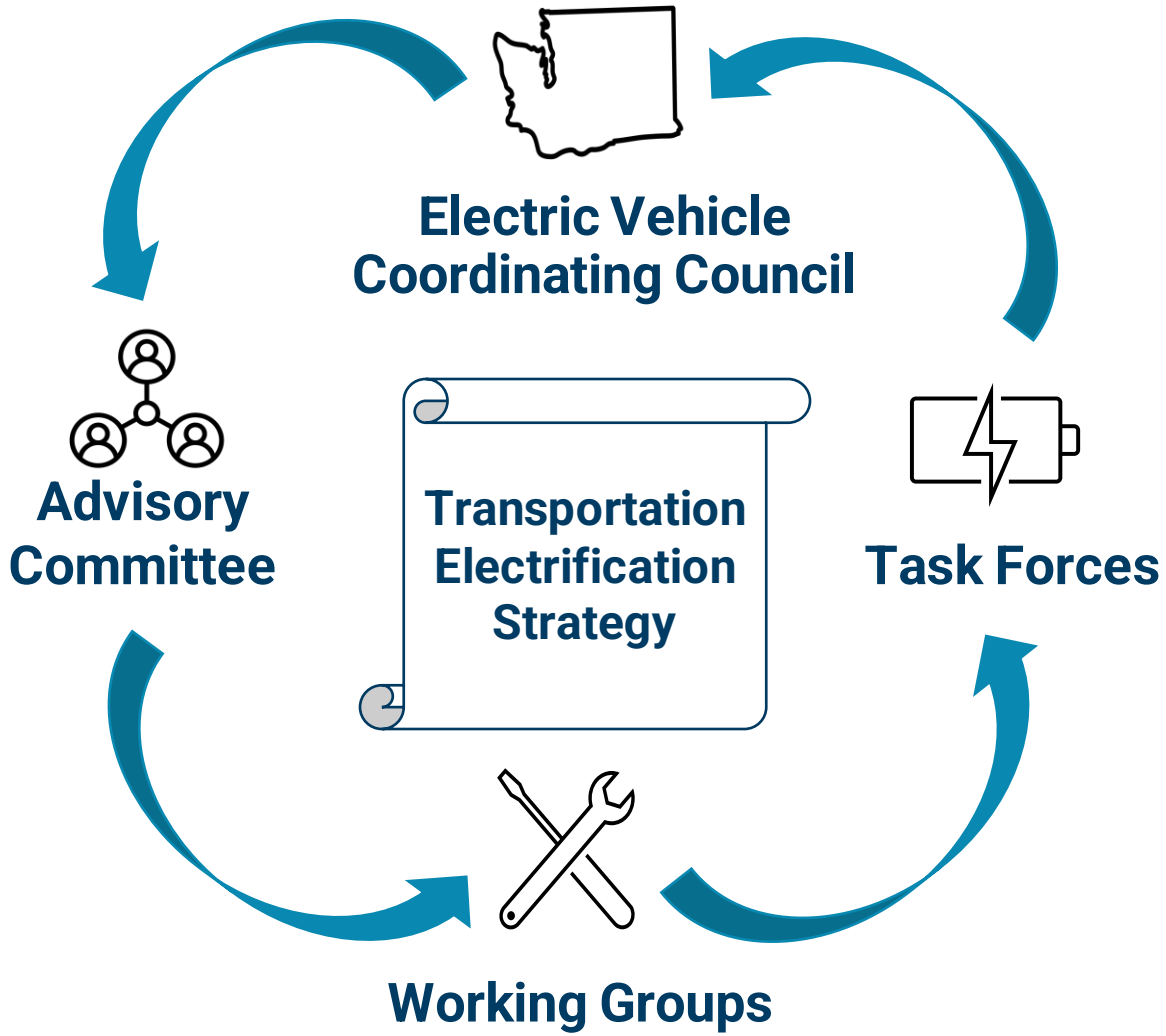
Display results interactively through Tableau

Engagement Efforts

Ensuring that the TES is informed by stakeholders across Washington

TES Formal Convenings

Outreach, engagement, and feedback across and among multiple channels ensures the TES is informing and informed by a range of stakeholders



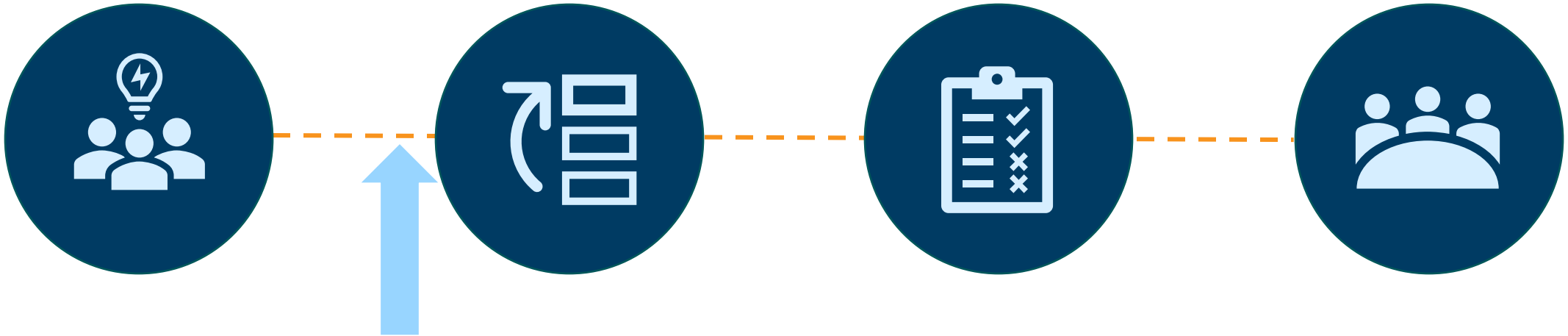
TES Public Engagement Approach

Phase 1: Discovery

Phase 2: Filling in the Gaps and Confirming Priorities

Phase 3: Feedback on Framework

Phase 4: Begin Implementation



We are here!

Phase 1: By the Numbers

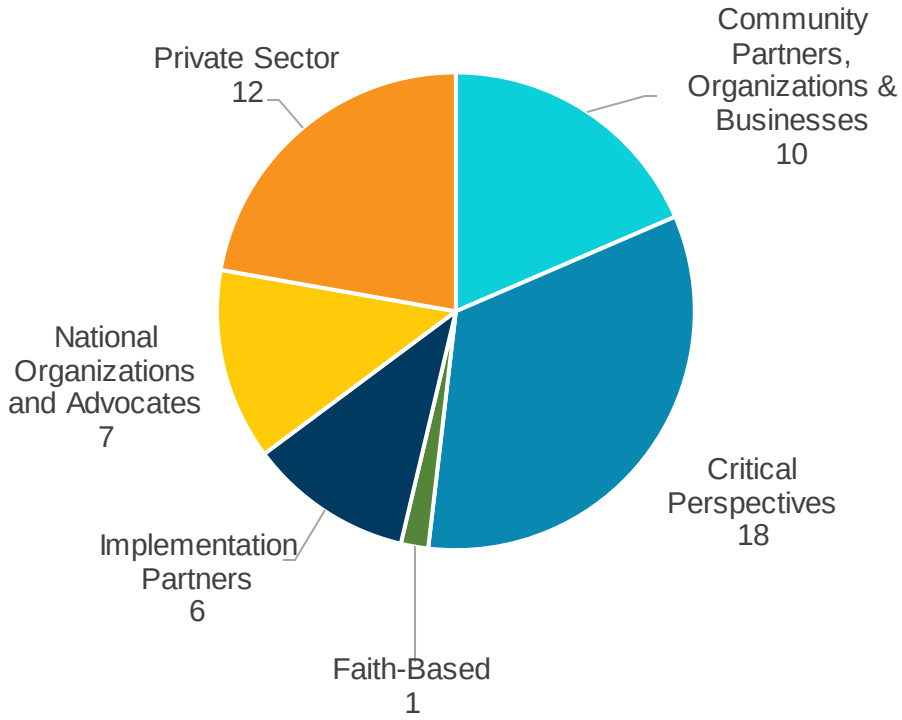
1:1 Interviews

- **27 1:1 interviews**
  - 15 interviews conducted by Cascadia and NWEC
  - 12 interviews conducted by Front & Centered

Focus Groups

- **5 focus groups, with 29 attendees in total**
  - OEM: 6 attendees
  - Environment: 2 attendees
  - Utilities: 5 attendees
  - EV Driver: 9 attendees
  - EVSP: 7 attendees

56 people, representing 54 organizations in total



Next Steps

- **Analyze statewide EV survey and summarize**
  - 3,000 statewide responses with quotas to ensure responses reflect the population in terms of gender, age, and regions of the state
  - Findings will inform a current understanding of how WA residents are thinking about EVs, including information gaps or myths, perceived barriers, etc.
  - Results will be used to form an education plan
- **Confirm Phase 2 audience and information priorities**
  - Further outreach in the form of additional focus groups and 1:1 interviews
  - Fills in audience gaps from Phase 1 (e.g., Eastern and Central WA, property managers, fleet operators, transit riders)

Developing Guidance and Recommendations

- **Analytical findings and feedback from stakeholders will be assessed, synthesized and incorporated into several outputs:**
  - Transportation Electrification Strategy
  - Engagement Strategy
  - Education Plan
- **The Transportation Electrification Strategy will include:**
  - Identification of barriers to electric vehicle adoption and charging
  - Address barriers with recommended actions, as well as other opportunities to reduce greenhouse gas emissions from the transportation sector
  - Implementation plan, including prioritization and sequencing of recommended policies and other state actions, and suggested metrics and indicators for tracking success

EV Council – JTC Collaboration

Both EV Council and JTC are developing strategies on:

- Incentives for high consumption fuel users to switch to EVs
- Medium and heavy duty zero-emission vehicle incentives and charging
- Reforms to sales/use tax exemption for clean passenger vehicles

1. Where can the JTC leverage findings from the EV Council and vice versa?
2. Should the EV Council TES stay high level, while JTC gets more detailed?
3. How do we engage communities and stakeholders together instead of making parallel asks?

Thank you!

Steven Hershkowitz

TRANSPORTATION ELECTRIFICATION POLICY LEAD

Steven.Hershkowitz@commerce.wa.gov

360.688.4006

Dave Pringle

GOVERNMENT AFFAIRS & POLICY DIRECTOR

Dave.Pringle@commerce.wa.gov

360.918.6033

ELECTRIC VEHICLE COUNCIL

Appendix

EV Council implementation timeline

July – Sept 2022

Approve NEVI plan

Adopt decision-making process

Oct 2022 – Jan 2023

Select Advisory Committee

Hire consultant team to support TES development

Feb – June 2023

TES project set-up

Modeling

Public engagement

EVCC Deliverables & Presentations

- **Feb 1**
  - Project Kick Off, Equity Approach Discussion, Engagement Approach Discussion
- **Mar 1**
  - Analytical Scope Presentation, EV Adoption Scenario Discussion, Final Engagement Approach Presentation
- **April 5**
  - EV Adoption Scenario Presentation, Analytical Dashboard Demonstration, Annotated Outline Discussion
- **May 3**
  - Final Annotated Outline
- **June 7**
  - Draft Detailed Scenario Outputs Discussion, Phase 1 Engagement Summary
- **July 12**
  - Policy Recommendations and Roadmap Framework Discussion
- **Aug 2**
  - Updated Scenario Outputs Presentation, Analytical Dashboard Demonstration, Education Plan Approach, Long-term Engagement Plan Approach, Early Draft Policy Recommendations and Roadmap
- **Sept 6**
  - Draft Long-term Engagement Plan Discussion, Draft Education Plan Discussion, Full Strategy Preview
- **Oct 4**
  - EVCC and Public Comment on Draft Strategy
- **Nov 1**
  - Early Discussion of Written Public Comment
- **Dec 6**
  - Final TES Presentation and Agency Review Process

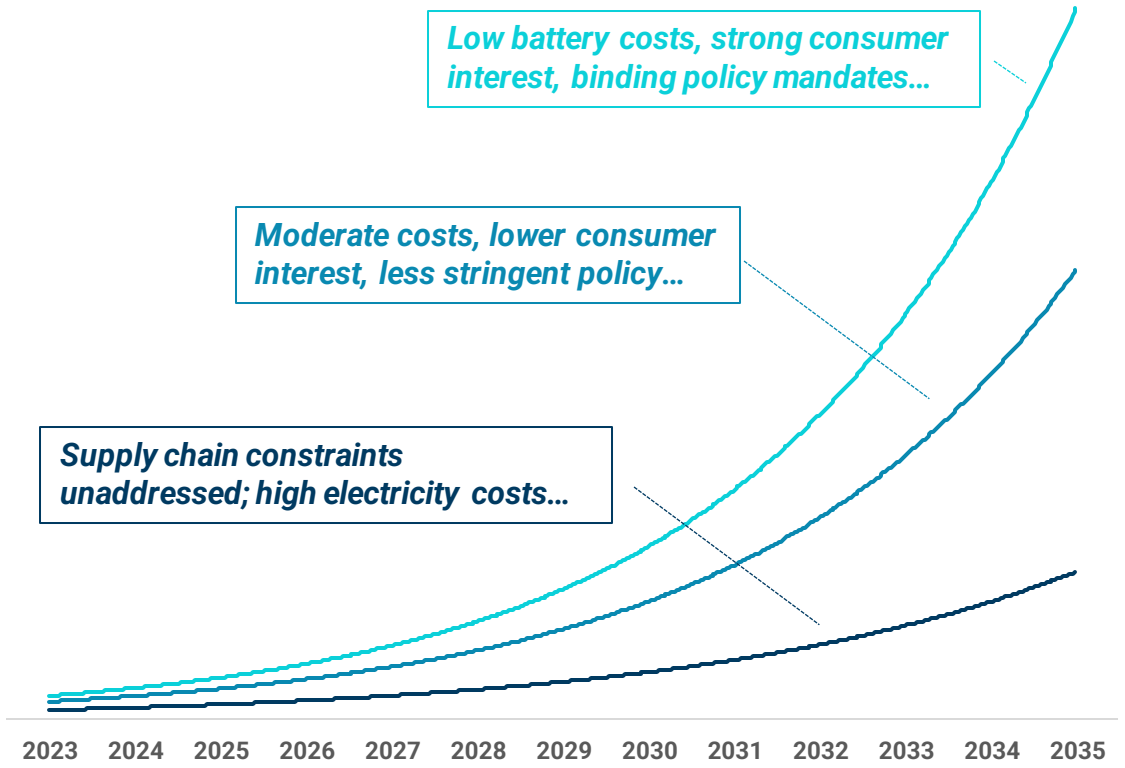
Example Informational Discussions Throughout

VMT Reduction Strategies | Regulatory Solutions | Market Solutions | Grid Impacts

Analysis conducted using these models helps to frame TES policy needs and options

- **Scenarios highlight different outlooks on Washington's transportation sector**
  - *What would need to be true to make assumptions underlying desired scenario(s) a reality?*
- **Comparing *between* scenarios highlights policy and/or economic gaps to be filled to meet state targets**
  - *What types and magnitude of additional policy action may therefore be required?*

Illustrative comparison of EV growth over time under different scenario assumptions



EV adoption scenarios cover a range of potential market and policy dynamics

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TODAY'S FOCUS	Low battery cost	High incentives	High LDV VMT & stock reduction	High EV, FCEV, elec., H2 cost	All policy and economic inputs move in "climate-aligned" direction
	Low EV, FCEV cost	High EVSE availability	More efficient vehicles	Low fossil fuel cost	
	Low elec., H2 cost	Advanced Clean Fleets passed	More Bus VMT and/or stock	Low EV, EVSE availability	
	High EV availability	Strong consumer demand for EVs	Less freight VMT and/or stock	Weak consumer demand for EVs	

*Baseline economics here indicates reasonable / middle-of-the-road outlooks on cost trajectories.

Sensitivity analysis helps illuminate the impact of key policy and/or economic factors

Forthcoming

Effect of Policy Requirements

- How much do ACCII* and ACT** influence outcomes?
- What supportive policies may be required to support these regulations?

2030 Target Met

- How close does each modeled scenario get to the 2030 target?
- What supportive policies may be required to enable this goal?

VMT Reduction w/o Stock, Freight Change

- What additional benefits are achieved by reducing vehicle size and fleet size, beyond reducing VMT?

High/Low Fossil Fuel Prices

- How do petroleum prices affect the outcomes?

*Advanced Clean Cars II | **Advanced Clean Trucks

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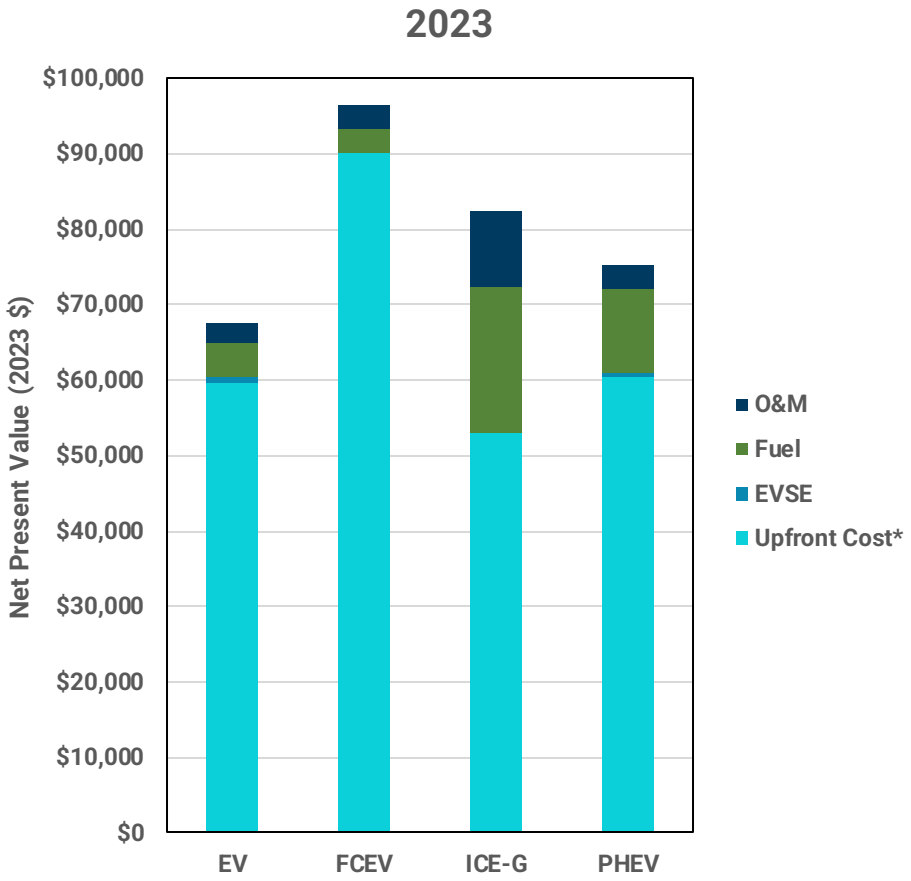
EV adoption model is driven in part by relative economics between powertrains

Baseline Scenario – Personal Truck/SUV, Single Family Home



- **Light-duty EVs and PHEVs have cost advantage today, on TCO basis**
- **FCEVs considerably more expensive than gasoline cars**
- **Increasing cost-savings from EVs over time**

*Upfront cost net of incentives.

FCEV: Fuel Cell Electric Vehicle | **PHEV**: Plug-in Hybrid Electric Vehicle | **ICE-G**: Gasoline Internal Combustion Engine Vehicle | **EV**: Battery Electric Vehicle | **EVSE**: EV Supply Equipment (charger)

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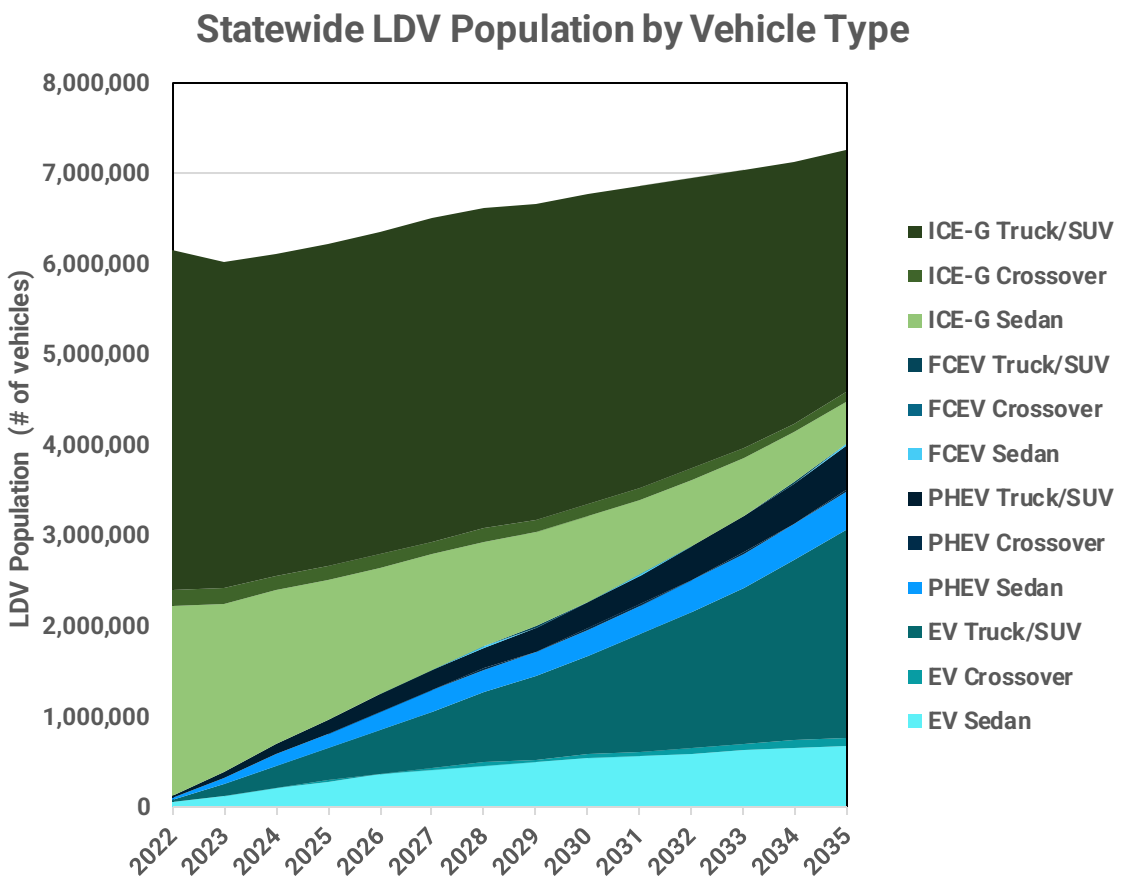
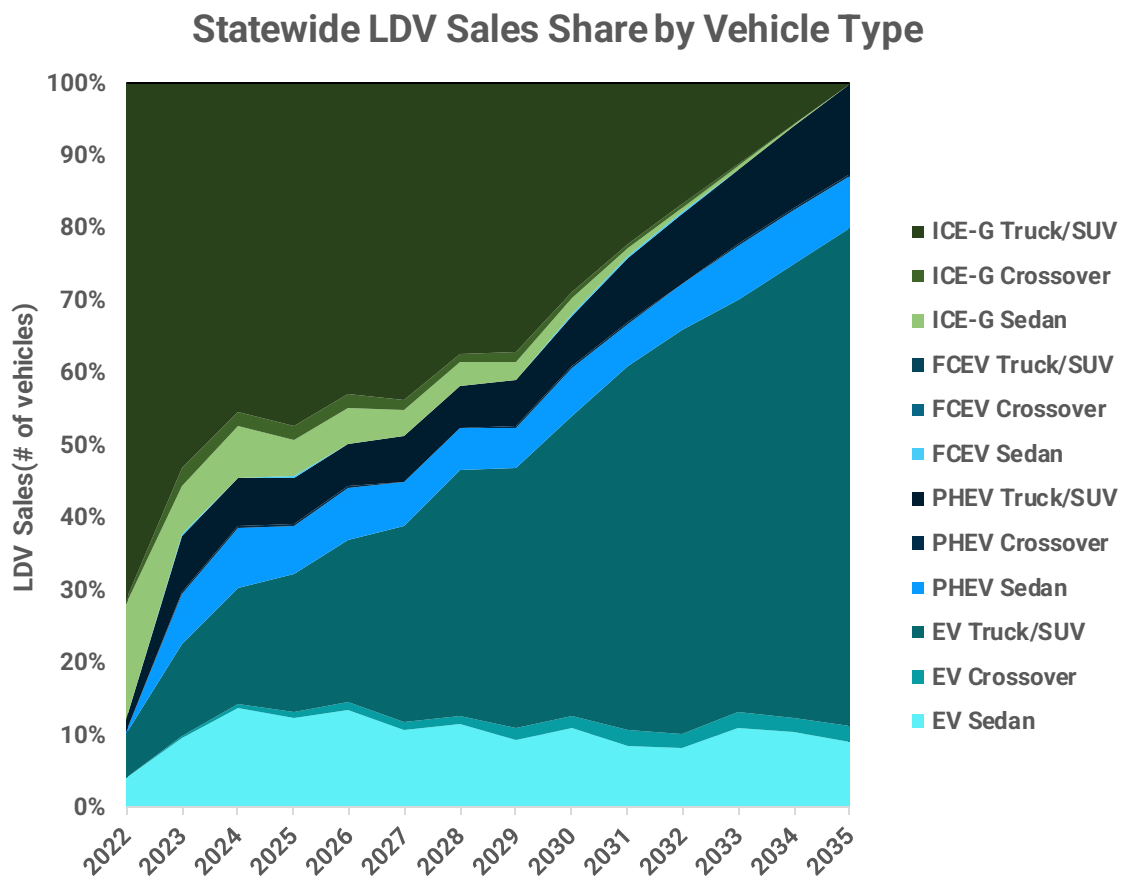
Light-duty ZEV Adoption by Vehicle Type

Baseline Scenario

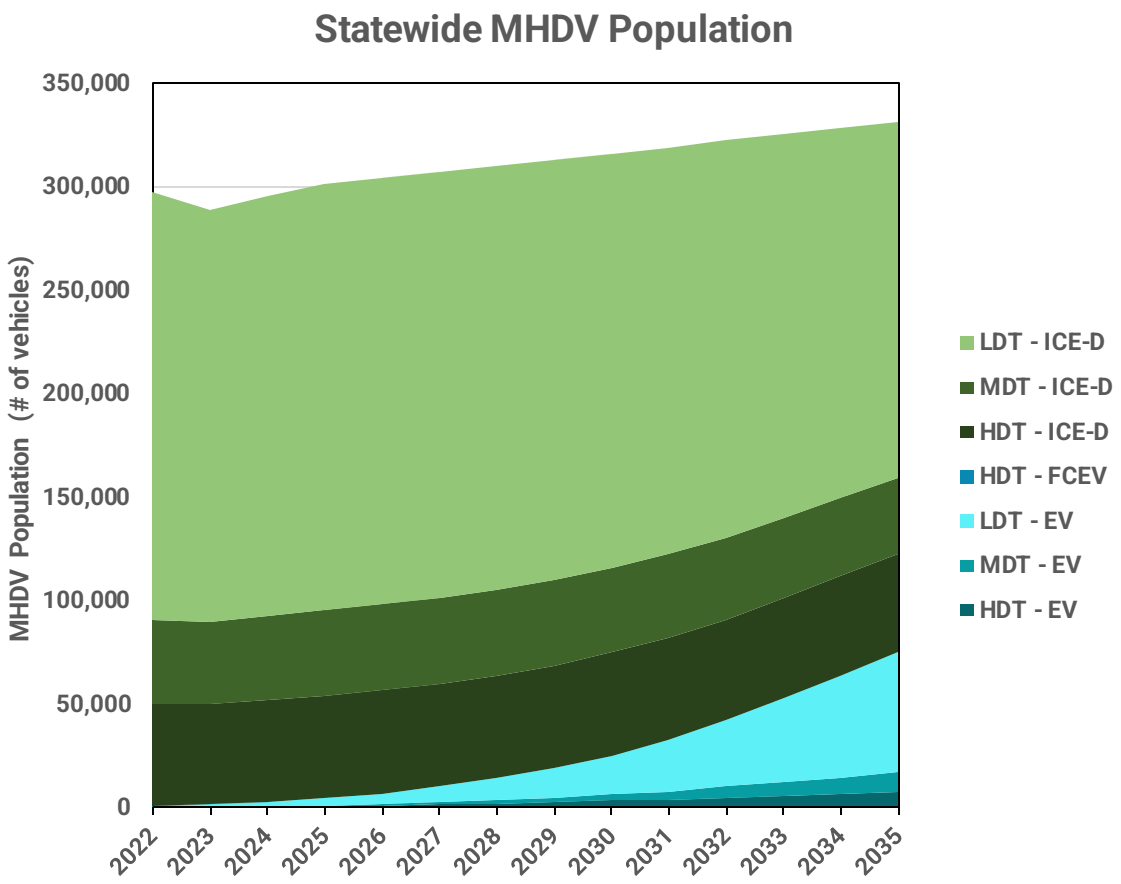




FCEV: Fuel Cell Electric Vehicle | **PHEV**: Plug-in Hybrid Electric Vehicle | **ICE-G**: Gasoline Internal Combustion Engine Vehicle | **EV**: Battery Electric Vehicle

Medium- and Heavy-duty ZEV Adoption

Baseline Scenario, Advanced Clean Trucks (ACT) Requirements



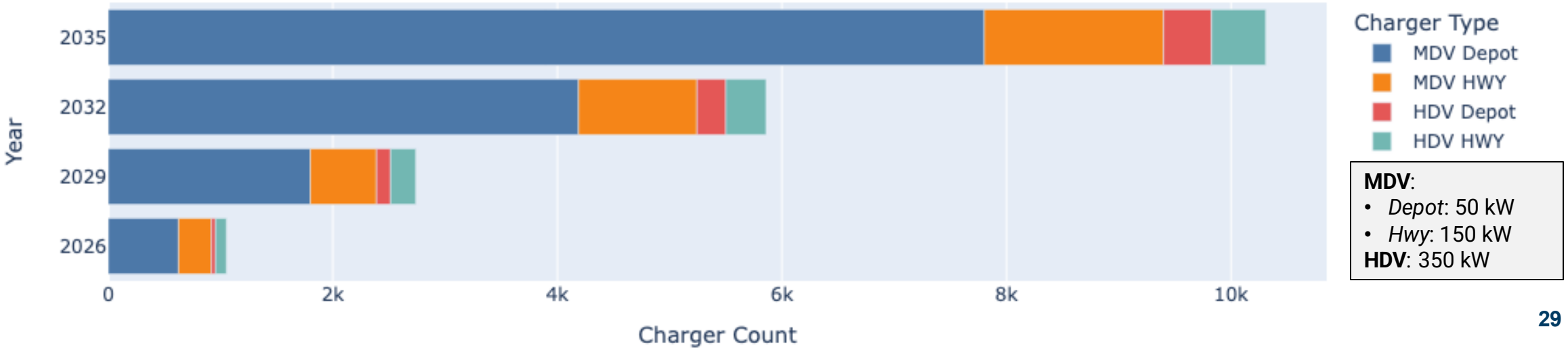
- **Meeting ACT requirements results in approximately 23% zero-emission MHDV stock by 2035**
  - Heavily dominated by EVs
  - Small share of heavy-duty FCEV beginning in early 2030s
- **Role of EV vs. FCEV in heavy-duty trucking remains uncertain**
- **Further refinement of MHDV economic inputs may shift results**

LDT: Light-duty Truck | **MDT**: Medium-duty Truck | **HDT**: Heavy-duty Truck | **FCEV**: Fuel Cell Electric Vehicle | **ICE-D**: Diesel Internal Combustion Engine Vehicle | **EV**: Battery Electric Vehicle

Projected Medium- and Heavy-Duty Charging Needs

Baseline Scenario

- **Many more electric MDVs than HDVs, especially in early years**
- **Relatively large share of highway charging based on assessment of driving patterns and energy needs**
  - Trucks that can (more) easily use depot charging will electrify first
  - Separate RMI analysis suggests ~55% of MDVs, 40% of HDVs in WA



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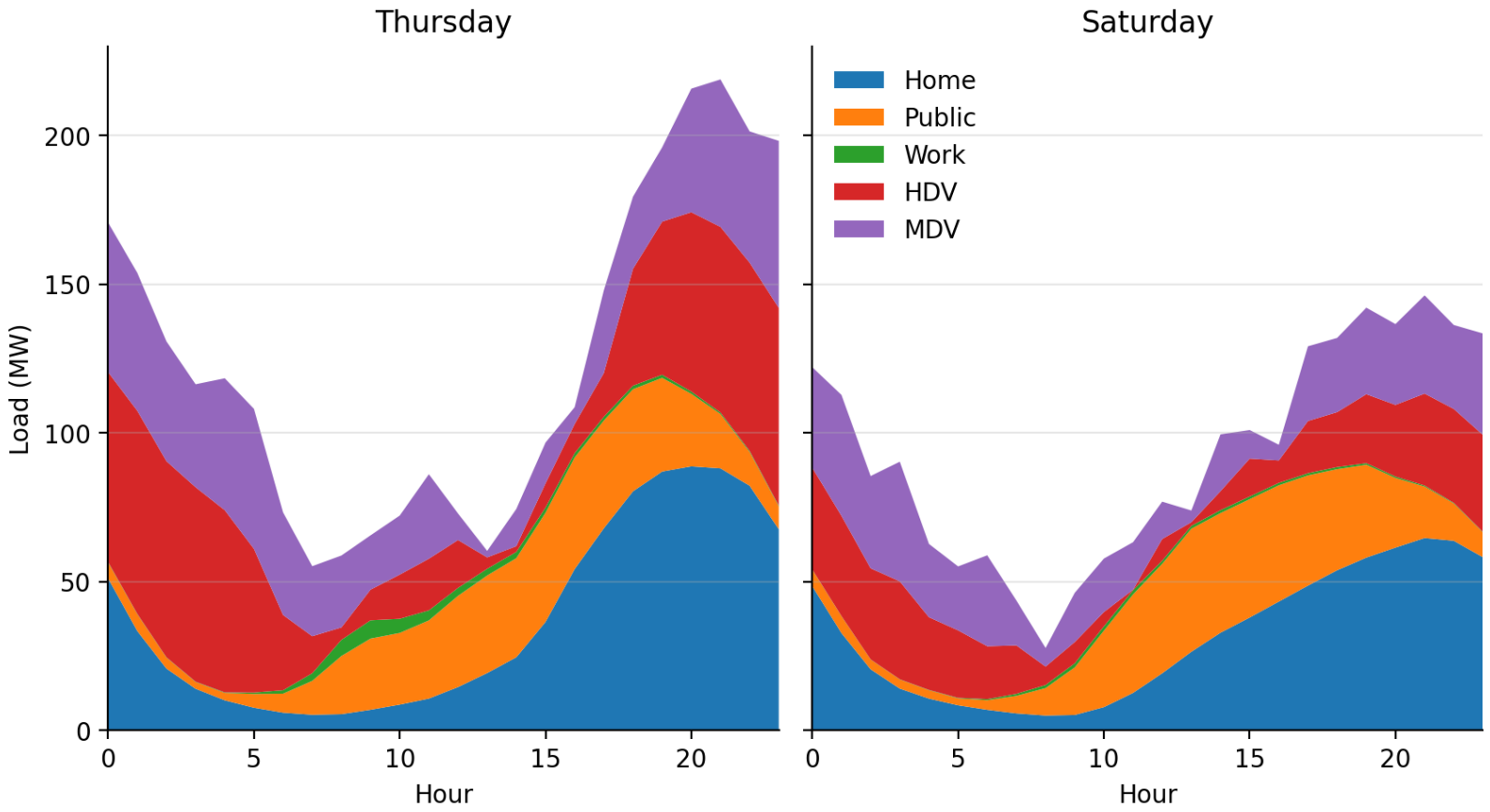
EV Charging Load Shapes

Baseline Scenario

- **Model generates representative load shapes by charging location and/or vehicle type**

- **Future scenarios can explore managed charging opportunities and impacts**

Example: Load shape for typical weekday and weekend day in Spokane County



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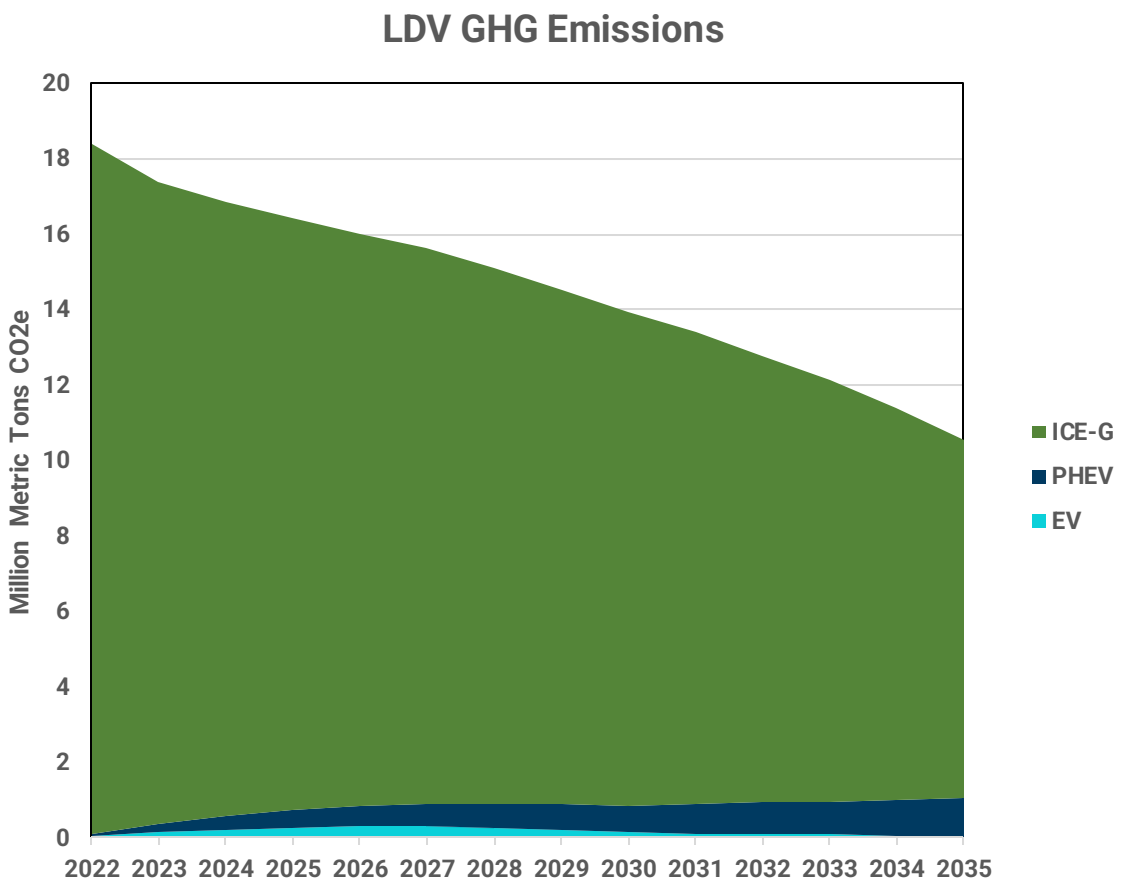
Light-duty Vehicle GHG Emissions

Baseline Scenario



- **Baseline scenario projects ~43% decline in LDV GHG emissions by 2035**
- **Growing EV and PHEV share offset by decreasing emissions intensity of Washington's electric grid**
- **RMI team refining MHDV GHG emissions and benchmarking to state inventory**
  - Draft results forthcoming

Electric grid emissions factors from NREL Cambium 2022 model, long run marginal emissions rate for Washington state.

PHEV: Plug-in Hybrid Electric Vehicle | **ICE-G**: Gasoline Internal Combustion Engine Vehicle | **EV**: Battery Electric Vehicle

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Initial Takeaways from Draft Results

Baseline Scenario

Baseline scenario projects ~68% EV and PHEV sales by 2030

- Economics unlikely to be favorable enough to EVs to reach 2030 100% LDV sales goal
- Additional support will be required

EV charging needs and costs will be significant

- Funding this infrastructure will merit dedicated focus in the transportation electrification strategy
- Current, unprecedented levels of public funding are a good start, but private sector must play a large role

Charging loads for MHDVs will be significant, and concentrated

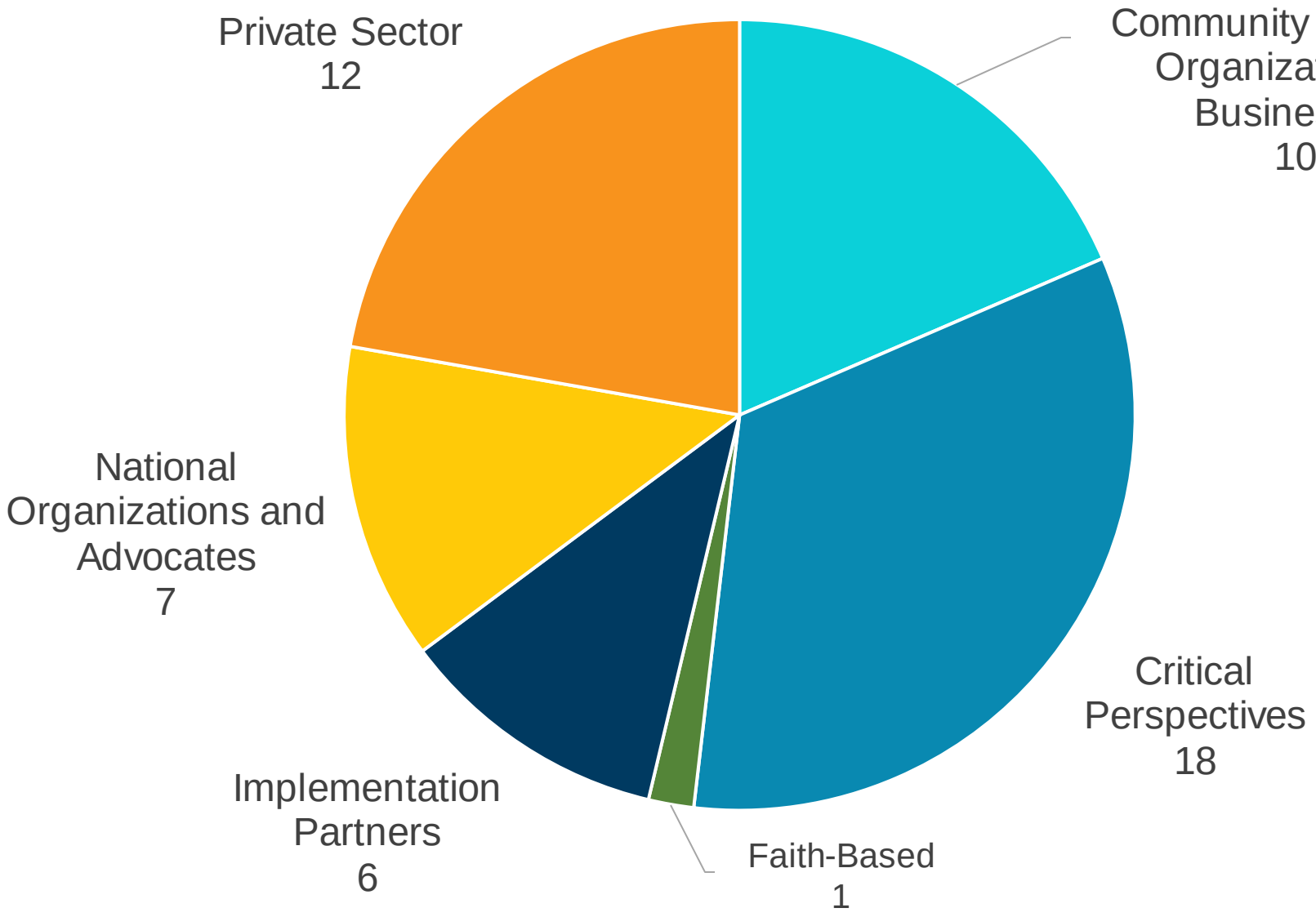
- State and utilities will need to work with fleet operators to identify and plan for electrification of these vehicles

End of IRA tax credits in 2032 will decrease economic advantage of ZEVs

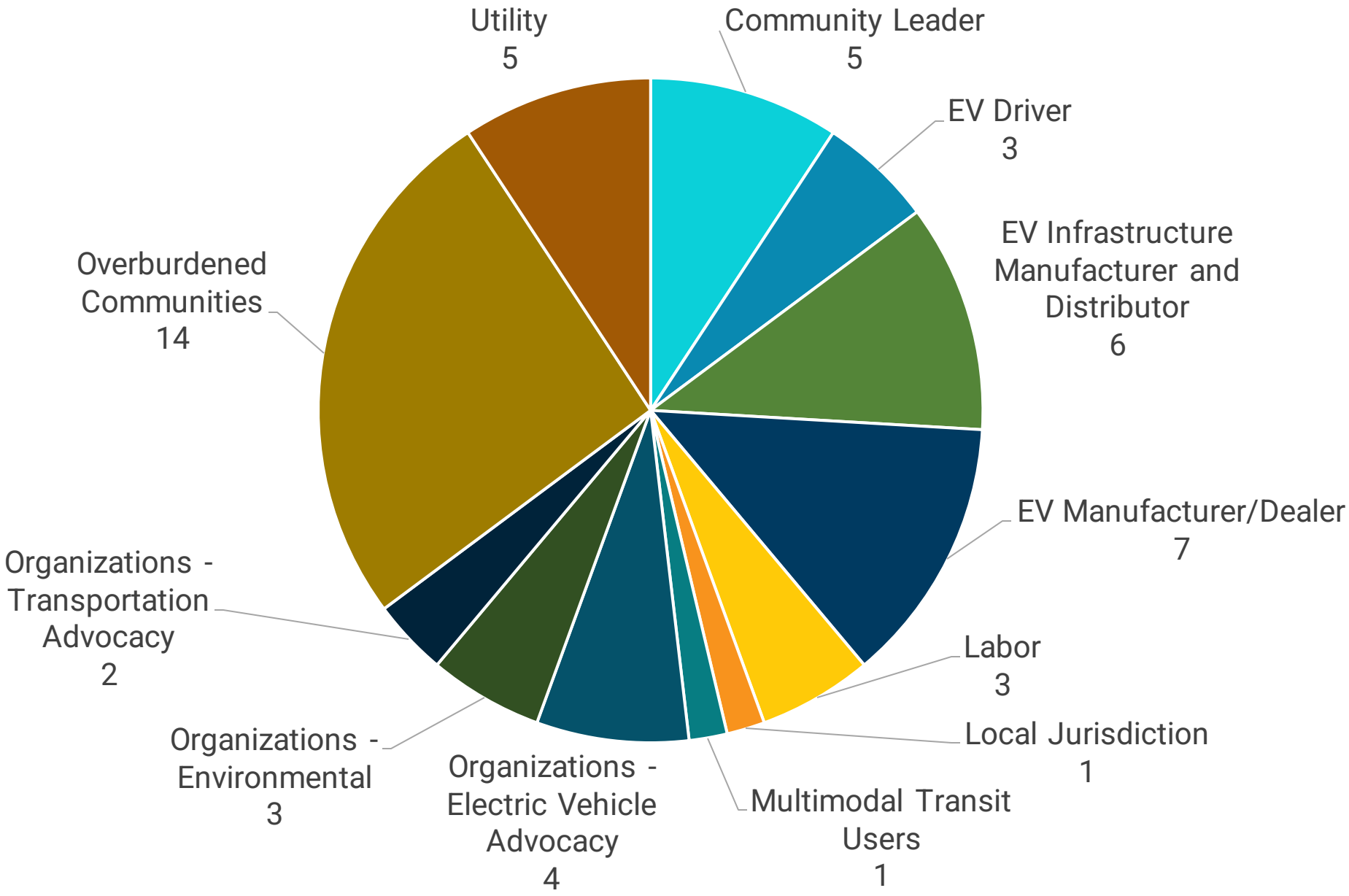
- Washington must consider the impact on EV economics expected post-IRA, and plan accordingly

IRA: Inflation Reduction Act

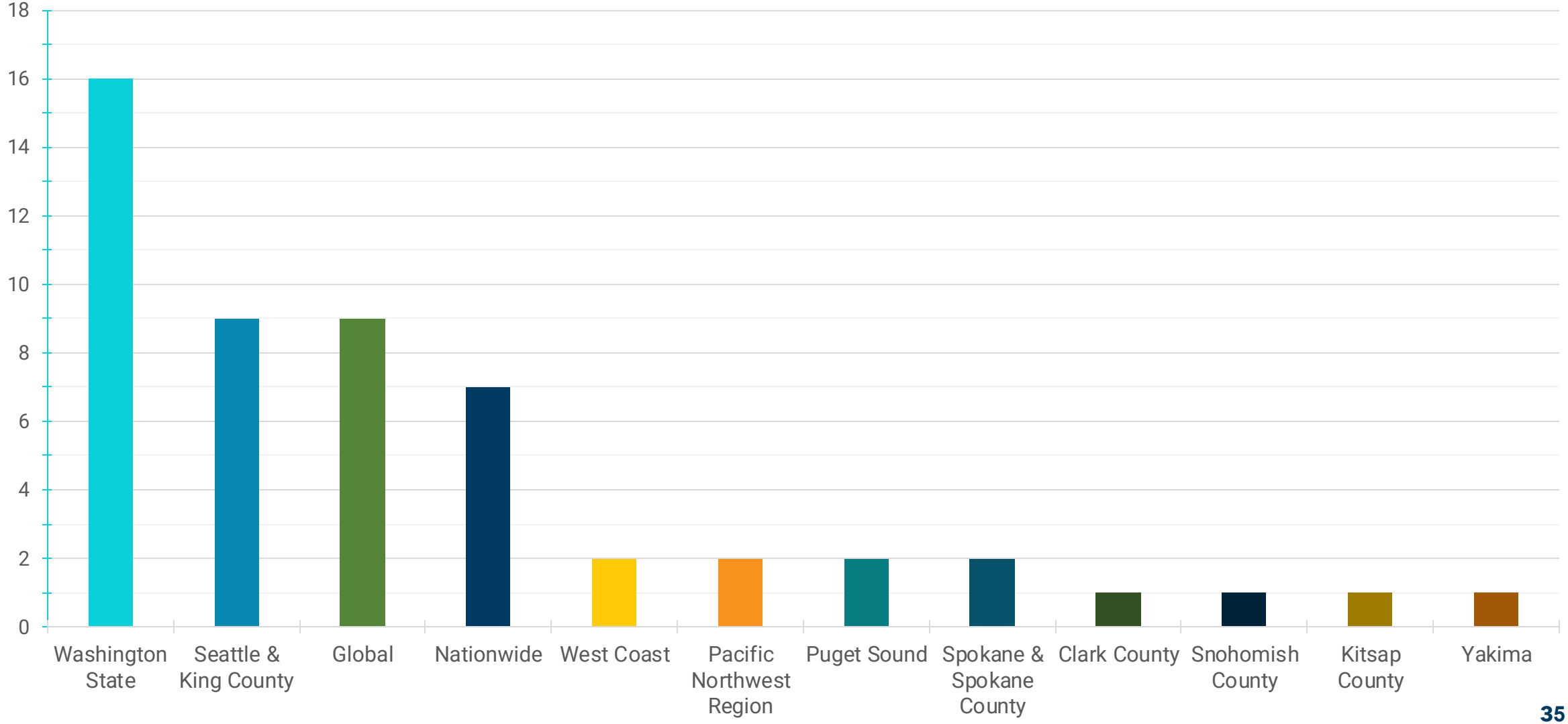
Phase 1: Audiences Engaged – high-level



Phase 1: Audiences Engaged – deep dive



Phase 1: Geographic Service Area of Groups



Barriers

Identified in Public Engagement

Charging

- Lack of charging infrastructure in public/transportation corridors
- Need for charging expertise at utilities
- Lack of policy and standardization needed for charging
- Multifamily housing charging challenges
- Long permitting timelines

Vehicles

- Upfront cost of EVs
- Lack of accessible education and exposure to EVs
- Differences in community priorities when it comes to EVs

Infrastructure & Workforce

- Lack of or limited non-charging infrastructure to support the demand on the electric grid
- Need for additional electric generation
- Inequitably accessible (language/technology access)
- Lack of workforce development

Most Impactful Incentives

Identified in Public Engagement

- Prefer rebates rather than tax incentives
- Access to low-cost charging stations or public/workplace charging stations
- Easy and more streamlined – at point-of-sale so people don't have to navigate complicated systems
- Stack-ability – should be able to put everything into a single application
- Infrastructure and utility incentives
- Update policies/regulations to make incentives more accessible

Needed changes to infrastructure for EV transition

- Need for an easily accessible public charging network
- Educate drivers on EV charging (education campaign)
- Provide job training for servicing & maintenance (workforce development)
- Address current infrastructure needs: upgrades to utilities' lines & electric infrastructure to increase grid reliability/resilience

Needed changes to infrastructure for EV transition

- Protect against vandalism and damage to public charging stations
- Need for a cultural shift away from gas station model
- Secure charging stations and storage for EVs at multifamily buildings

Best Ways to Get the Word Out

- Hands-on experience/in-person ride and drive outreach events with electric MHD vehicles/community events
- Partnerships
  - CBOs/trusted community members for outreach and utilities to host community events and get the word out
  - Rideshares/driving schools to get word out and expand EV visibility
  - Influencers to bolster social media campaigns
- Concentrated projects/cohort of different entities that are trying to electrify together
- Large, widespread communications via conventional media outlets/newsletters

Equitably serving communities by electric transportation and the TES

- Financial subsidies: access to low-cost EV and low-cost electricity
- Expand and invest in other modes of transportation, particularly public transit
  - Design a reliable and inclusive transportation system
- Fast-charging infrastructure and multifamily charging infrastructure
- Electrify heavy duty trucks and buses and prioritize electrifying these in overburdened communities
- Equitable & accessible education/job training
- Solutions that benefit rural, small town, and suburban areas

Annotated Outline

High-level Overview

- **Executive Summary**
- **Introduction: Objectives and Historical Context**
- **Transportation Equity in WA**
- **Where WA is Today**
- **Current state of transportation sector**
  - Current policy landscape
  - Current state of opinion/perceived barriers
- **Where WA Needs to Go**
  - Different scenario options
  - Preferred scenario + implications
- **How WA Can Get There**
  - Priority policies and other actions for EV adoption and EVSE
  - Anticipated barriers
  - Implementation roadmap
- **Conclusion / Call to Action**