

NW Seaport Alliance Puget Sound
Zero-Emission Truck Collaborative

NW Seaport Alliance Puget Sound Zero-Emission Truck Collaborative

April 29, 2024



Meeting Objectives

- Review and affirm initial draft recommendations on drayage characterization and infrastructure location (from March meeting)
- Discuss best practices in ZEV vehicle incentive program design and implementation lessons learned
- Discuss role of hydrogen in the ZEV transition

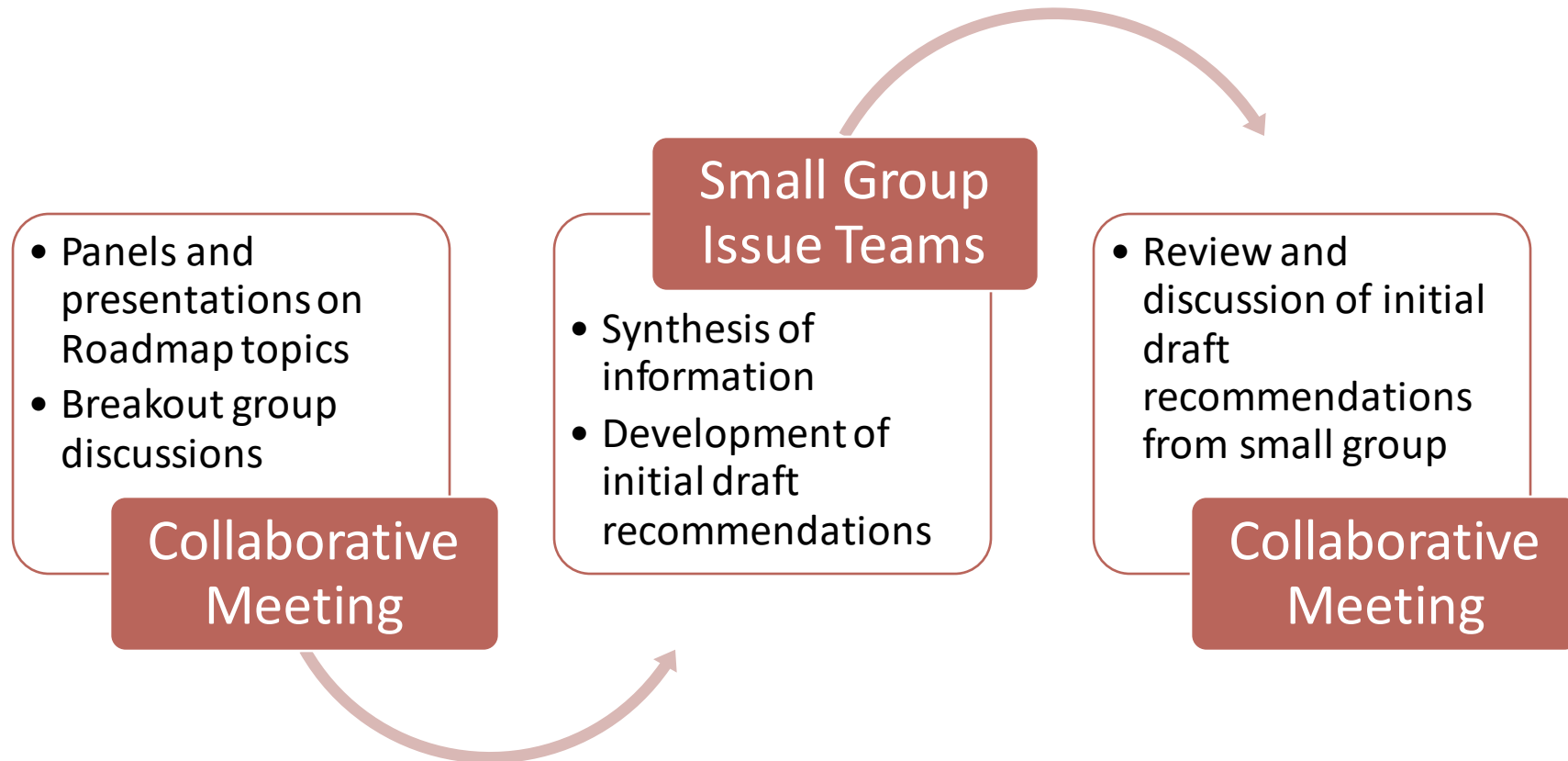
Roadmap Outline: Today's Focus on Vehicle Incentive Programs and Hydrogen Fueling



1. Introduction
2. Vision
3. Drayage Sector Context
4. Forecasted Transition
5. **Issues & Actionable Recommendations**
6. Funding and Enabling Policy Needs
7. Roles and Responsibilities
8. Ongoing Collaboration and Coordination
9. Conclusion

- a. **Equity and Opportunity**
 - Ensure vehicle affordability, access, and support for IOOs and small businesses
- b. **Vehicles**
 - Ensure affordability through financial incentives
- c. **Infrastructure**
 - Create appropriate role for hydrogen vehicles and fueling

Development of Draft Recommendations



Small group session with Vehicle subgroup:
Thursday, May 2: 12:30-2:00 PM

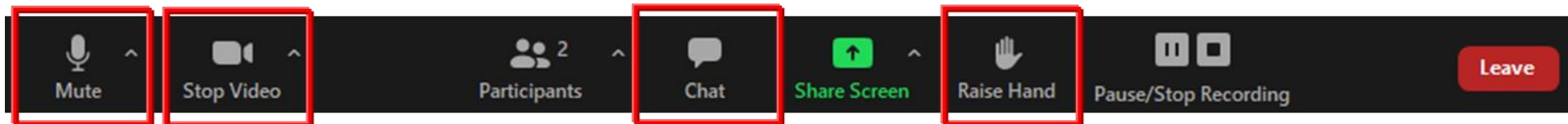
Meeting Agenda



- | | |
|---------------------|---|
| 8:30 – 8:45 AM | Welcome and Meeting Overview |
| 8:45 – 9:00 AM | Draft Recommendations Review: Drayage Characterization and Infrastructure Location |
| 9:00 – 10:45 AM | ZEV Vehicle Incentive Program Design and Lessons Learned |
| 10:45 – 11:00 AM | <i>Break</i> |
| 11:00 AM – 12:00 PM | Role of Hydrogen in the ZEV Transition |
| 12:00 – 12:10 PM | Public Comment |
| 12:10 – 12:15 PM | Wrap up and Adjourn |

Participating Effectively via Zoom

- Collaborative members please show your video
- If you're using your telephone for audio, remember to enter your participant ID
- If needed, update your name and affiliation
- To reduce background noise, please mute yourself when you are not speaking
- During discussions, please let us know you'd like to jump in by "raising your hand"



Public Participation

- Those observing the meeting will be muted, off video, and off chat until the public comment time
- There will be an opportunity for 2-minute public comments at the end of the meeting. At that time, members of the public who would like to comment should raise their hands if they would like time to speak

Project Website

URL:

<https://www.rossstrategic.net/Zero-Emission-Truck-Collaborative/>

PUGET SOUND

Zero-Emission Truck Collaborative

[Meeting Schedule & Materials](#)

About the Collaborative

The transition to zero-emission drayage vehicles serving ports in the Pacific Northwest is a key step to meet zero emission trucking targets adopted in the Northwest Ports Clean Air Strategy while also contributing to city and state decarbonization goals. The multi-stakeholder Puget Sound Zero-Emission Truck Collaborative to develop a roadmap for transitioning to zero-emission drayage services at the Puget Sound region marine cargo terminals no later than 2050. The Collaborative will meet approximately every other month for half-day meetings between June 2023 and December 2024. Most of these meetings will be virtual but some may be in-person meetings that will include site visits and/or listening sessions. This website will be updated with relevant materials for each of these meetings.

Meeting Schedule and Materials

Meeting 1: June 30, 2023

The purpose of this first meeting is to introduce members of the Collaborative and create a shared understanding of project context, background, and objectives and proposed process for the Collaborative. Members will discuss and affirm Roadmap principles and Collaborative purpose, as well as the Collaborative charter and operating guidelines.

[Meeting Agenda](#) [Draft Charter](#) [Collaborative Members](#) [Collaborative and Roadmap Scoping Document](#)

Meeting dates and materials will be posted for future meetings as available.

Quick Ice Breaker

What is your favorite blooming flower or tree this time of year?

- Please chat in



Draft Recommendations Review: Drayage Characterization and Infrastructure Location



Potential Recommendations



- Early on, build out a diverse network of different types of charging/fueling for local drayage routes (e.g., depot, publicly-available, trucking-as-a-service) and dwell/parking locations
- Use early testing and emerging data to inform what the future charging/fueling network will look like--we don't know enough now to design the optimal future network
- Develop initial publicly-available charging/fueling stations in a set of "no regrets" locations where they are most likely to serve high-volume local drayage routes and dwell locations--most likely in Sumner, Fife, Tukwila, and/or near port terminals (including port-owned real estate)
- Refine understanding of potential public charging/fueling locations in Sumner, Fife, Tukwila, and near port terminals to provide maps that can help infrastructure providers identify sites. Refine siting analysis by:
 - Refining/validating drayage study analysis
 - Applying local knowledge from trucking companies and drivers
 - Engaging communities about benefits, concerns, and optimal locations
 - Assessing utility infrastructure (existing and potential)
 - Understanding real estate opportunities and land uses that can guide identification of sites/parcels

Potential Recommendations, continued



- Given that most drivers park in company lots overnight, support opportunities for companies to develop early deployments of behind-the-fence charging to complement publicly-available charging
- In addition to identifying near-term charging/fueling needs and locations, forecast buildout scenario of charging/fueling that meets needs of a future fleet of 4500-5000 ZEVs; use the full buildout scenario to “work back” to phases of charging/fueling development
- Advance use of clean diesel to reduce emissions while charting the course for a longer-term transition to zero-emissions

Recommended Criteria for Evaluating Potential Charging and Fueling Sites



- Locations makes sense for drivers
 - Along the most frequently traveled routes and where drayage vehicles most likely to dwell (e.g., warehouses, logistics centers)
- Locations make sense for communities
 - Located to maximize air quality benefits and minimize negative impacts (e.g., traffic, idling, parking, etc.)
- Sufficient power from utilities is or can be made available
- Appropriate real estate is available
- Sites can be secured to prevent vandalism, etc.

Recommendations Related to Community/Driver Feedback*

- Recognize that larger trucking companies will likely be the primary early adopters of zero-emission vehicles and will provide much of the learning about how to adapt operations, etc. (as well as providing used ZEVs for secondary markets). At the same time, ensure that smaller companies and owner-operators have the opportunity to be early adopters if they choose to do so.
- Offer accessible opportunities to expose truck drivers to zero-emission trucks through demonstration centers and ride-and-drives. Utilize these opportunities to also help drivers and trucking companies with financing and other aspects of ZEV adoption.
 - Location of early adoption will be places where air quality benefits are realized earlier. Community needs should inform where to target early adoption.

ZEV Vehicle Incentive Program Design and Lessons Learned





WA State Infrastructure & Incentive Program Design for MHD ZEVs

NWSA Puget Sound Zero Emission Truck Collaborative

April 29, 2024

WA MHD ZEV Incentive Program Timeline

- **April 2021** – WA Legislature passed the Climate Commitment Act (CCA)
- **Feb. 2023** – First emissions allowance auction provides funding to the CCA account
- **April 2023** – WA 2023-25 Biennium Transportation Budget passed, placing \$100 mil of CCA funding into “unallotted status until the joint transportation committee completes the medium and heavy duty vehicle infrastructure and incentive strategy”
- **July / Aug 2023** – JTC releases RFP, selects research team to design an MHD ZEV incentive strategy for Washington state
- **Sept. – Dec. 2023** – Research, stakeholder outreach, report writing and program design
- **Jan. 2024** – Final presentation to WA JTC
- **Feb. 2024** – Final MHD ZEV Incentive Design report published
 - Elements of the final report were incorporated into the interim transportation budget HB 2134
- **March 2024** – ESHB 2134 was signed into law, allocating funds to program

Central Questions

- What works well for existing MHD ZEV incentive programs in the U.S.?
- What issues or challenges are present in these existing MHD ZEV incentive programs?
 - Are these challenges based in program policy, program design, administration, etc?
 - Who is responsible for addressing the identified challenges? For example, ZEV truck insurance is outside the scope of this program.
- How can we take the best pieces of existing programs and customize them for businesses in Washington state?
- **Goal of the program: Accelerate the adoption of MHD ZEVs in Washington State**

Report Structure

I. Introduction

Research & Stakeholder Engagement

II. Understanding the MHDV Landscape

III. Review of Existing Zero-Emission MHDV Incentive Programs

VI. Review of Existing Zero-Emission MHDV Programs in WA

V. Stakeholder and Industry Engagement

User Guide for Implementing Agency

VI. Key Attributes of an Incentive Program for Washington State

VII. Implementation Plan

Policy Recommendations

VIII. Policy Gaps, Recommendations, and Future Considerations



II. Understanding the MHDV Landscape

- Background
- Purpose of Study
- Medium- and Heavy-Duty Vehicles
- State of MHD ZEV Technology in 2023
 - Battery Electric and Hydrogen Fuel Cell Technology
 - Infrastructure Needs
- Market Overview of MHDVs in Washington State
 - Impact of MHDVs on Emissions in Washington State
- Role of Incentive Program
- Goals of Study

III. Review of Existing MHD ZEV Incentives

- Tools to Incentivize ZEV Adoption
 - Grants
 - Point of Sale Voucher
 - Tax Credits
 - Third Party Financing
- Policies and Regulations
 - Federal
 - California (ACT & ACF)
- Incentives & Grants
 - California; Colorado; Hawaii; Massachusetts; New Jersey; New York, New York City; Quebec; British Columbia; Canadian Federal
- Key Takeaways from Evaluating Existing Programs

IV. Review of Existing ZEV Programs in Washington State

- State-Level Policies and Initiatives
- State Grant Programs & Incentives
- Evaluation of Clean Fuel Passenger Vehicle Tax Exemption
- Local Programs & Incentives
- Key Takeaways from Evaluating WA Programs

V. Stakeholder & Industry Engagement

Consultation with Legislators
Coordination with Staff Work Group
Industry Engagement & Outreach
Case Studies

Key Takeaways from Stakeholder Engagement

Stakeholder Engagement

22 Focus Groups

10/17: School buses
10/23: Off-road equipment - ports/airports
10/30: Utilities - Puget Sound Energy
11/03: Utilities - Public Utility Districts
11/07: Long-Haul Trucking
11/08: City of Seattle Drayage Driver Advisory Council
11/09: Public Agency
11/09: Staff work group
11/13: Dealership and finance meeting 2
11/15: Transit - buses
11/15: Small/mid-sized business operating MHD vehicles
11/17: Agriculture and farming equipment
11/27: Minority owned businesses operating MHD vehicles
11/30: Zero-emission refueling
12/07: Off road equipment - railroad | 1 - 2:30 p.m.
12/13: Agriculture and farming equipment | 1 - 2:30 p.m.

18 One-on-One Industry Interviews

9/27: Volvo North America
10/6: PACCAR
10/12: Earth Finance
10/23: Daimler
11/10: Peninsula Trucking
11/10: Ryder
11/10: Lynden Transport
11/13: Mercer Logistics
11/13: Hogland Trucking
11/14: AAA Washington
11/14: Stryder Motorfreight
11/16: Rivian
11/20: Oak Harbor Freight
11/20: Fastway Freight
11/21: DKS Associates
12/14: ConMet

Plus:

- Staff Work Group meetings
- Legislator meetings
- Partnerships with regional organizations



Stakeholder Feedback

- **Barriers to Purchasing MHD ZEVs**

- Vehicle cost
- Infrastructure
- Weight of BEV technology
- Range
- Insurance
- Existing technology does not match current needs, duty cycles

- **Point-of-Sale Voucher Programs (Voucher Incentive Program (VIP)) Work**

- Proven, effective tool for getting more MHD ZEVs on the road
- Existing VIP programs put too much financial risk on vendors, makes vendors responsible for implementing state-level policies
- Third Party Administrator is best option for implementation
- “Plus Ups” on base voucher amount encourage equity in program outcomes

- **Program should be easy to use**

- Future users want centralized place to get information, apply to program
- Users want stackability between state, local, and federal programs
- OEMs and vendors want coordination between WA and CA programs (ex. vehicle eligibility)

Stakeholder Feedback Continued

- **General lack of information or understanding about what this transition will look like**
 - Legislators want a roadmap to ZE technology adoption
 - Fleet advisory programs are key to helping all fleets transition
 - Targeted, sector-based outreach leveraging trusted, established partners is needed to share information
 - Future users want place to send, review, and process data related to MHD ZEV deployment
- **Equity should be centered in transition**
 - Ensuring benefits of emissions reductions benefit most burdened communities
 - Enable both small and large fleets to access incentives and make the transition
- **Secondary Market Incentives for ZEVs are needed**

VI. Key Elements of Incentive Program



- Third-party administered point-of-sale voucher program for zero-emission MHDV fleets and the infrastructure to support their operation
 - An analysis of voucher programs across U.S. demonstrates as best practice
- Voucher amount plus-ups, or modifiers, for select fleet types, vehicles, or environmental impacts, such as:
 - Vehicles domiciled in disadvantaged communities; small, minority-owned businesses and fleets
 - A reduced incentive for secondary market vehicles
 - Allow for vouchers to be stackable with other federal, state, or local incentives

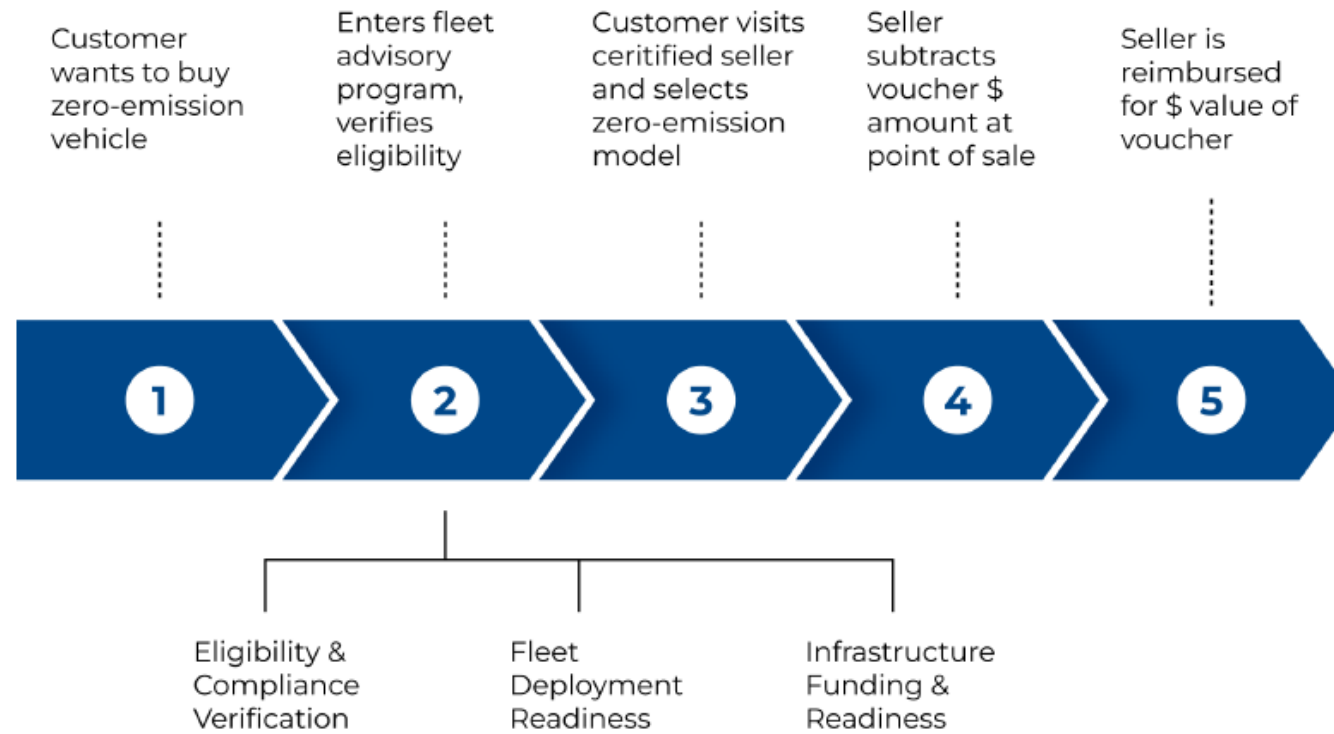
It is also recommended that the following innovative approaches be incorporated in the point-of-sale voucher incentive program to greatly enhance the offering by streamlining participation:

- Develop integrated technical assistance for fleets
- Streamline proactive coordination with utilities
- Develop a single program online portal for fleet applicants that includes on-road and non-road
- Develop a front-end pre-approval process and paperwork verification
- Create an education and outreach effort that targets fleets by sector with customized messaging that is important to each sector

Point of Sale Voucher - Advisory Track

- Fleets seeking technical assistance will complete checklist to prepare for decarbonization
- Process mitigates risk of a fleet being unprepared to transition to zero-emission technology

Figure 6. Major Stages of Voucher Application and Process for Washington State



Vehicle Voucher Amounts

Vehicle voucher amounts consistent with HVIP funding levels. Modifiers are unique to Washington State needs and program goals.

GVWR (lbs.)	Vehicle Class	Incentive Amount	Modifier Type	Amount Above Base
8,501-10,000	Class 2b	\$7,500		
10,001-14,000	Class 3	\$45,000	Class 8 Drayage	+ 25%
14,001-16,000	Class 4	\$60,000	More Impacted Environmental Risk	+ 15%
16,001-19,500	Class 5	\$60,000	Small or minority-owned fleet	+ 25%
19,501-26,000	Class 6	\$85,000	In-Use Converted/Remanufactured	- 50%
26,001-33,000	Class 7	\$85,000	Used Vehicle	- 50%
33,001+	Class 8	\$120,000	EV Charging and Infrastructure	+ 50%

VII. Implementing a MHD ZEV Incentive Program

Goal: Grow MHD ZEV market in Washington State

Objective:

- Spend incentive money before end of biennium
- Demonstrate value of incentive program to accelerating MHD ZEV deployment

VIII. Policy Gaps & Future Considerations

- MHD ZEV Insurance
- Supply Chain Issues
- Secondary Market Development
- Incentive Funding as Local Match
- Stackable Scrappage Incentives
- Additional Recommendations on School & Transit Fleets
- Infrastructure Considerations
- Next Steps

Impact to Puget Sound ZE Truck Collaborative

- Once the program is available, drayage drivers should be able to layer the state incentive program with local programs, including the NWSA pilot projects.
- Report can be a resource and reference for the 2050 ZE Roadmap.
- Legislators highly invested in drayage elements of this study.
- Final report will include a drayage engagement and outreach plan that can help inform future efforts for the state and NWSA programs.
- Our recommendation to the JTC and WSDOT is to work closely with established partners (like NWSA and other members of the Collaborative), who will be powerful partners in sharing information and providing feedback about what is and isn't working about the program.



Thank you!

Please send feedback & further comments to betz.mayer@pnwer.org!

City of Seattle's Heavy-Duty Vehicle Electrification Incentive PILOT

Office of Sustainability & Environment

April, 2024

Seattle Office of Sustainability & Environment



City of Seattle

City of Seattle's Heavy Duty Vehicle Electrification Incentive Pilot

The Office of Sustainability and Environment (OSE), in partnership with SCL, SDOT, Seattle CBOs (and funded by the Green New Deal) have developed a **Heavy-Duty Vehicle Electrification Incentive Pilot** to enable independent owner operators of drayage trucks to transition to electric drayage trucks.

The team is committed to taking a **racial equity approach** to determine how best to design the incentives, support the drivers, and to ensure that the Duwamish Valley community benefits from the electrification of these trucks.



ONE SEATTLE CLIMATE JUSTICE AGENDA

Equitable Clean Energy Economy

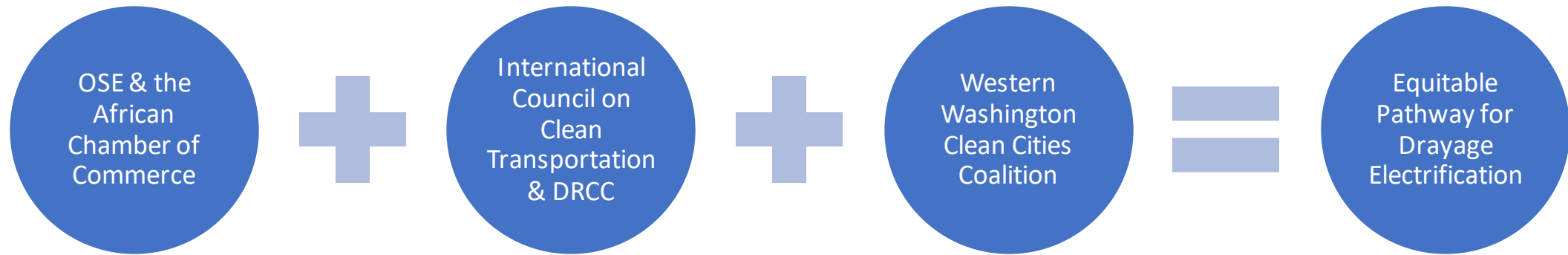
Just Transition Away From Fossil Fuels

Healthy, Resilient Communities

*Building on what we know works to accelerate investments
and prioritize actions that achieve Climate Justice.*



Centering equity by partnering with drivers and the community



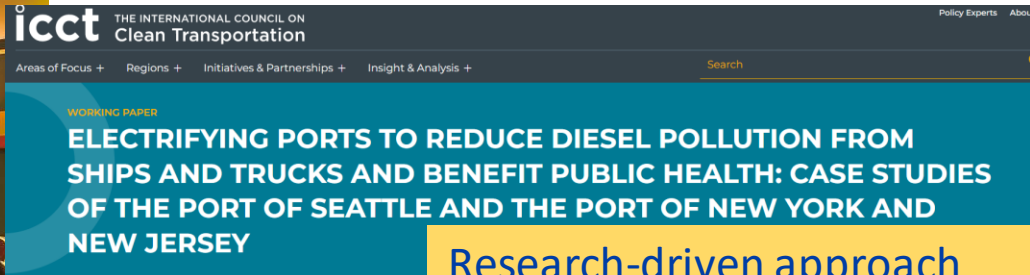
- **African Chamber of Commerce:** Paid surveys, educational webinars, driver group outreach, planning events to discuss eligibility requirements & education about the incentive, helped determine racial equity goals.
- **DRCC** Elevating community voices to inform the project, helping to define the scope of the project, partnering with ICCT on research elements, and serving as project champion, helped determine racial equity goals.
- **Western Washington Clean Cities** is an expert in offering incentives and rebates and will serve as the City of Seattle's rebate administrator.



ACC's Driver Advisory Group



Defining our Racial Equity Outcomes



Research-driven approach with ICCT



Partners! Drayage Drivers & Climate Solutions

WE INVITE YOU TO VIRTUALLY ATTEND!!!

CLEAN ENERGY UPDATE

Presenting to Drivers: Help us design equitable incentives!
SAT, MARCH 4TH @ 11:00AM

Presenter
Tracey Whitten
Transportation Electrification Program Manager
City of Seattle

News • Green Cars

Here's Why Drayage Trucks Are among the First to Go EV

Electrify America to build fast chargers in the Port of Long Beach, California, for one of the largest EV truck fleets of its type.

BY JAY RAMEY • SEP 14, 2022



Drayage in the News!

1. Air-quality improvements from drayage truck electrification are felt most in port-adjacent communities *(Ensure electrified trucks are put to work in the Duwamish Valley.)*

- In the application process, prioritize vehicles that will operate in the Duwamish Valley
- Quantify the air-quality improvement by installing telematics in the vehicles

2. No undue harm/financial burden to BIPOC truck drivers, especially owner/operators, as they transition to ZE trucks & Ensure drivers can access new ZE trucks at little to no additional out of pocket expense, while maintaining (or increasing) their level of take-home pay.

- Charging infrastructure is installed to support the trucks
- The cost to access the truck is not larger than what they would otherwise pay for a used drayage truck
- Drivers will own the asset after the 3-year pilot (if they comply with the incentive parameters)
- The City & our partners can address problems early, in order to successfully scale

3. Incentive co-designed with community, to ensure the program reflects our shared racial equity Outcomes.

- We have been designing and sharing our draft incentive structure with our partners
- The 2-tiered incentive ensures that risk is shared and that different business models can be included to inform our learning
- Our goal is to create a scalable pilot, that can serve as a model for a just transition for Independent Owner Operators of drayage trucks
- We seek to build a program that will become a magnet for state and federal investments, or a model for new state/federal programs

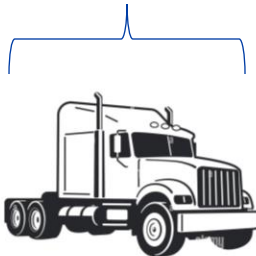


Background on Target Fleet Groups

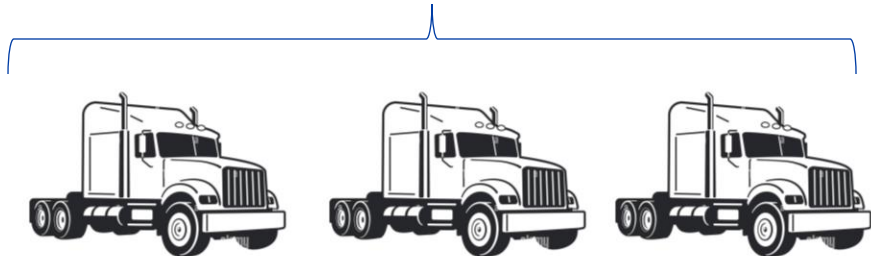
Independent Owner-Operators

- Owns 1 truck
- Traditionally buys 3rd-hand used trucks
 - Used truck cost of ~\$20,000 - \$50,000
- Does not typically have a “home base” other than their private home to park and refuel trucks at night

Independent Owner/Operator



Small Drayage Fleet Owner



Small Drayage Fleet Owner


- Owns between 2-20 trucks (+/-)
- Buys New or 2nd-hand used trucks
 - New diesel truck cost of ~\$120,000
- Typically parks trucks at a fleet yard overnight





Engagement Strategies and Opportunities in Transitioning to Zero-Emission Drayage Trucks

By SIBA



Better ways to engage with drayage drivers and owners

- **Surveys:** Conduct surveys to understand drivers' needs, and preferences, thus fostering better engagement.
- **Flexibility and Convenience:** Offer flexible scheduling to accommodate drivers' busy schedules and meet them where they are.
- **Value Drivers' Time:** Recognize the value of drivers' time, especially during in-person meetings, by offering stipends or snacks/refreshments.
- **Culturally and Linguistically Appropriate Support:** Ensure support materials and interactions are culturally and linguistically appropriate.
- **Advisory Committee:** Establish an advisory committee comprising of drivers and owners to enhance communication and trust, providing quarterly stipends for their insights.



Additional Engagement Strategies

- **Support for Contracts and Work:** Assist drivers in securing fair contracts and additional work opportunities to ensure job stability.
- **Community Engagement:** Collaborate with driver associations and community organizations to amplify outreach efforts and foster community engagement.
- **Accessible Support Services:** Provide accessible support services, such as legal advice and financial assistance, to address drivers' needs comprehensively.

Opportunities and Barriers to Transitioning to MHD-ZEV

Opportunities

1. **Cost Savings:** EVs offer significant long-term savings due to lower maintenance costs and gas costs.
2. **Maintenance Benefits:** Elimination of oil changes and regular maintenance reduces downtime and associated expenses.
3. **Environmental Impact:** Transitioning to zero-emission vehicles improves air quality, reduces greenhouse gas emissions, and enhances public health.
4. **Charging Infrastructure Expansion:** The ongoing expansion of charging infrastructure increases accessibility and convenience for drivers, supporting smoother operations.
5. **Government Support:** Continued government incentives such as tax credits and charging rebates make electric vehicles more financially viable for drivers.





Barriers

- 1. Financial constraints:** Electric trucks' high upfront costs pose a significant financial burden for drivers. E.g., over \$600,000
- 2. Limited charging infrastructure:** Insufficient availability and accessibility of charging stations, especially during routes.
- 3. Range limitations:** Electric trucks have a limited range per charge, posing practical concerns for longer-distance hauls.
- 4. Time constraints:** Longer charging times compared to refueling diesel trucks impact operational efficiency and scheduling.



Barriers cont'd

5. **Economic uncertainties:** Short timeframe for decision-making and economic challenges complicate the feasibility of taking loans.
6. **Workload concerns:** Uncertainty about workload improvements with electric trucks, job insecurities, and reduction in available work.
7. **Regulatory barriers:** Federal regulations on driver work hours and restrictions on travel within city/state limits pose operational challenges.
8. **Lack of trust** in the port and its services in this new project given already strained relationship currently.

Designing an Effective Program

- 1. Financial Assistance Program:** Develop a program to address upfront costs of EVs, leveraging government incentives for long-term savings. E.g., grants, low-interest loans, and tax incentives.
- 2. Maintenance Workshops:** Integrate educational workshops on reduced maintenance needs of EVs, emphasizing cost savings.
- 3. Environmental Education:** Include training on EV benefits for air quality and public health, addressing emissions concerns.
- 4. Charging Infrastructure:** Advocate for expanded charging infrastructure to alleviate range anxiety and ensure accessibility.





Effective program cont'd

- 5. Government Incentives:** Provide guidance on tax credits, grants, and rebates available to overcome the financial barriers.
- 6. Outreach and Education:** Develop targeted outreach campaigns tailored to address specific concerns and misconceptions and promote community engagement.
- 7. Simplified Application Process:** Streamline the application process by reducing unnecessary complexity and lengthy requirements, ensuring ease of access and participation for all drivers.
- 8. Community Organization Training:** Provide targeted training to community-based organizations (CBOs) to ensure they are equipped with the knowledge and resources needed to support the drivers in transitioning to electric trucks effectively.

Additional Considerations for an Effective Program

1. **Increased Incentives:** Explore raising incentive percentages to 80-90% for greater affordability.
2. **One-on-one Technical Support:** Provide technical support in multiple languages to ensure drivers and owners understand the application process.
3. **Community Engagement:** Partner with local organizations for outreach and engagement.
4. **Job Security:** Guarantee job contracts for drivers transitioning to electric trucks, providing stability and assurance during the transition period.
5. **Infrastructure Improvement:** Enhance port services and charging station availability.
6. **Funding Allocation:** Ensure adequate funding for program sustainability.



Additional Considerations for an Effective Program continued...

- 7. Driver work hours:** Revise federal regulations regarding driver work hours to accommodate charging times.
- 8. Legal and Contract Assistance:** Provide free or subsidized legal advice on transportation contracts and documentation.
- 9. Port hours:** Extend port operating hours to streamline services and facilitate the transition to electric trucks.
- 10. Reliable maintenance support:** Ensure access to reliable mechanics and garage stations for maintenance and repairs of electric trucks.





Conclusion

- Transportation, MHD trucks included, plays a very important role in connecting communities, facilitating economic growth, and ensuring access to essential services. It serves individuals, families, and businesses, by enabling mobility and access to opportunities.
- Transitioning to cleaner transportation options through electric trucks, is essential for reducing pollution, mitigating climate change, and preserving the health and well-being of both our current and future generations.



Thank You!



Discussion



What is needed in the broader ecosystem to enable WA's incentive program to be as effective as possible in driving adoption of ZEVs for drayage drivers and companies?

Break



Role of Hydrogen in the ZEV Transition



Updates from Canada's Hydrogen Sector

Laura Quinlan, Project Manager – Transportation Solutions

April - 2024



HTEC respectfully acknowledges that its head office operates on the traditional, ancestral and unceded territory of the Skwxwú7mesh (Squamish), xʷməθkʷəy̓əm (Musqueam) and səlilwətał (Tsleil-Waututh) Nations.

HTEC and the Clean Hydrogen Value Chain



HTEC By The Numbers



140+
Employees



5
Open H₂
stations



\$237M
Equity
raised



>75,000
KG of hydrogen
delivered &
dispensed
avg 80kg/day



>1,000
Tonnes of
CO₂ abated



300
FCEVs
supported

Why Hydrogen Electric Vehicles?



FAST FUELING



LONG RANGE



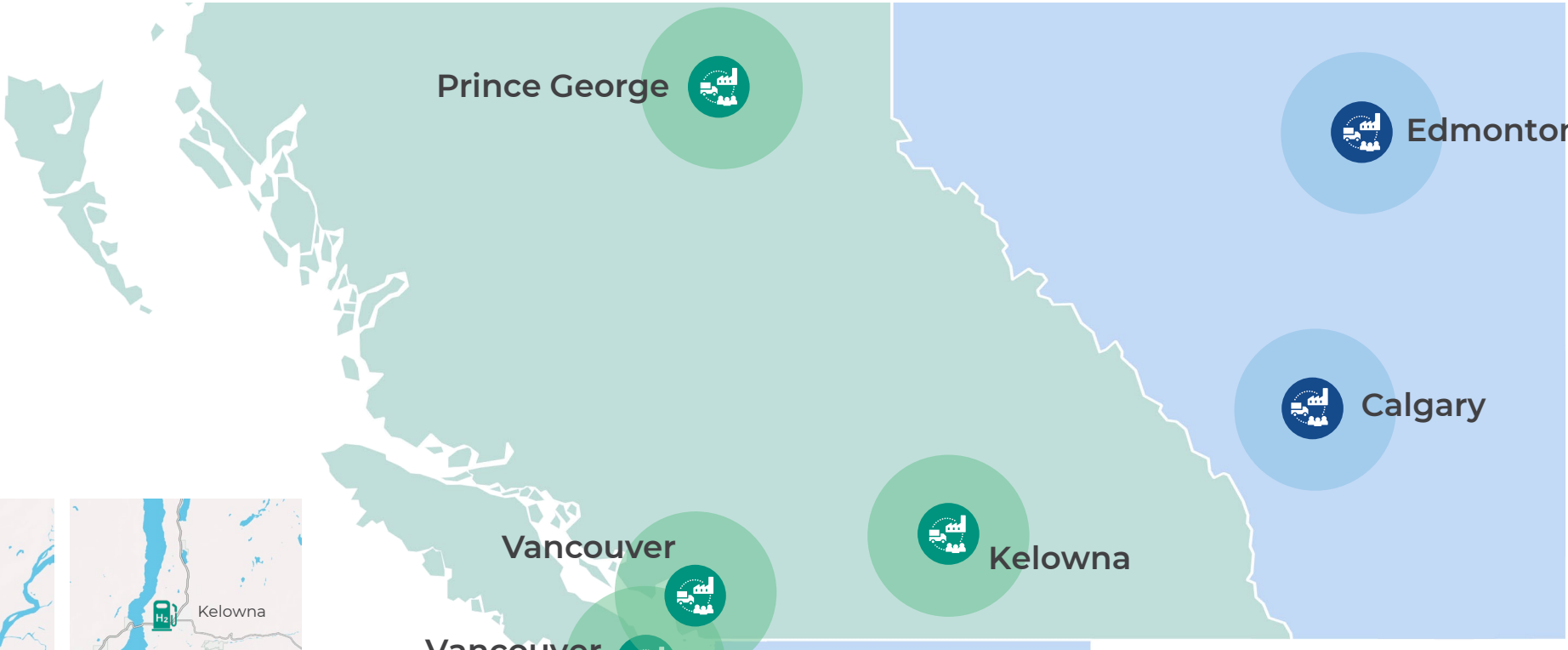
**25-90% FEWER
GREENHOUSE GAS
EMISSIONS**



**ZERO
TAILPIPE EMISSIONS**



Building a Hydrogen Ecosystem Starting in BC



Legend

- Upcoming Hubs
- Potential Hub Expansion

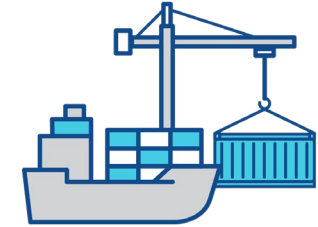
HTEC Stations – BC, Quebec, California



Demonstration Projects: BC Hydrogen Ports Project








FUEL CELL



Hydrogen Provider	Station Host & Owner	Fuel Cell Developer	Truck Developers	Port & Container Drayage Operations
<p>Burnaby 1TPD Electrolyzer Plant</p>	<p>Combined Commercial & Light Duty</p> <p>350 bar/700 Bar Capability</p> <p>400kg/day</p>	<p>FC move HD+ Engine</p> <p>8th Generation Heavy-Duty Fuel Cell Module</p>	<p>6 Fuel Cell Electric Drayage Trucks in Port Operations</p>	<p>Trucks Operated by Harbor Link, Tidewater and BC Ferries During Trial</p> <p>Definitive Utilization at the Port of Vancouver</p>

Demonstration Projects: BC Hydrogen Pilot Truck Project



Hydrogen Provider	Hydrogen Distribution	Hydrogen Station	Hydrogen Truck Leasing Services	Hydrogen Truck Maintenance Services
				
<p>Burnaby 1TPD Electrolyzer Plant</p>	<p>Transported in HTEC PowerCubes Trailers</p>	<p>Combined Commercial & Light Duty 350 bar/700 Bar Capability</p>	<p>6 OEM Class 7/8 Trucks 6 Fleet Operators</p>	<p>Upgraded Hydrogen Bay in Abbotsford</p>



Announcement 16th November 2023 at Velocity Truck Centre

Thank you to Province of BC and OEMs for all their support in bringing the event together and attending the occasion!



What's coming 2024-2025

HTEC's Burnaby Clean Hydrogen Production Facility

- 1 tonne of clean hydrogen produced on site via electrolysis every day.
- A liquid hydrogen (LH2) subsystem providing an additional 1-tonne-per-day on an as-needed basis.
- Will provide H2 supply for the HTEC's transportation projects.



HTEC's Tsawwassen Heavy-Duty Fueling Station

- HTEC's first heavy-duty station fueling station
- 350 bar/700 bar capability
- Anticipated daily usage to support 150-200kg/day

Vehicle Adoption Support

- Expanding partnerships with OEMs and fleet operators
- Training for drivers & fleet operators
- Leasing service development



What's Next?

- Creating the BC Hydrogen ecosystem
 - Production
 - Distribution
 - Stations – LD & HD
 - Fuel Cell Trucking

Pacific Northwest selected as Regional Clean Hydrogen Hub by US Department of Energy

- HTEC has been down selected as a sub-recipient as part of the PNWH₂ Hub
- We will be focused on liquefaction, station development and truck deployment along the I-5 corridor



Pacific Northwest Hydrogen Hub
PNWH2.com | info@PNWH2.com

FOR IMMEDIATE RELEASE
October 13, 2023

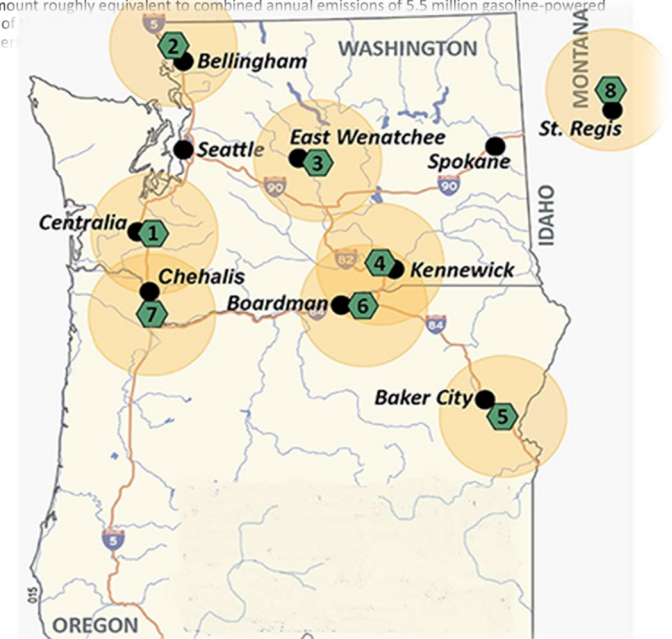
Media Contact
Kate Gregory, PNWH2 Hub Advisor
info@pnwh2.com

US Dept. of Energy Selects Pacific Northwest for Regional Clean Hydrogen Hub

Pacific Northwest Hydrogen Association's PNWH2 Hub enters negotiations with DOE for initial hydrogen hub federal funding

OLYMPIA, WA – The Pacific Northwest will continue to lead the way in building a clean energy future as a network of clean hydrogen suppliers and end-users to decarbonize some of the hardest-to-abate sectors of the region's economy is one step closer to reality.

The U.S. Department of Energy (DOE) [today selected](#) the [Pacific Northwest Hydrogen Association's](#) PNWH2 Hub for award negotiations as one of the [Regional Clean Hydrogen Hubs](#) following a competitive nationwide process. DOE's H2Hubs will kickstart a national network of clean hydrogen producers, consumers, and connective infrastructure while supporting the production, storage, delivery, and end-use of clean hydrogen. Funded by President Biden's Investing in America agenda, the H2Hubs will accelerate the commercial-scale deployment of clean hydrogen—helping generate clean, dispatchable power, create a new form of energy storage, and decarbonize heavy industry and transportation. Together, they will also reduce 25 million metric tons of carbon dioxide emissions from end-uses each year—an amount roughly equivalent to combined annual emissions of 5.5 million gasoline-powered cars—and create tens of thousands of jobs in manufacturing, construction, and strengthening America's energy security.

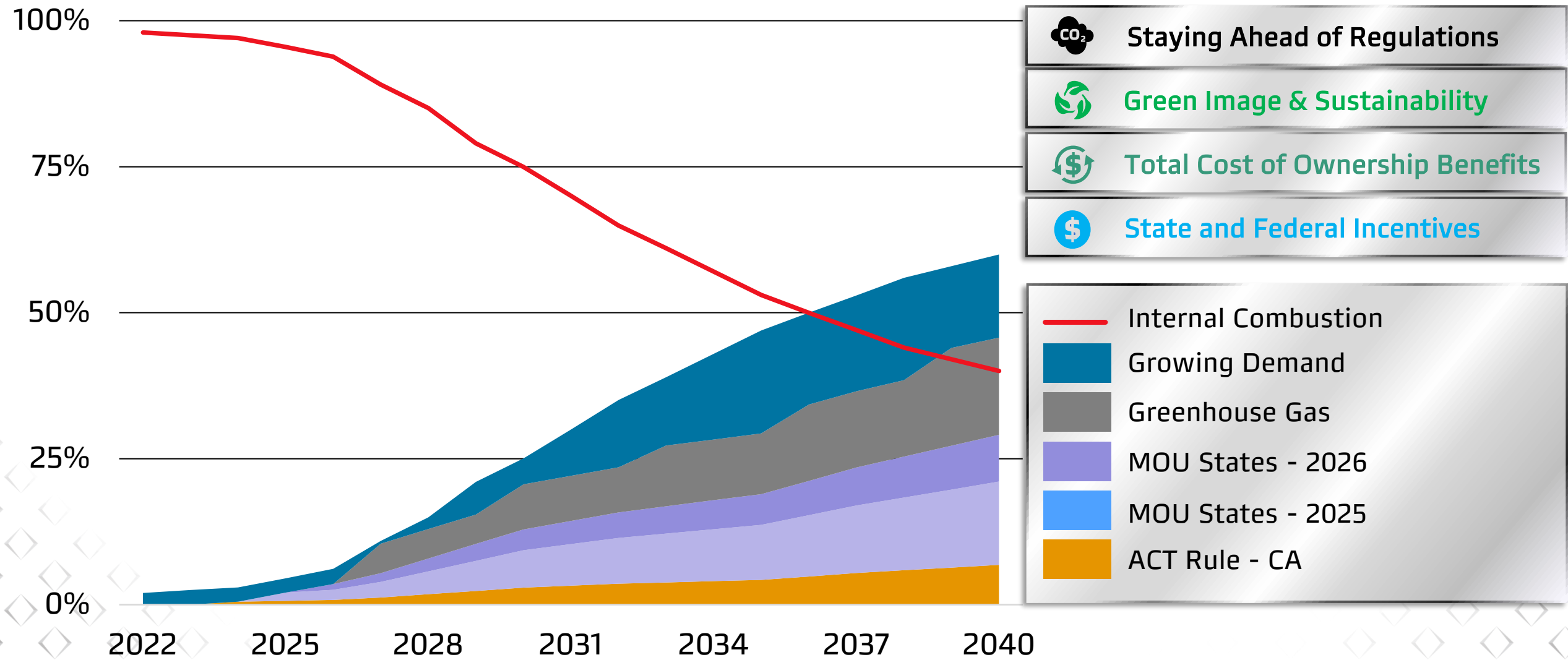




Puget Sound ZET Collaborative: Building the Hydrogen Economy

Alec Cervenka | ZEV Sales Manager, Kenworth

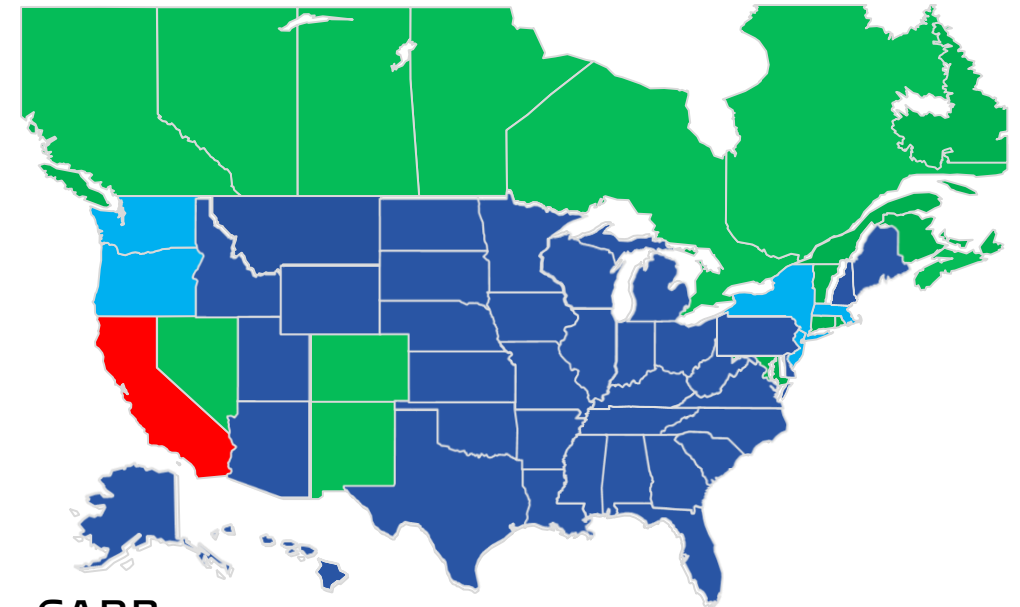
ZERO EMISSIONS VEHICLE MARKET



REGULATORY LANDSCAPE – CARB & EPA



- **CARB**
- Advanced Clean Truck (ACT): Sales Requirements on OEMs
- Advanced Clean Fleets (ACF): Purchase Requirements
- Additional Regulation on Warehousing, TRUs, Intermodal Sites Enacted
- **EPA**
- Greenhouse Gas Phase 3: Uniform for All 50 States
- Every Vehicle Manufactured Generates Credits or Deficits Based on Powertrain, Efficiency, Overall CO2 Impact
- **More Impactful Than CARB ACT, ACF**



CARB

2024 ADOPTION

2025 ADOPTION

2026+ ADOPTION

EPA

2027 ADOPTION

TOYOTA'S COMMITMENT TO HYDROGEN



- **Toyota Has More Than 25 Years of Experience with Hydrogen Powertrain Development**
 - First Prototype FCEV Debut in 1996
- **Mirai Sales Success**
 - Current-Generation Mirai is the Most Successful FCEV in History
- **FCEV Powertrain Built in USA**
 - Toyota Motor Manufacturing Kentucky (TMMK)
 - Toyota Planning Ten-Fold Increase of Fuel Cell Stacks and Hydrogen Tanks

KENWORTH AND TOYOTA DEVELOPMENT



2017
Built by: Toyota R&D
Fuel Cell System:
1st Generation
Range: 200+ miles



2018
Built by: Toyota R&D
Fuel Cell System:
1st Generation
Range: 300+ miles



2019
Built by: Kenworth
Fuel Cell System:
1st Generation
Range: 300+ miles



2023
Built by: Kenworth
Fuel Cell System:
2nd Generation
Range: 400+ miles

T680 Project OCEAN



Class 8 Daycab

300 Mile Range

P&D, Drayage, Regional

T680 FCEV PROJECT OCEAN



- **CARB Shore to Store Program**
 - POLA, POLB, Port of Hueneme, Inland Empire
- **10 T680 FCEV Prototypes**
- **Reduced CO₂ by 74.66 tons/Truck Annually**
- **H₂ Fueling Commissioned by Shell**
- **Operating Partners**
 - Toyota Logistics
 - UPS
 - Total Transportation Services Inc.
 - Southern Counties Express

T680 FCEV



Class 8 Daycab

400+ Mile Range

P&D, Drayage, Regional

T680 FCEV NEXT GENERATION



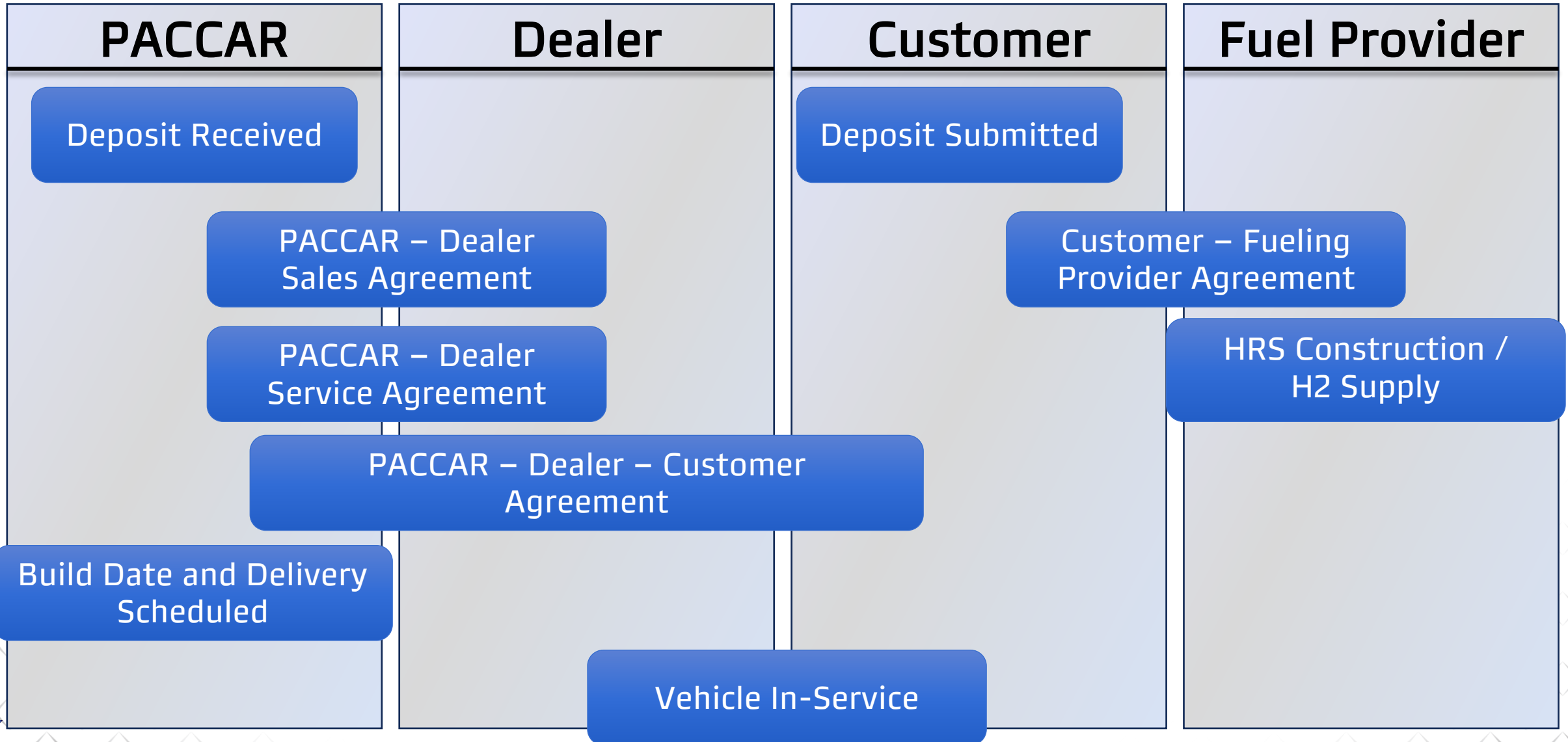
- **Class 8 6x4 Day Cab**
- 82,000lb GCWR
- **Next Generation T680 FCEV Powertrain**
 - 170kW Fuel Cell Stack
 - 60kg, 700Bar Hydrogen Storage
 - 200kWh Energy Storage System
 - 310kW Motor
 - 4 Speed Transmission
 - Target Range : 400+ Miles
 - Target Vehicle Weight : 22,500lb

T680 FCEV POWERTRAIN



- Pure Hydrogen Combines with Oxygen
- Chemical Reaction Occurs Within Fuel Cell Catalysts
- $2\text{H}_2 + \text{O}_2 \Rightarrow 2\text{H}_2\text{O}_2$
- $2\text{H}_2\text{O}_2 \Rightarrow \text{FC Reaction} \Rightarrow 2\text{H}_2\text{O} + \text{e}^-$
- Electricity from Fuel Cell Distributed to Motor and/or High Voltage Batteries
- Only Emission is Water

PACCAR FCEV SALES PROCESS



FCEV DEALER SERVICE READINESS



PACCAR/TMNA Service Planning

- PACCAR Field Service, Dealer Development Coordinating with TMNA for Service Requirements/Tooling Based on Mirai Platform
- PACCAR Dealerships/Service Centers will Require Facility and Tooling Upgrades, Technician Training
- Region-Based Approach to Dealer Preparedness
- FCEVs Will Not be Deployed Prior to Dealer Certification

FUELING INFRASTRUCTURE OVERVIEW



PACCAR/TMNA Coordination with Fuel Providers

- PACCAR/TMNA Maintaining Database
 - Provider, Location, Capacity, Timing, etc.
- PACCAR Sales Facilitating Customer-Fueler Discussions
- Executing NDAs with Fuel Providers
- Over 270 Total H₂ Fueling Sites (Including Light Duty)
 - 6 Active HD-Capable Sites
 - 120+ Proposed HD-Capable Sites

FUELING INFRASTRUCTURE OVERVIEW



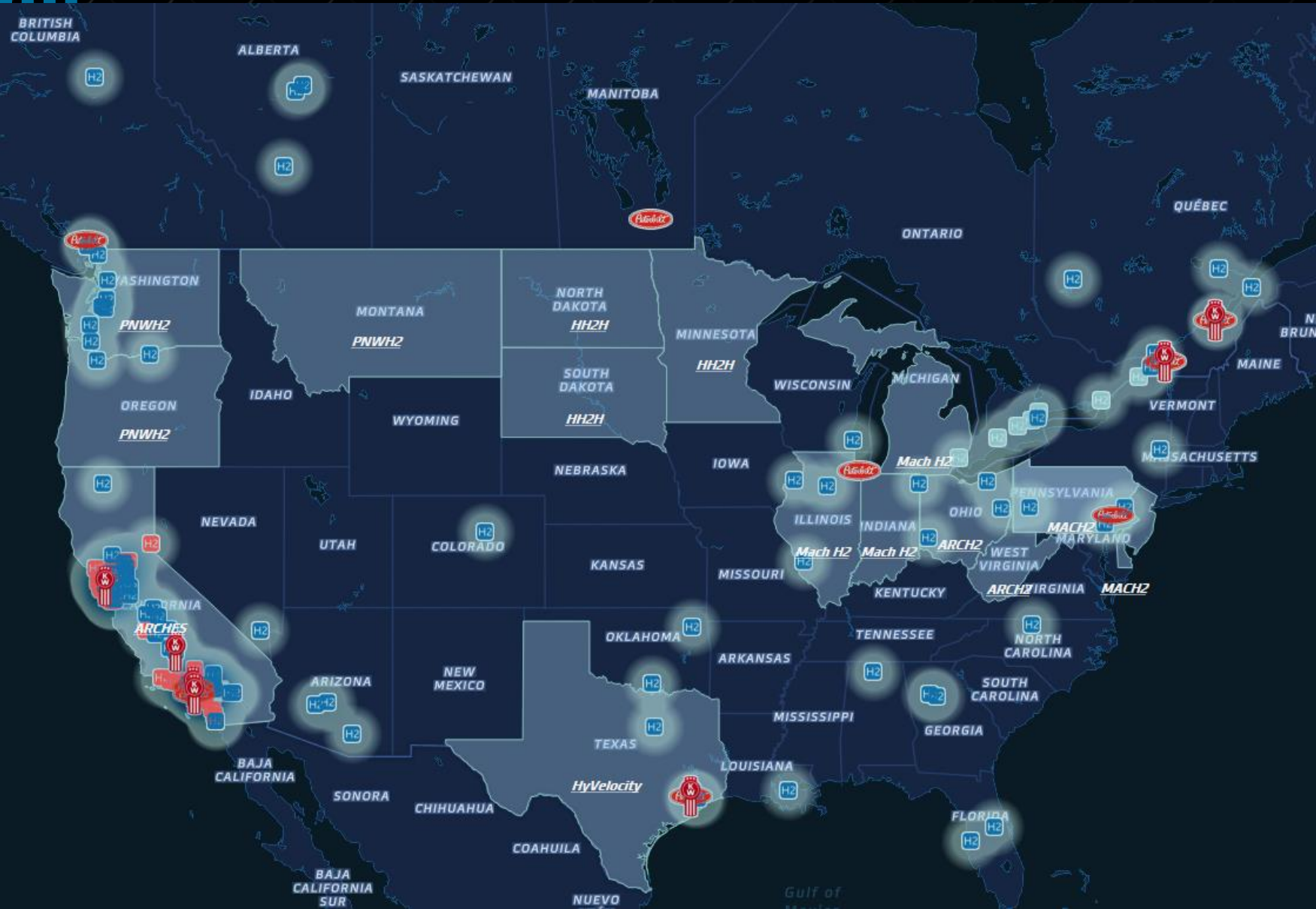
3 Distinct Sales Scenarios

- Customer-Driven, with Need for Fueling
- Fueller-Driven, with Need for Customers
- Customer with Fuel, Needing FCEVs

Customer Sentiment

- Most Fleets Preferring Public Station Model
 - Risk Avoidance, Poor BEV Infrastructure Experience
- Fleets with CNG Experience Prefer On-Site Fueling
- Mobile Fueling Viewed as Temporary Option at Best

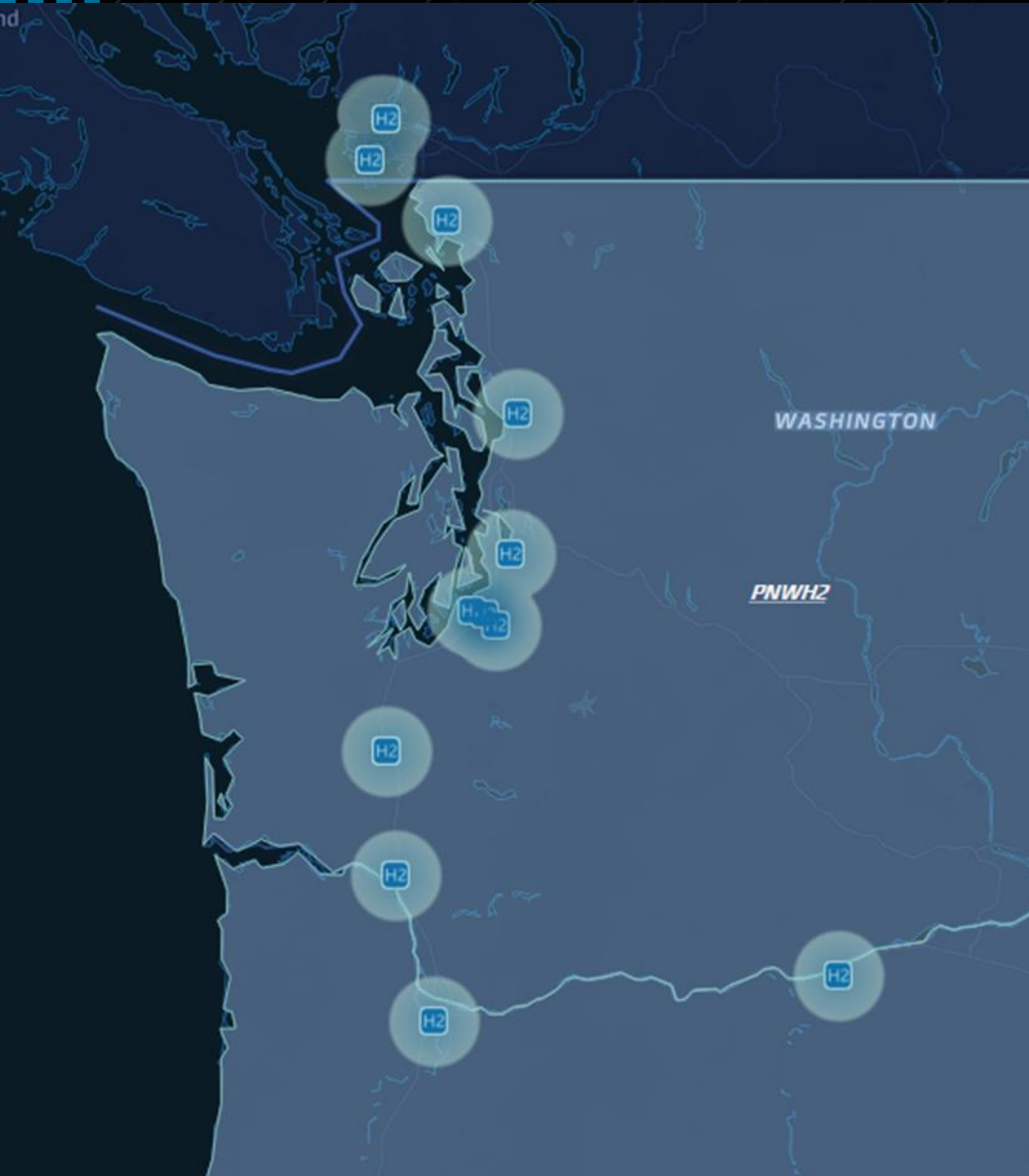
FCEV/FUEL LOCATION OVERVIEW



PACCAR/TMNA Tracker

- Deposit Holder Info
 - Location, Quantity, Dealer, etc.
- Fuel Station Info
 - Operator, Service Type, Capacity, Feedstock, Status, Timing
- H2 Hub Information
 - Award Amount, Project Details

REGION REVIEW – PACIFIC NORTHWEST



Region	Fuel Availability	Confidence Timing
Vancouver, BC	3 Stations Planned	High 1H 2025
Washington	11 Stations Planned	High 2H 2026
Oregon	3 Stations Planned	Medium 1H 2027

Comments/Gaps/Risks

- Limited Available Vehicle Incentives in WA/OR
 - PACCAR Collab. with WA for Voucher, Dray Programs
 - High CapEx Risk for Fuel Providers in Near Term
- PNWH2 Hub: \$1B Award
 - I-5 H2 Corridor Planned; Vehicle Awards Apply
 - Funding Disbursement ETA 2H 2025 at Earliest

ENSURING FCEV SUCCESS



Coordination with Fuel Providers is Necessary

- Ensure Fuel Provider Readiness and Timing for Existing Customers
- Facilitate Communication Between Fleets and Fuel Providers
- Identify Gaps Limiting FCEV Deployment
 - Geographic – “Hydrogen Deserts”
 - Time-Related – Molecule and Station Supply
 - Density – Create FCEV Density in Specific Regions
 - Cost – Leverage Grants/Incentives for TCO Parity



Driving to Zero Emissions



**EARLY ORDER PROGRAM
PREFERRED ACCESS FOR
SELECT PARTNERS**
Limited Volumes in 2025
Full Production in 2026
Accepting Initial Deposits

Discussion



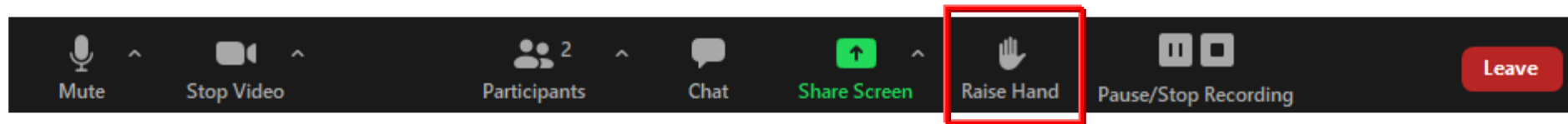
What are key opportunities and challenges for hydrogen in the ZEV transition for drayage?

Public Comment



Instructions for Public Comment

- Members of the public that are interested in making 2-minute statements are invited to do so
- To the extent possible, please frame remarks as comments rather than questions
- Please use Zoom to raise your hand if you would like to make a statement, and you will be unmuted



Next Steps



Next Steps

- Meeting summary, slides and materials will be posted on website— along with driver session summaries
- Small group session with Vehicle Affordability and Access group: Thursday, May 2: 12:30-2:00 PM
- Next full Collaborative meeting: June 4, 1:00 – 4:30 PM