Planning Strategies & Tools for Highway Corridor Zero Emission Vehicle Infrastructure

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Washington State Department of Transportation
WSDOT Webinar Wednesday
November 18, 2020

Washington Gov. Inslee aims to "Electrify Everything that Moves"



- Electric Cars
- Electric Public and Private Fleets
- Electric Transit Buses
- Electric School Buses
- Electric Ferry Vessels
- Electric Freight
- Electric Port and Airport Equipment

Today's presentation focuses on *highway corridor charging for passenger battery electric cars* and *ChargEVal, a modeling tool to support investment decisions*.

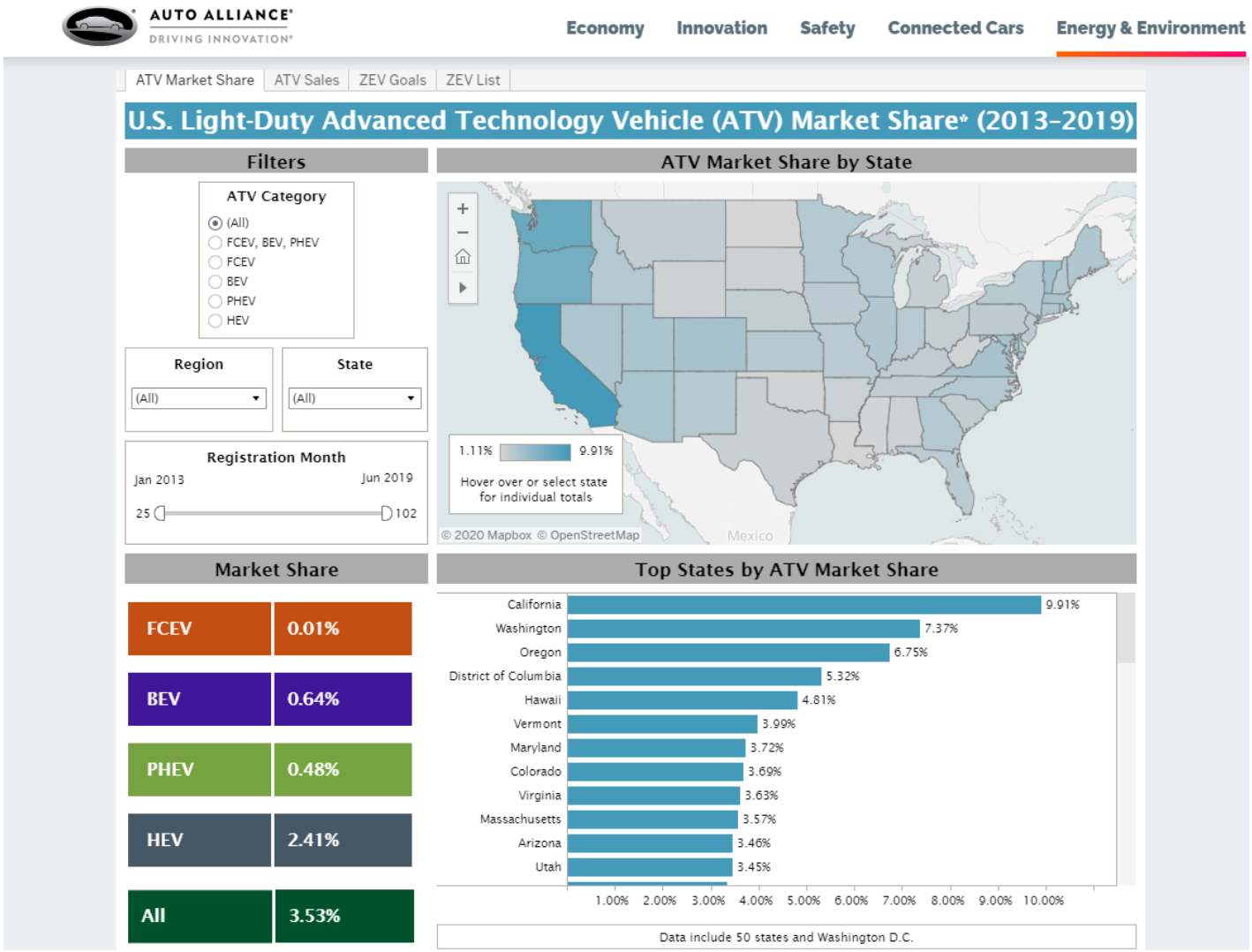
Strategies & Tools to Advance ZEV Adoption

Highlights:

- Washington State ZEV update
- EV corridor charging—planning by state and region
- Evolution of planning strategies and tools used in Washington State
- Resources
- UW ChargEVal

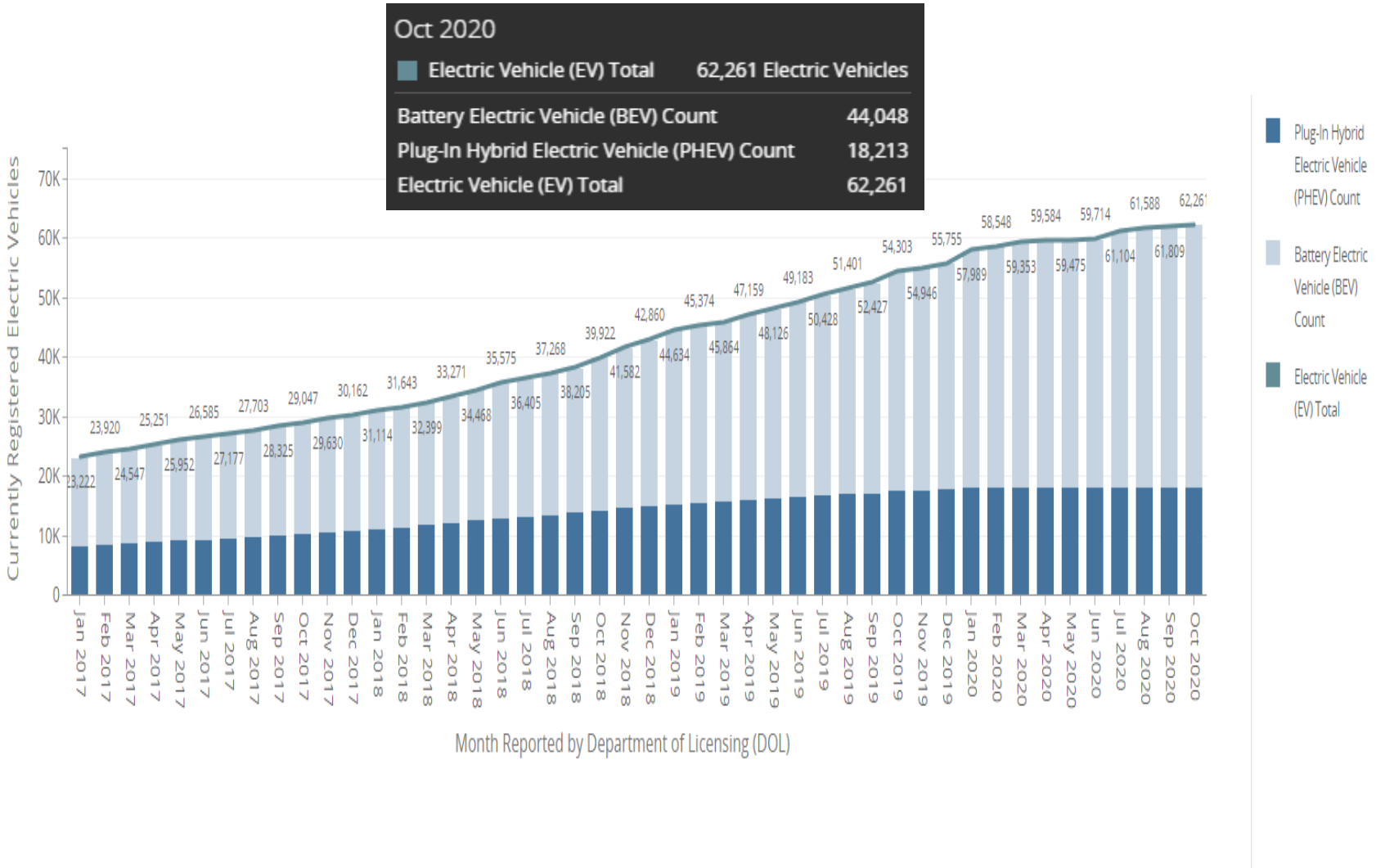


Washington is #2 for BEV Sales & ATV Market Share



Source: https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/

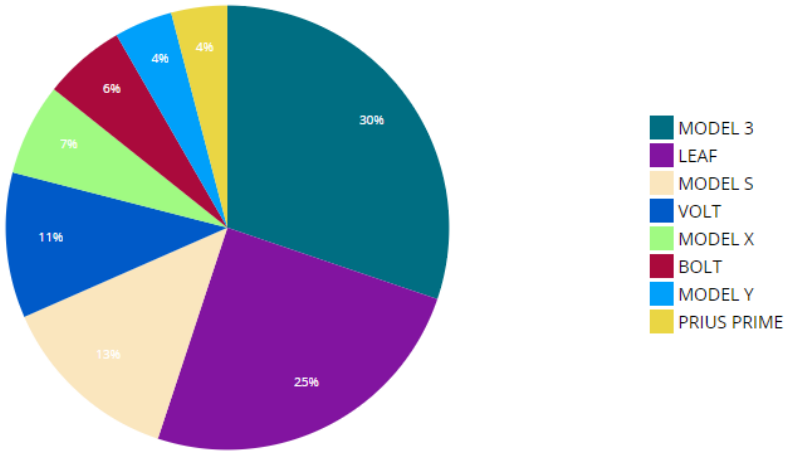
Washington Plug In Electric Vehicle Registration



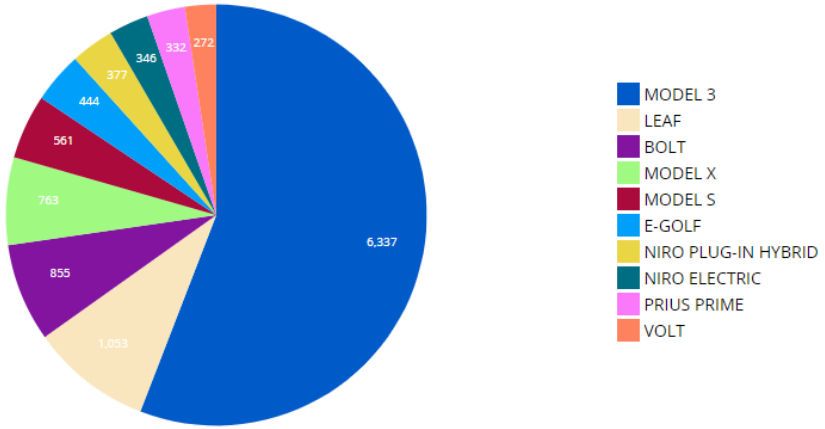
Source: Department of Licensing https://data.wa.gov

Popular Plug In Electric Vehicles in Washington

8 most common models
of total currently registered PEVs

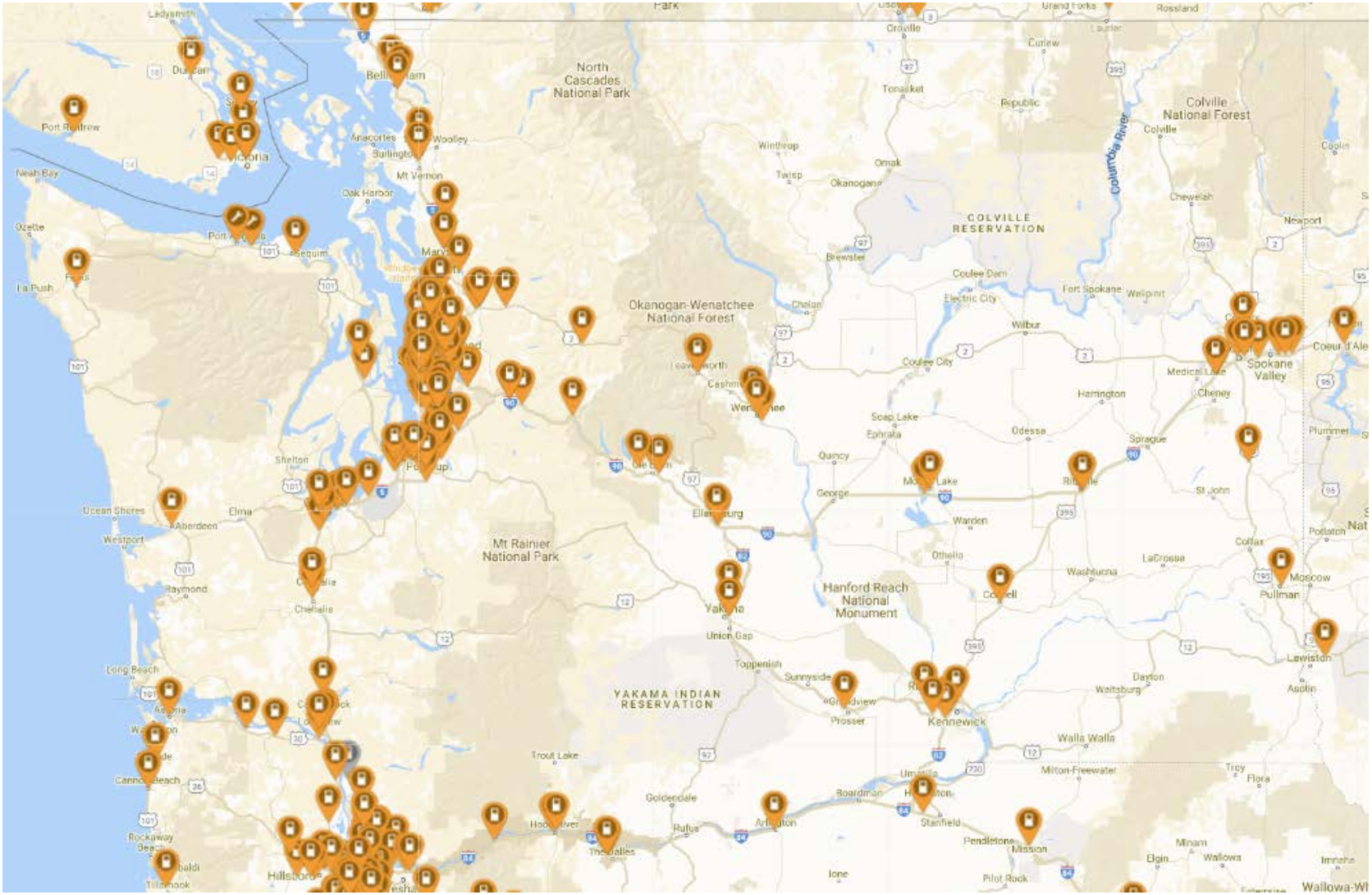


Top 10 new vehicles
that were titled by Washington residents during the past 12 months (approx.).



Source: Dept. of Licensing https://data.wa.gov (as of November 10, 2020)

168 Electric Vehicle Fast Charging Locations

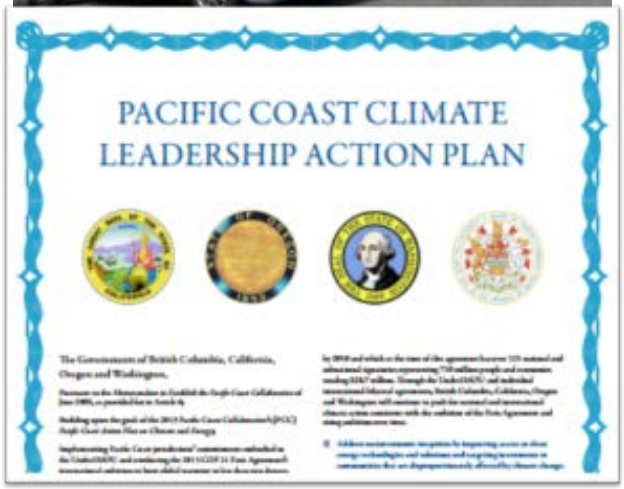


Source: https://www.PlugShare.com (November 18, 2020)

Regional Planning

- **Pacific Coast Collaborative**: leaders in Washington, Oregon, California, British Columbia and West Coast Cities
- Green Highway from British Columbia, Canada to Baja California, Mexico “BC to BC”
- Promotes petroleum reduction and sustainable transportation solutions on I-5 / Hwy 99 corridor
- Provides travelers with alternative fuel infrastructure (CNG, Hydrogen, Biodiesel, Electricity)
- West Coast Electric Highway
- West Coast Electric Fleets





Highway Corridor EV Charging Network



Accelerating EV adoption by promoting robust electric vehicle fast charging corridors.

Connecting Communities and Enabling Long Distance Travel

Seamless EV Driver Experience

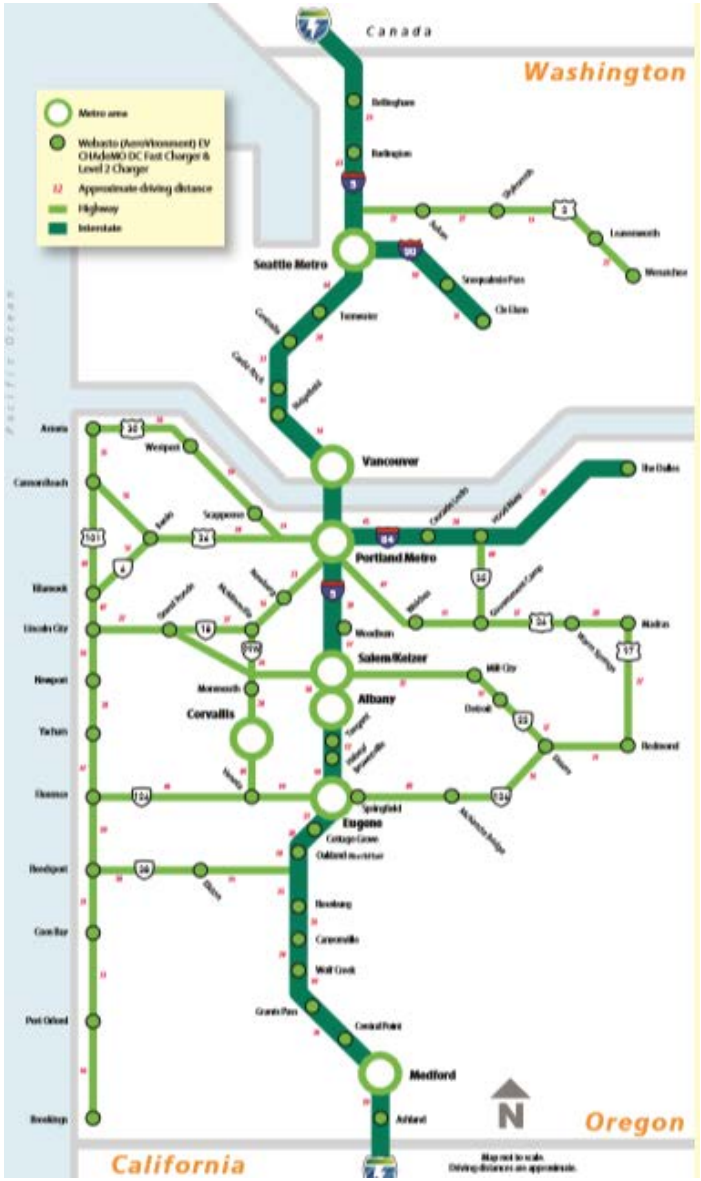
- Equipment Specifications
- Highway Signs
- Branding and Marketing

I-5, Hwy 99, US 101, and other major highway corridors

Common vision, patchwork of funding sources and projects

www.westcoastgreenhighway.com

Original West Coast Electric Highway Sites



56 EV Charging Locations
Fast charging stations (44 in OR, 12 in WA) at retail sites every 35-50 miles along I-5 and connecting roadways

Charging Equipment: AeroVironment
50 kW DC Fast Charger (CHAdeMO)
7.2 kW Level 2 EVSE (J1772)

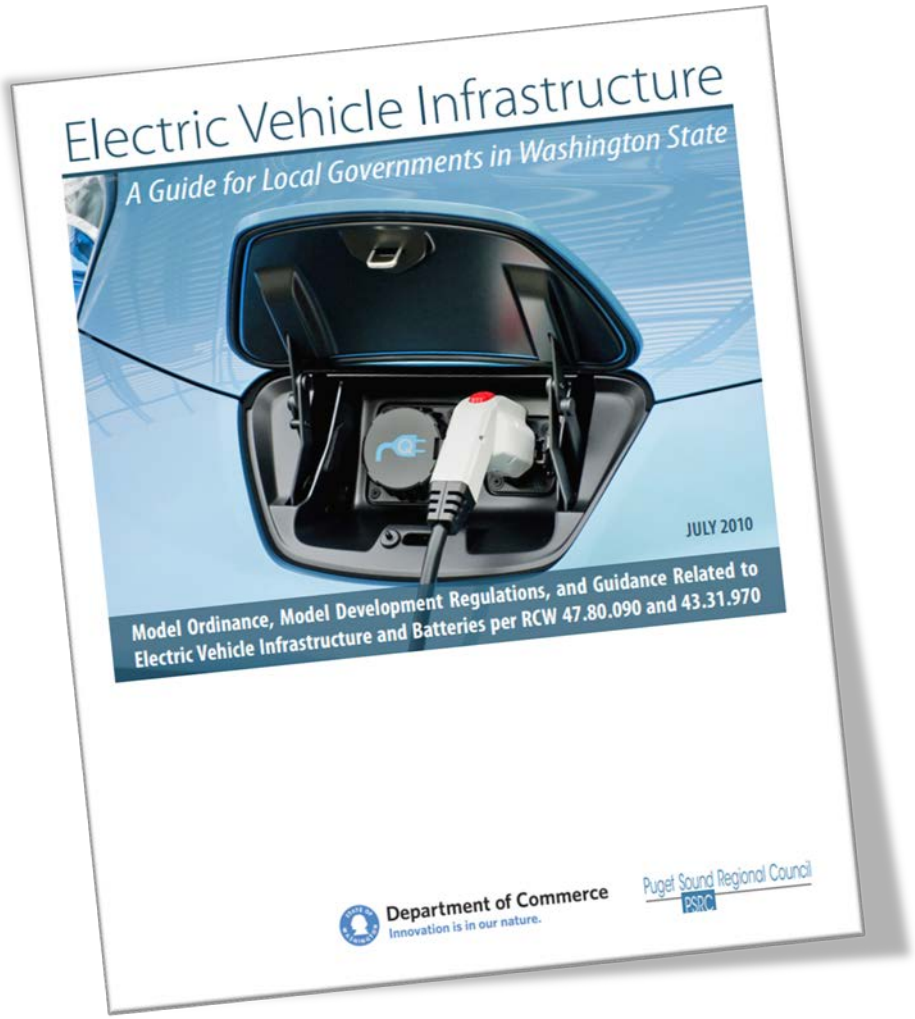
Federal Funding:
Washington: $1.6M USDOE ARRA SEP
Oregon: $1M+ USDOE SEP
$3M+ FHWA TIGER II

Partners:

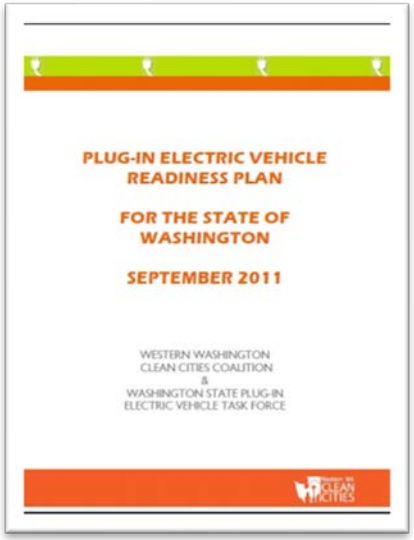
- WSDOT/ODOT
- 22 Electric Utilities
- Host Sites
- EV Drivers

Open for Public: 2012

Evolution of Planning Efforts



2010



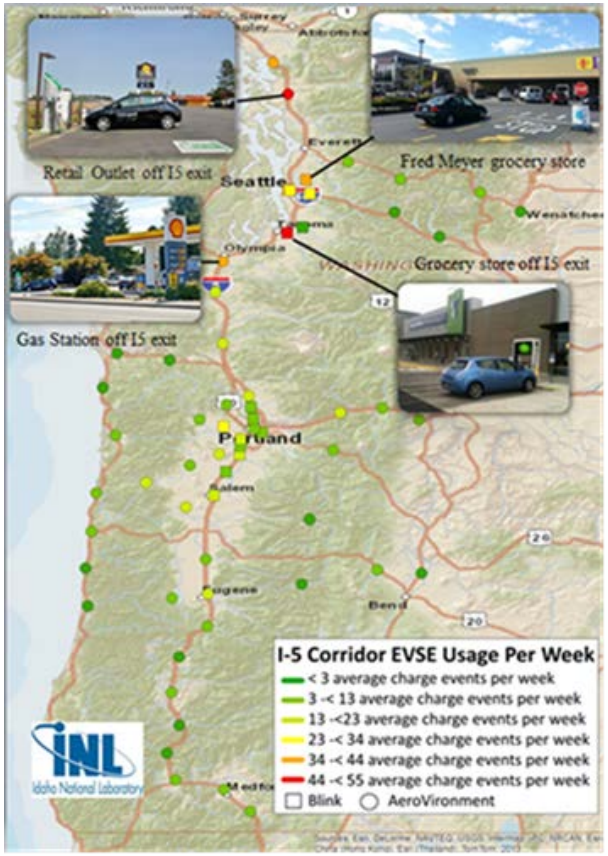


2011

Highway Corridor EV Charging Network

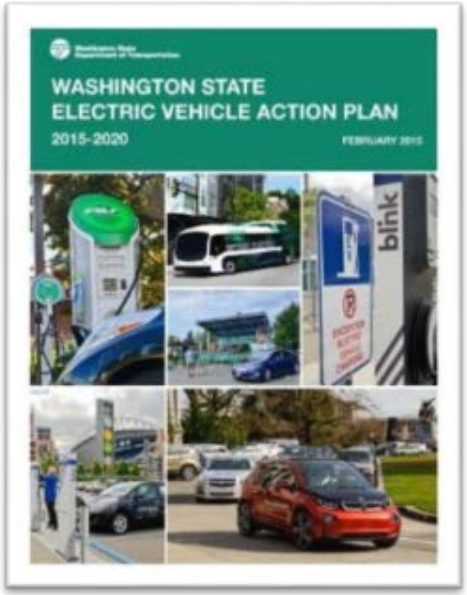


2012



2013

Washington's Goal: 50,000 by 2020



2015

2015-2020 Actions

Accelerate Electric Vehicle Sales/Adoption in WA

1. Renew the sales and use tax exemption for the purchase of Clean Cars.
2. Transform public and private fleets.
3. Conduct public education and outreach to increase consumer awareness.
4. Provide more EV charging signage to increase public awareness.
5. Explore providing incentives for driving electric vehicles.

Strengthen Washington's EV Charging Network

6. Complete build-out of WA's fast charging network.
7. Explore funding mechanisms & business models to bolster EVSE installation.
8. Support workplace charging.
9. Address building codes, policy, and zoning barriers to EV infrastructure.
10. Engage utilities.
11. Support both DC fast charging standards (CHAdeMO and SAE CCS).

Synergize Actions throughout the Region

12. Support and participate in regional alternative fuel partnerships.
13. Track and participate in national EV efforts.

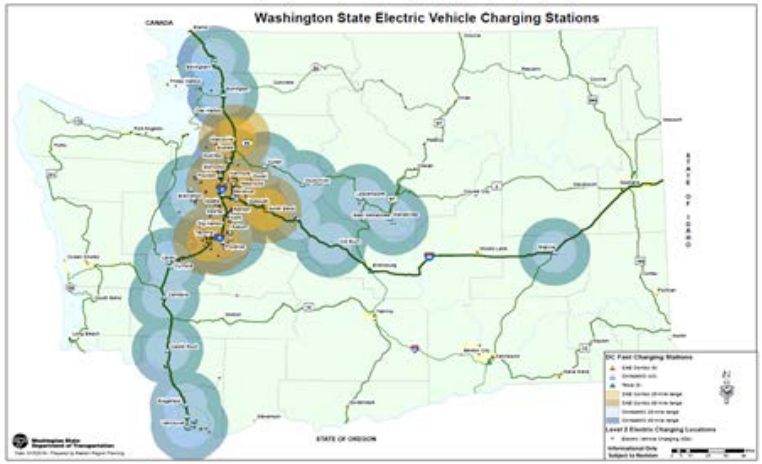
Governor Inslee announces 50,000 plug in electric vehicles in Washington!

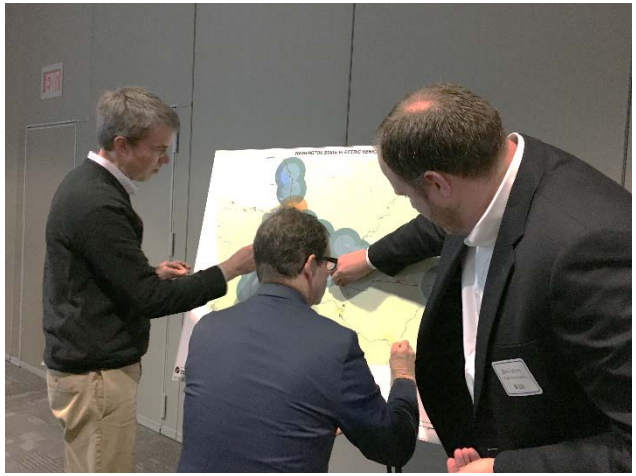
https://www.youtube.com/watch?v=yGLYtlAaPro

Identifying Priority EV Corridors through Stakeholder Feedback

- Car dealers and manufacturers
- Elected officials
- EV drivers & associations
- EV charging equipment providers
- Cities, counties, transit, tribes
- Utilities
- Universities









WSDOT's Zero Emission Vehicle Infrastructure Partnerships (ZEVIP) Program

Investments shall provide safe, convenient, cost-competitive, reliable, and easy access for drivers to recharge/refuel mass-produced electric vehicles.

Locations

- Priority corridors include I-5, U.S. 2, I-90, U.S. 101, I-82, U.S. 395, and roadways connecting midsize communities and major tourist destinations
- Located every 40-50 miles along the corridor
- Must demonstrate demand for stations

Site Criteria:

- Within ½ mile of highway interchange
- Safe and convenient access
- Parking spaces
- Restrooms and drinking water
- Shelter and lighting
- 480V 3-phase electric power supply
- Customer amenities (food, traveler info)

Expanding Highway Corridor Fast Charging

Leveraging $1 million in annual EV fees to serve more communities and more drivers

Electric Vehicle Infrastructure Partnership Program (EVIPP) investments from 2017-2019

As of February 2020; New public electric vehicle charging stations supported by the EVIPP program



Map source: Washington State Department of Transportation Innovative Partnerships office.

Notes: A map of all charging locations statewide is available on plugshare.com.

WEST COAST ELECTRIC HIGHWAY

New Fast Charging Sites Along I-5

Grant Recipient: Forth
Network Provider: EVgo



Bellingham
Whole Foods Market
(2 DCFC)



Lynnwood
Whole Foods Market
(2 DCFC)



Seatac
SeaTac Cell Phone Lot
(2 DCFC)



Tacoma
LeMay America's Car Museum
(2 DCFC, 1 L2 EVSE)



DuPont
Ace Hardware
(2 DCFC, 1 L2 EVSE)



Chehalis
Commerce District
(1 DCFC, 1 L2 EVSE)

New Fast Charging Sites in Eastern WA

Grant Recipient: Energy Northwest/EVITA
Network Provider: Greenlots



Kennewick (US-395)
Southridge Sports Complex



Yakima (I-82)
Chevron/Bullseye Burgers



Moses Lake (I-90)
Downtown Grant PUD



Richland (I-182)
City Parks and Facilities Div.



Connell (US-395)
Welcome Center



Prosser
Chevron

Photo Credits : EV drivers using Plugshare.com

New Fast Charging Sites in Eastern WA

Grant Recipient: Energy Northwest/EVITA
Network Provider: Greenlots



Ellensburg
Main Street



Pasco (I-82 & US-395)
Starbuck's
(with solar canopy)



Cle Elum (I-90)
Coffee Company
(co-located w/ Tesla Supercharger, includes 4.5kW solar array)

Photo Credits : EV drivers using Plugshare.com

Consistent Signage

Roadway Directional Signs

State Highways, Local Roads, City Streets









D9-11b (alternate) EV Charging Station Symbol



British Columbia

Regulatory Signs & Striping

"No Parking Except Electric Vehicle Charging"





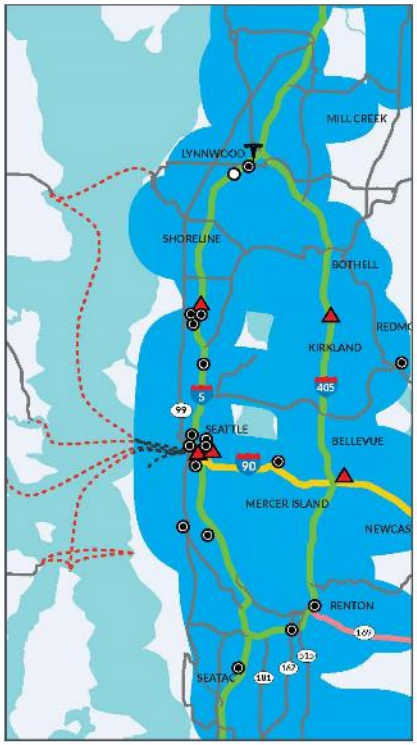




Washington state law "de-ICEing bill" (SB 5849)

Source: www.westcoastgreenhighway.com/evsigns.htm

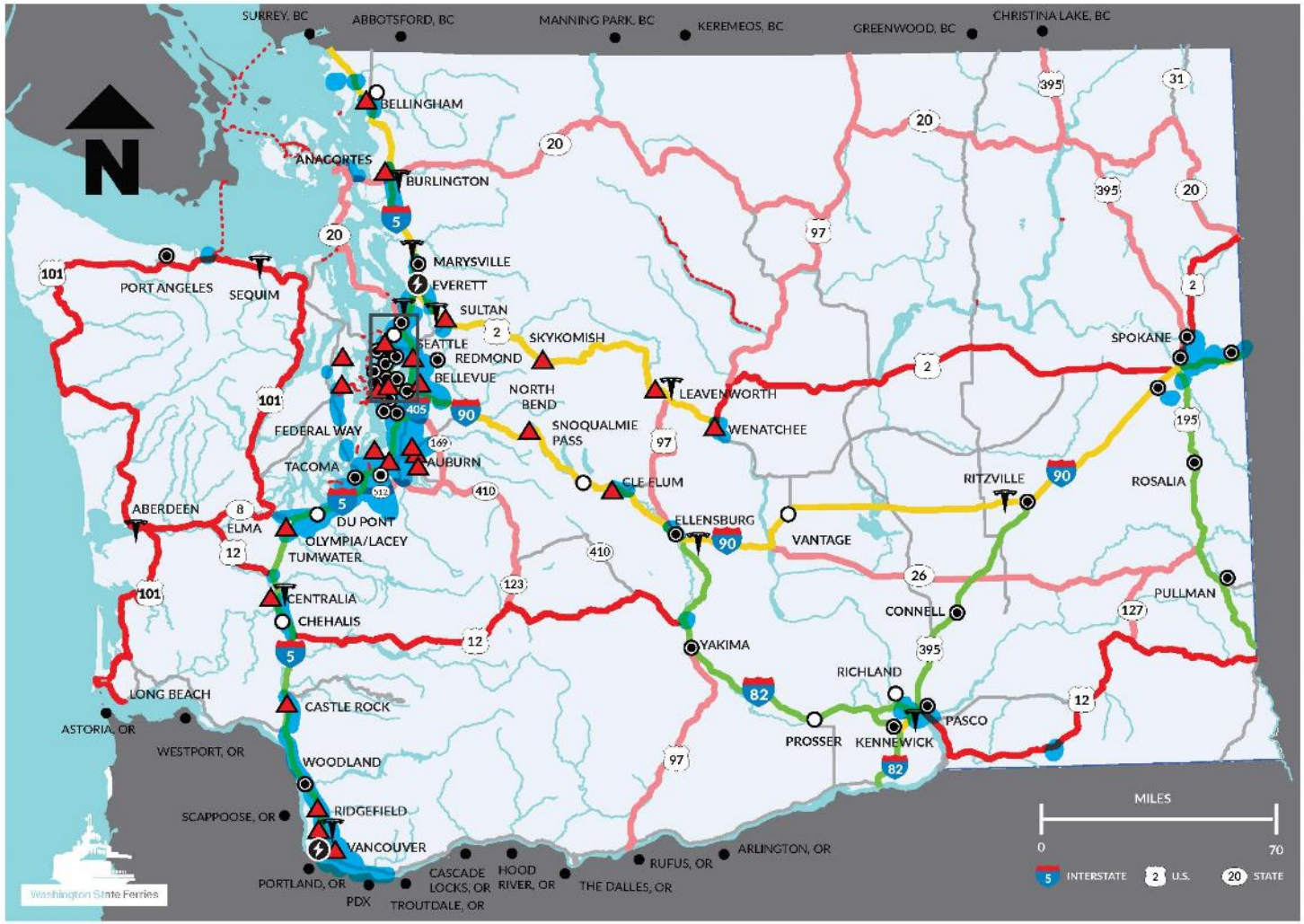
Filling Gaps and Cleaning Air in Washington



- No or insufficient charging - high priority
- No or insufficient charging - medium priority
- Weak charging/needs retrofitting
- Adequate existing and funded fast charging
- Ferry routes
- High NOx Emissions Areas

Public Charging (not including dealerships)

- Existing CHAdeMO only (needs upgrades)
- EVIPP planned CCS/CHAdeMO
- Existing CCS/CHAdeMO
- Public fast charging near border
- Electrify America CCS/CHAdeMO
- Tesla Superchargers



18-08-0326

Modeling for Corridor Fast Charging Investments

ChargEVal: A tool for evaluating Electric Vehicle Charging along Highway Corridors



Source: https://chargeval.readthedocs.io/en/latest/

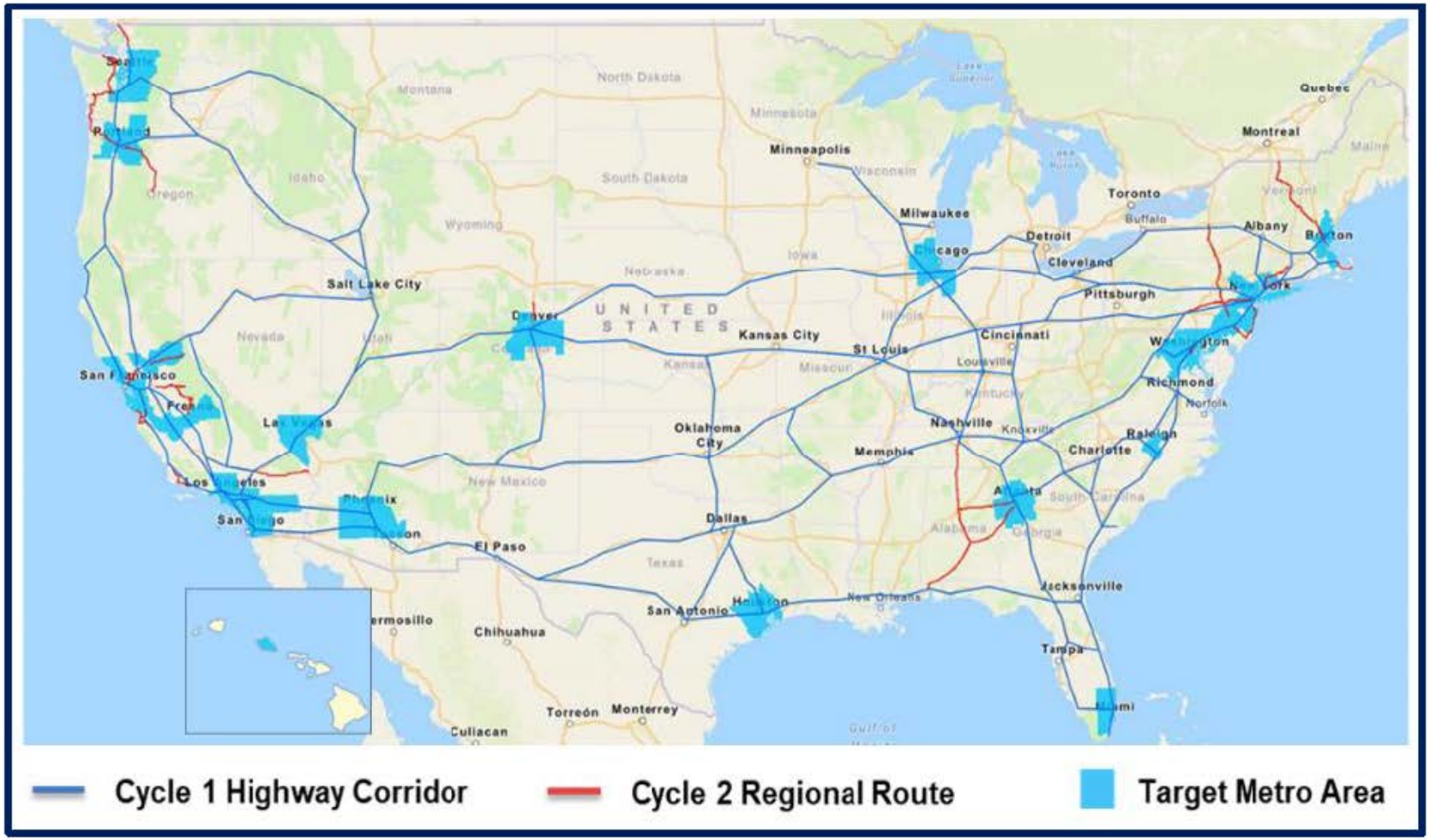
UNIVERSITY of WASHINGTON
CIVIL & ENVIRONMENTAL ENGINEERING

National EV Charging Corridors



Source: https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/

Electrify America's National Network of Charging Stations



Source: electrifyamerica.com

Connecting EV Charging Corridors

West Coast Electric Highway



REV West

Future Proofing Investments

Zero Emission Vehicles

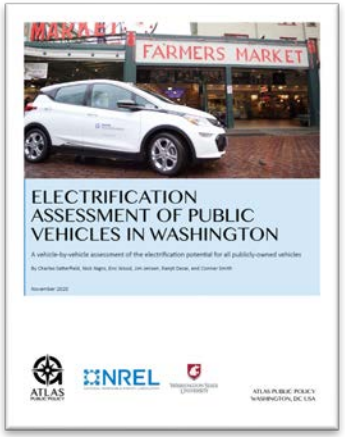
- More variety (makes and models)
- More pricing options (low to luxury subscription)
- More driving range
- Bigger battery packs
- More shared EVs (TNCs)
- More autonomous driving features
- Medium/Heavy duty delivery and freight vehicles
- Electric school and transit buses

Highway Corridor Infrastructure

- More interstate coverage
- Improved technology
- More charging plazas
- Farther corridor spacing
- Extreme Fast Charging
- Faster DCFC charge time
- Higher power levels (120 - 400 kW)
- Higher electricity demand charges
- Multiple fast charging standards
- Hydrogen Fuel Cell Vehicle Fueling



Tracking New Planning Strategies and Tools



West Coast:

- JTC Electrification Assessment of Public Vehicles in WA
  https://leg.wa.gov/JTC/Meetings/Documents/Agendas/2020%20Agendas/Nov%2017%20Meeting/Electrification_draftfinalreport.pdf
- Oregon DOT Climate Office - Transportation Electrification Infrastructure Needs Analysis
  https://www.oregon.gov/odot/Programs/Pages/TEINA.aspx
- I-5 West Coast Collaborative Medium/Heavy-Duty Alternative Fuel Infrastructure
  https://westcoastcollaborative.org/files/sector-fuels/wcc-aficc-mhd-plan-highlights-2020-05-19.pdf
- I-5 Corridor Electric Utility Plan
  https://westcoastcleantransit.com/

Multi-State Initiatives:

- Western Governors' Association Electric Vehicles Roadmap
  https://westgov.org/news/article/register-gov-kate-brown-to-announce-wga-chair-initiative-the-electric-vehicles-roadmap
- NESCAUM Medium/Heavy-Duty 15-State ZEV MOU
  https://www.ccjdigital.com/states-support-electrifying-commercial-vehicles/

Resources

Technical assistance:

- Federal, state, local stakeholders
- National EV Associations
- Alternative Fuel Toolkit http://altfueltoolkit.org

National databases and resources:

- U.S. Dept. of Energy www.energy.gov
- Plug In America www.pluginamerica.org
- Alternative Fuels Data www.afdc.energy.gov
- Clean Cities www.cleancities.energy.gov
- FuelEconomy.gov www.fueleconomy.gov
- FHWA Alternative Fuel Corridors: www.fhwa.dot.gov/environment/alternative_fuel_corridors/

Unbiased data to support investment decisions:

- National Labs
- Universities





Thank you



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