

# **Planning Strategies & Tools for Highway Corridor Zero Emission Vehicle Infrastructure**

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Washington State Department of Transportation  
WSDOT Webinar Wednesday  
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# 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 ChargeEval



# Washington is #2 for BEV Sales & ATV Market Share



**AUTO ALLIANCE**  
DRIVING INNOVATION™

Economy Innovation Safety Connected Cars Energy & Environment

ATV Market Share | ATV Sales | ZEV Goals | ZEV List

## U.S. Light-Duty Advanced Technology Vehicle (ATV) Market Share\* (2013-2019)

### Filters

#### ATV Category

- (All)
- FCEV, BEV, PHEV
- FCEV
- BEV
- PHEV
- HEV

#### Region

(All)

#### State

(All)

#### Registration Month

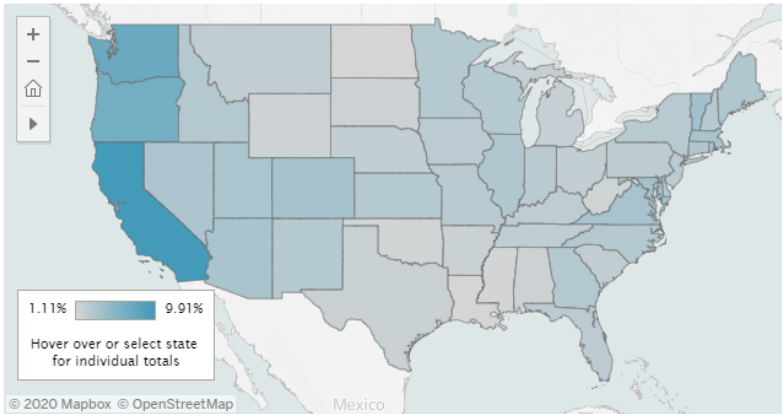
Jan 2013

Jun 2019

25

102

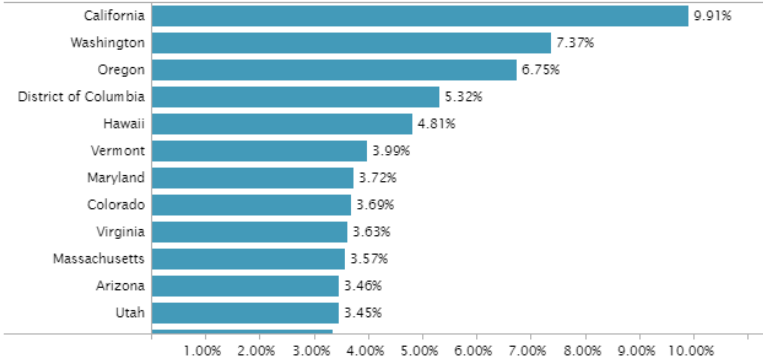
### ATV Market Share by State



### Market Share

FCEV	0.01%
BEV	0.64%
PHEV	0.48%
HEV	2.41%
All	3.53%

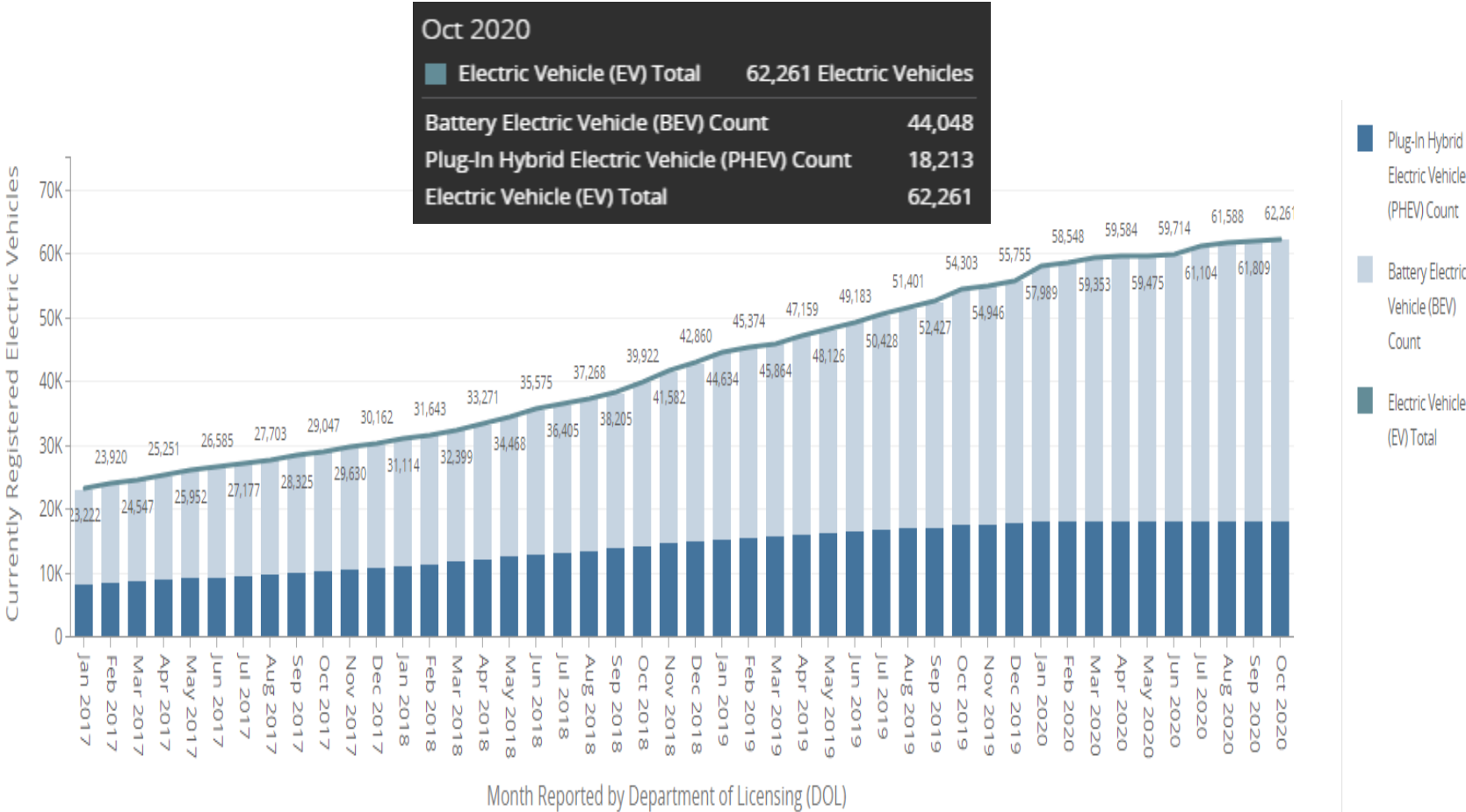
### Top States by ATV Market Share



Data include 50 states and Washington D.C.

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

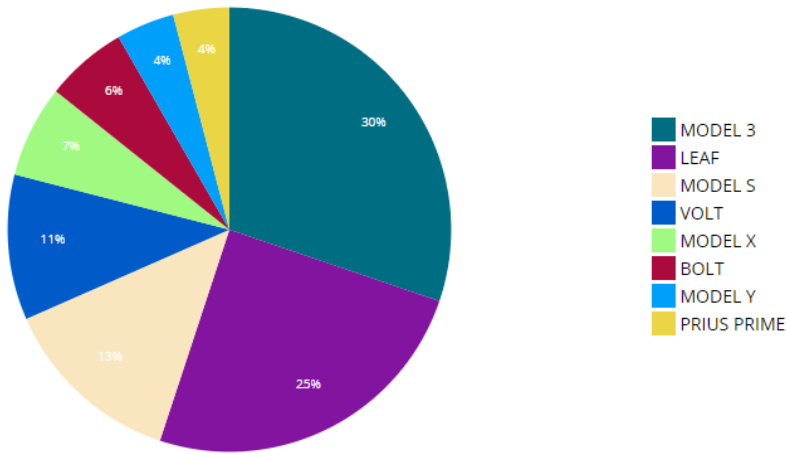
# Washington Plug In Electric Vehicle Registration



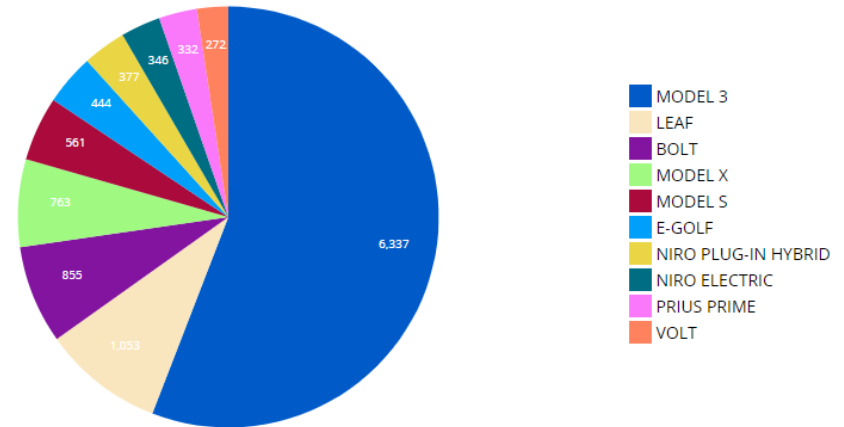
Source: Department of Licensing <https://data.wa.gov>

# Popular Plug In Electric Vehicles in Washington

**8 most common models**  
of total currently registered PEVs

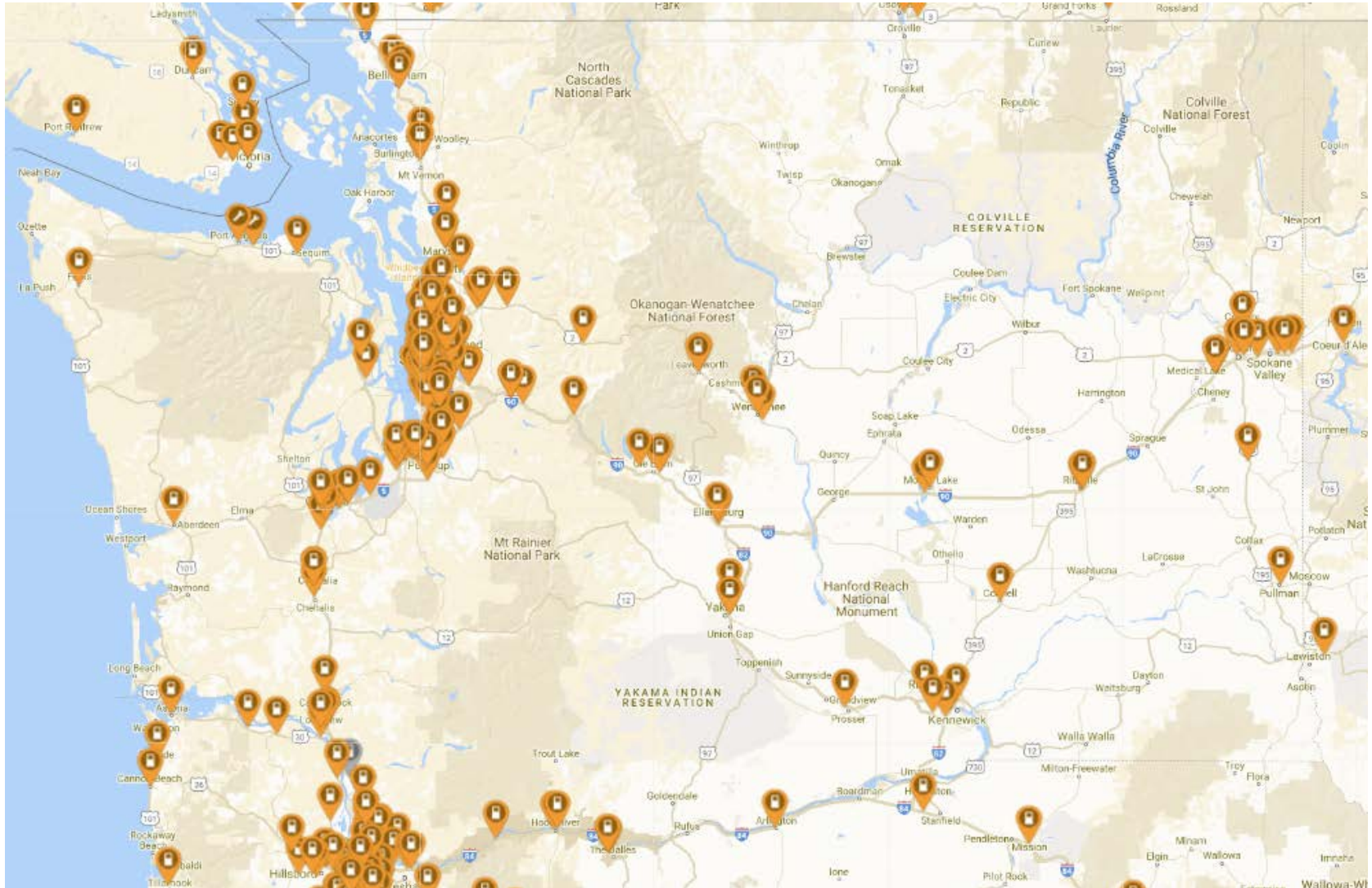


**Top 10 new vehicles**  
that were titled by Washington residents  
during the past 12 months (approx.).



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

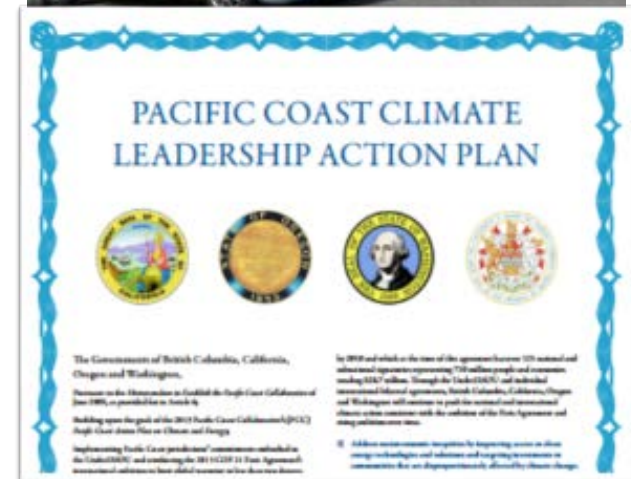
# 168 Electric Vehicle Fast Charging Locations



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](http://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:

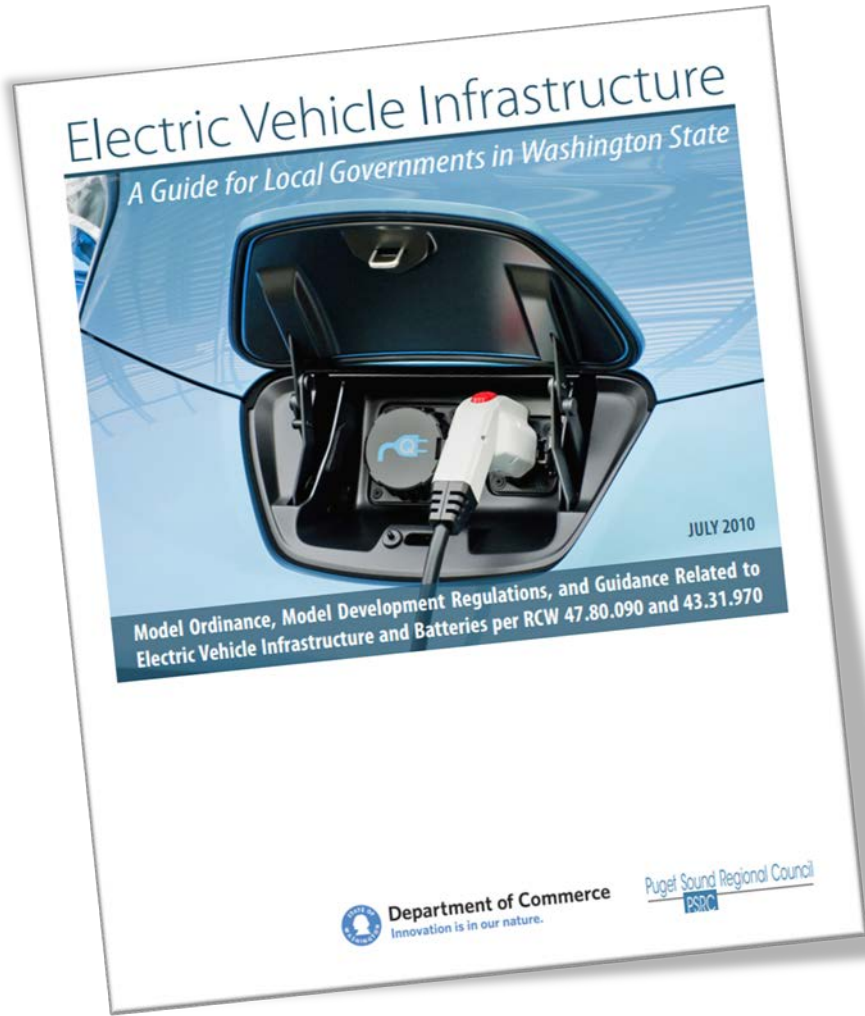
Washington: \$1.6M USDOE ARRA SEP  
Oregon: \$1M+ USDOE SEP  
\$3M+ FHWA TIGER II

## Partners:

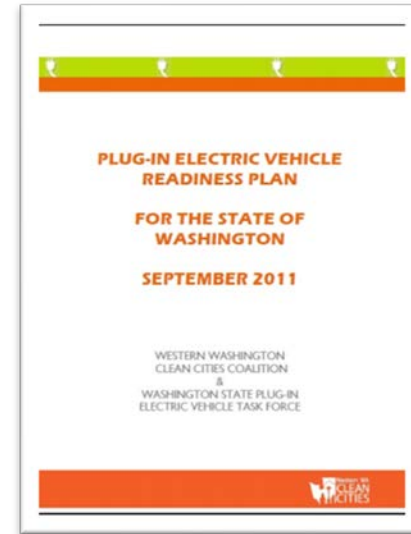
- WSDOT/ODOT
- Host Sites
- 22 Electric Utilities
- EV Drivers

**Open for Public: 2012**

# Evolution of Planning Efforts

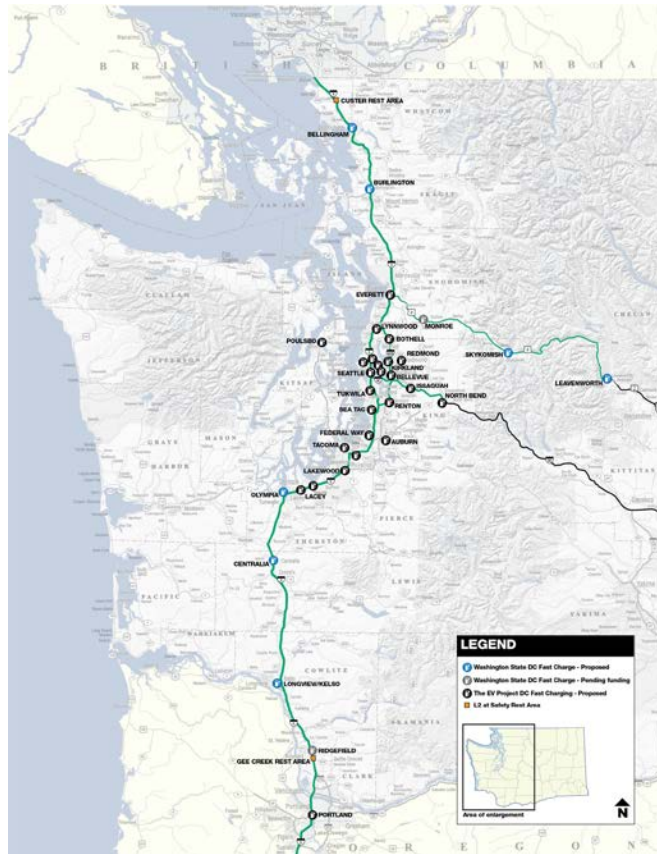


2010

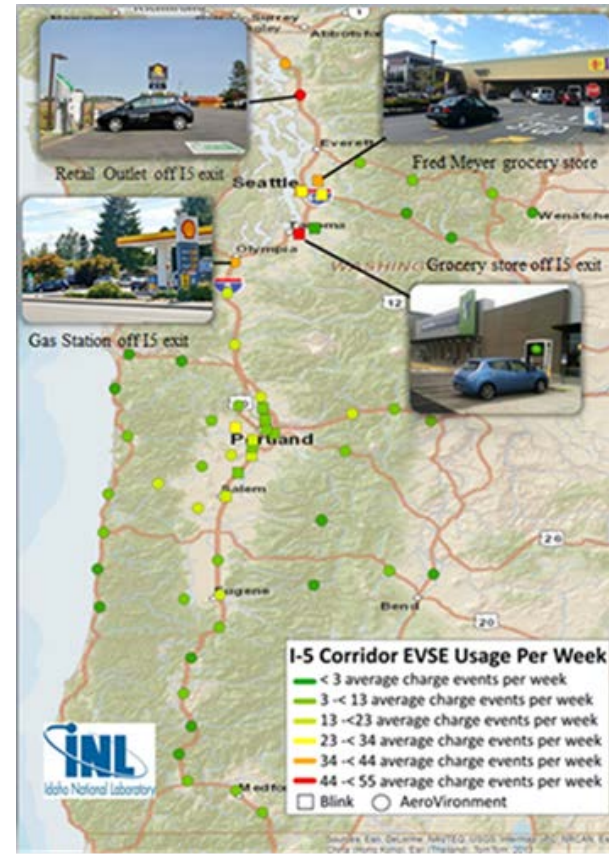


2011

# Highway Corridor EV Charging Network

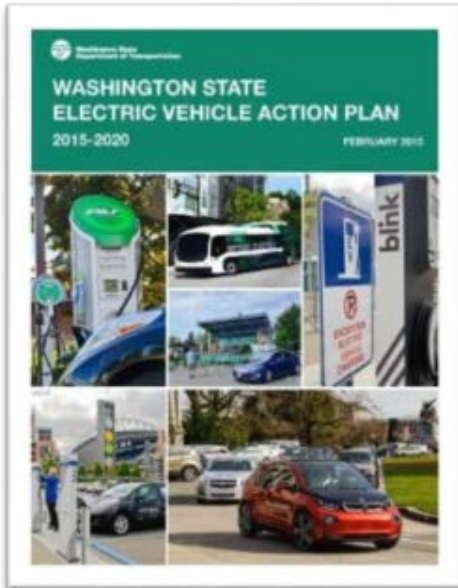


2012



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

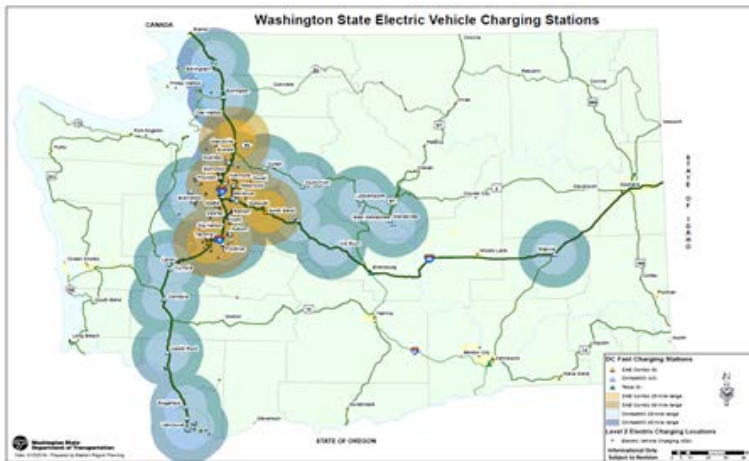
12. Support and participate in regional alternative fuel partnerships.
13. Track and participate in national EV efforts.

**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](https://www.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)  
**Starbucks**  
(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

## Regulatory Signs & Striping “No Parking Except Electric Vehicle Charging”



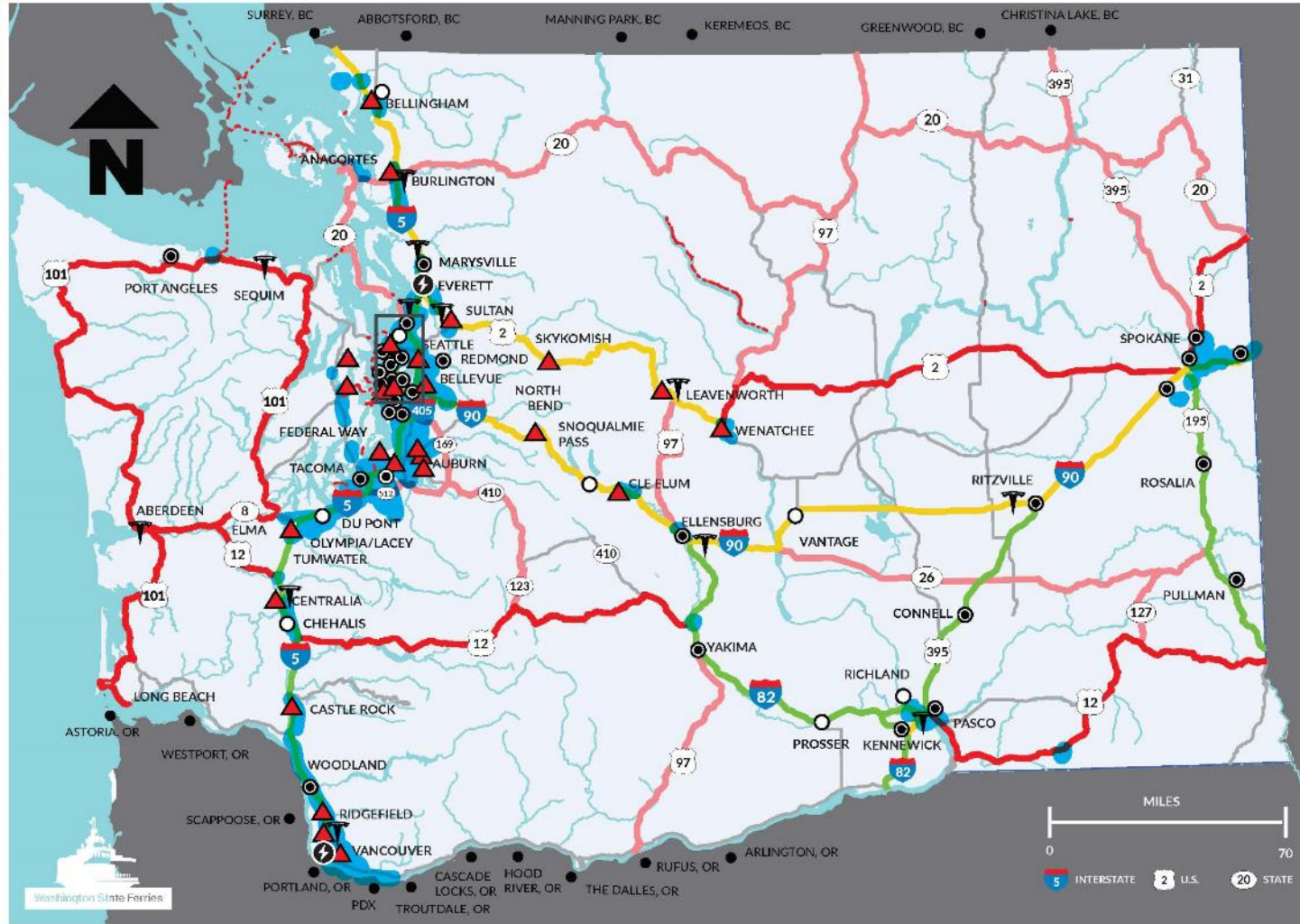
British Columbia



Washington state law “de-ICEing bill” (SB 5849)

Source: [www.westcoastgreenhighway.com/evsigns.htm](http://www.westcoastgreenhighway.com/evsigns.htm)

# Filling Gaps and Cleaning Air in Washington



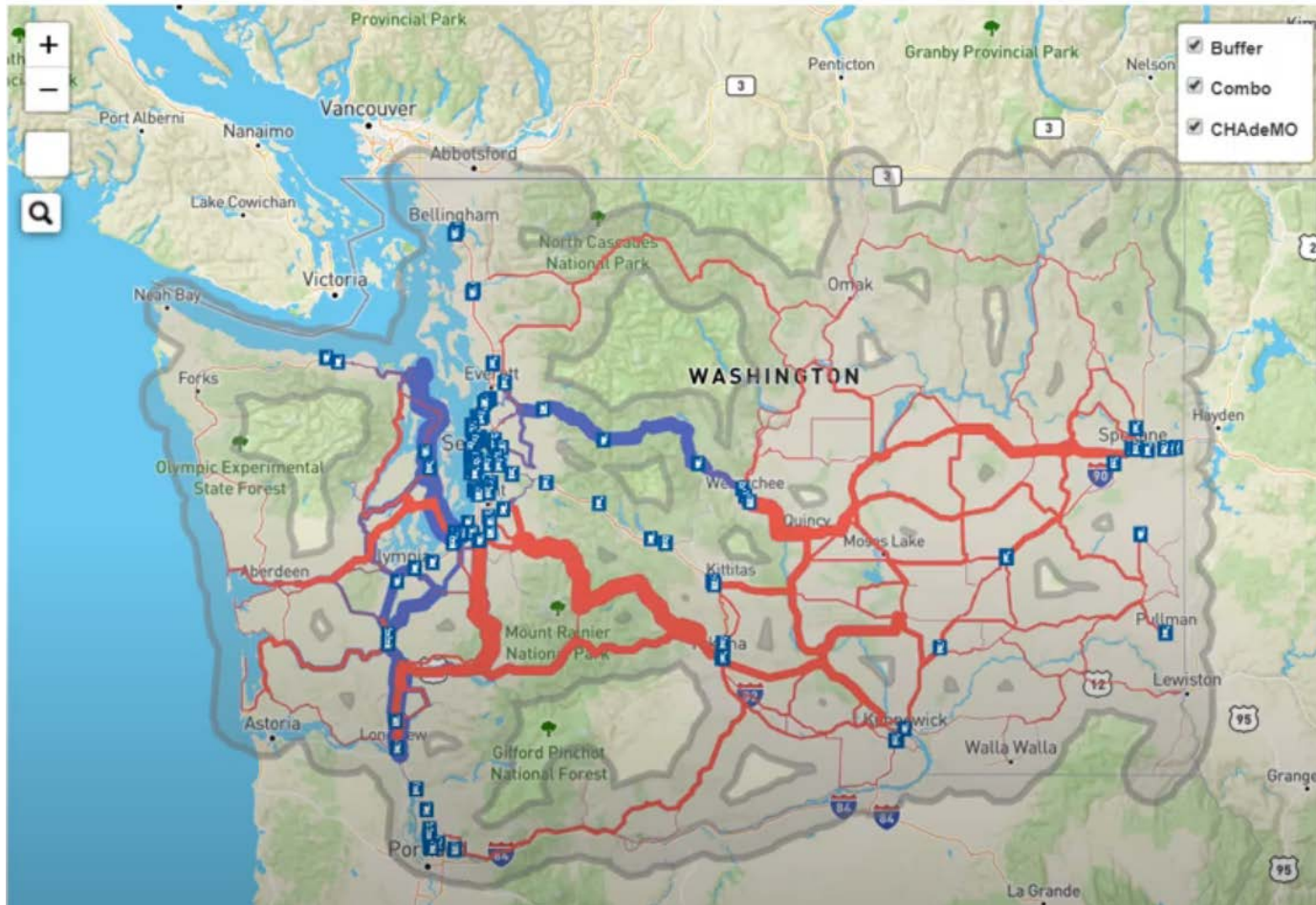
- No or insufficient charging - high priority
- No or insufficient charging - medium priority
- Weak charging/needs retrofitting
- Adequate existing and funded fast charging
- - - Ferry routes
- High NOx Emissions Areas

- 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
  - T Tesla Superchargers



# Modeling for Corridor Fast Charging Investments

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



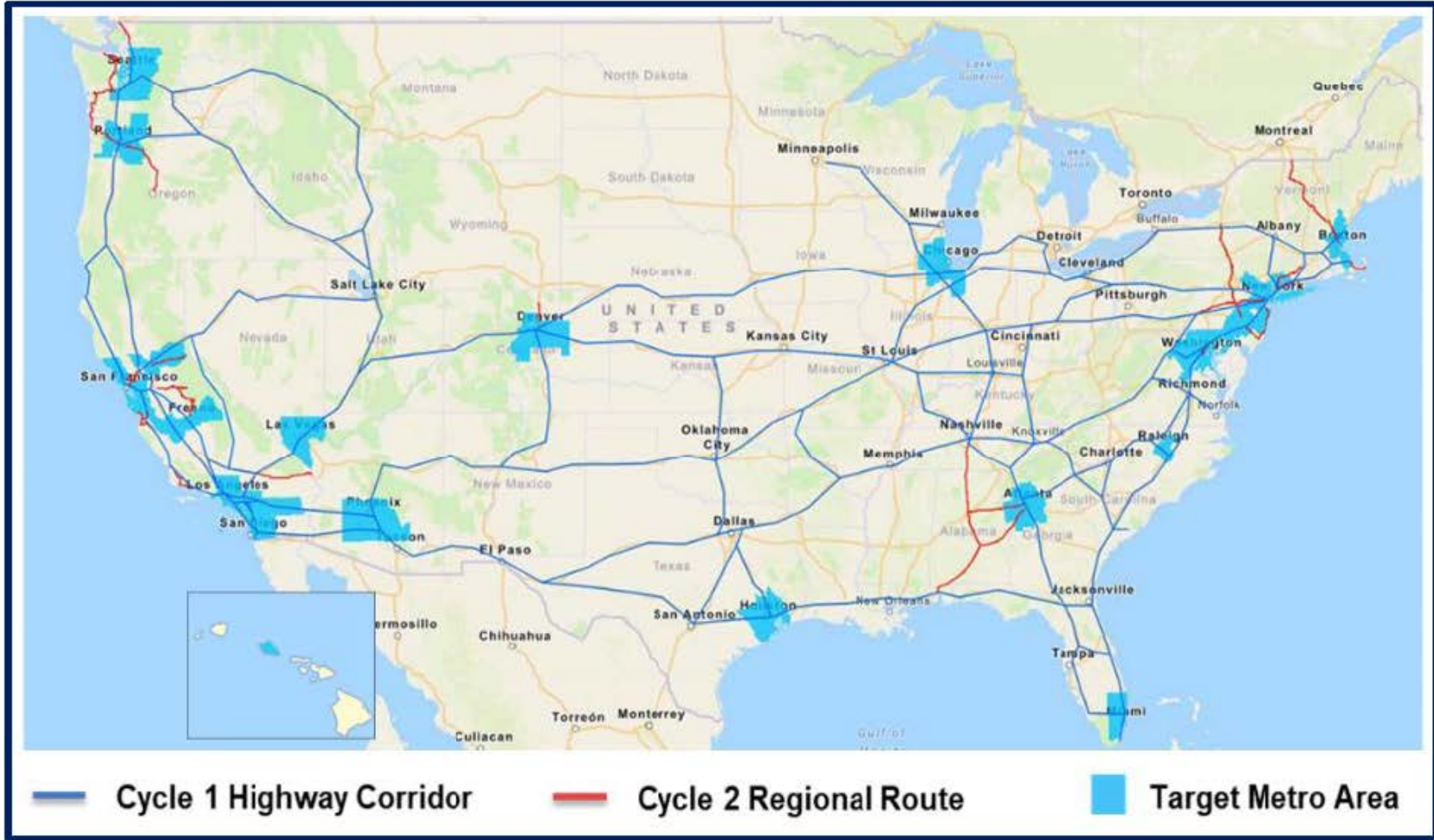
Source: <https://chargeval.readthedocs.io/en/latest/>

# National EV Charging Corridors



Source: [https://www.fhwa.dot.gov/environment/alternative\\_fuel\\_corridors/](https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/)

# Electrify America's National Network of Charging Stations



Source: [electrifyamerica.com](https://www.electrifyamerica.com)





# 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

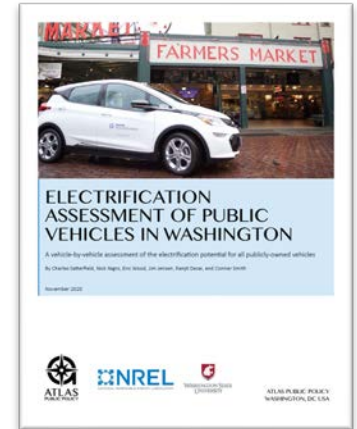
- More interstate coverage
- Improved technology
- More charging plazas
- Farther corridor spacing
- Extreme Fast Charging
- Faster DCFC charge time
- Higher power levels (120 - 400 kW)
- Higher electricity demand charges
- Multiple fast charging standards
- Hydrogen Fuel Cell Vehicle Fueling



# 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](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](http://www.energy.gov)
- Plug In America [www.pluginamerica.org](http://www.pluginamerica.org)
- Alternative Fuels Data [www.afdc.energy.gov](http://www.afdc.energy.gov)
- Clean Cities [www.cleancities.energy.gov](http://www.cleancities.energy.gov)
- FuelEconomy.gov [www.fueleconomy.gov](http://www.fueleconomy.gov)
- FHWA Alternative Fuel Corridors: [www.fhwa.dot.gov/environment/alternative\\_fuel\\_corridors/](http://www.fhwa.dot.gov/environment/alternative_fuel_corridors/)

## Unbiased data to support investment decisions:

- National Labs
- Universities



Thank you



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