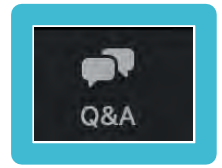
WEST COAST COLLABORATIVE
A public-private partnership to reduce diesel emissions

Alternative Fuel Infrastructure Corridor Coalition (WCC AFICC)

Public Webinar – July 29, 2021

- Submit questions in Zoom using the 

box.
- Webinar recording and slide deck will be posted on the WCC AFICC webpage. https://westcoastcollaborative.org/workgroup/wkgrp-fuels.htm
- Contact Maddy Reznick, maddy@cwcleancities.org with technical questions about this webinar.

Medium and Heavy-Duty Alternative Fuel Infrastructure Planning in the Western US

John Mikulin

Region 9: Air and Radiation Division

Technology and Partnerships Office

US EPA

West Coast Collaborative Webinar

July 29, 2021

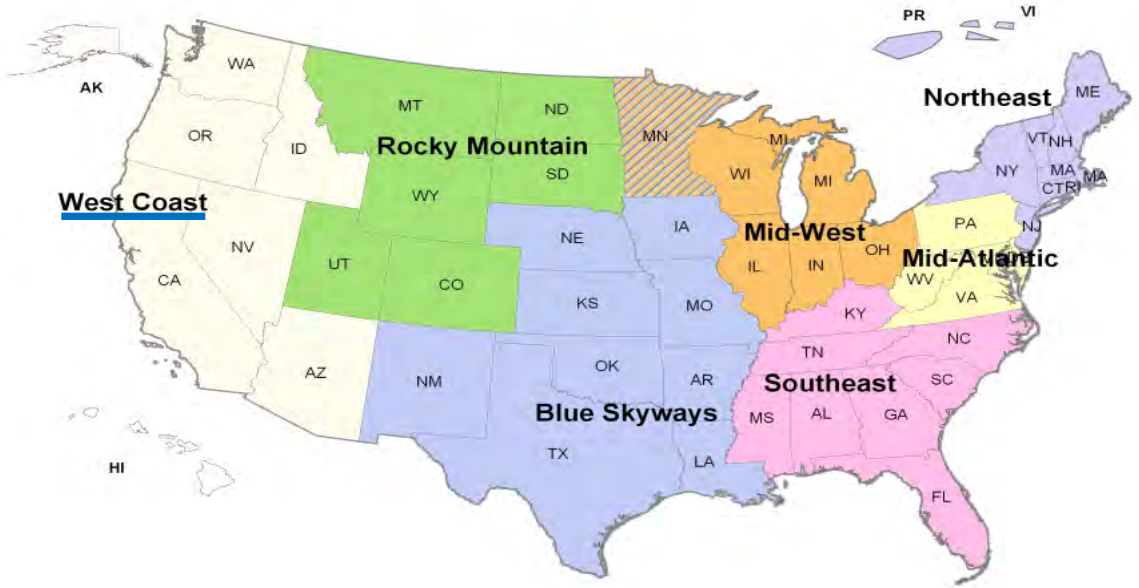
National Clean Diesel Campaign

Regional Clean Diesel Collaboratives

❖**Public-Private Partnership**

❖**EPA Regions 9 & 10 → AK, AZ, CA, HI, ID, NV, OR, WA, Pacific Islands & 419 Native Tribes**

❖**Over 1,000 Partners**



WEST COAST COLLABORATIVE
A public-private partnership to reduce diesel emissions

RMCDC
ROCKY MOUNTAIN CLEAN DIESEL COLLABORATIVE

Blue Skyways COLLABORATIVE

MIDWEST CLEAN DIESEL INITIATIVE

Mid-Atlantic Diesel Collaborative
on the route to cleaner air

Northeast Diesel Collaborative

Southeast Diesel Collaborative

WEST COAST COLLABORATIVE
A public-private partnership to reduce diesel emissions

West Coast Collaborative Goals

1) **Help meet National Ambient Air Quality Standards (NAAQS).**
2) **Reduce diesel particulate emissions in impacted communities, and leverage emission reduction co-benefits.**
3) **Support technology advancement and deployment to increase energy efficiency, energy security, and economic growth.**

Picture: Pre-1980 school bus exhaust

https://westcoastcollaborative.org

FAST Act: Section 1413 - Alternative Fuel Corridor Designations

- **National electric vehicle charging, hydrogen, propane, and natural gas fueling corridors.**
  - Directs US DOT to designate alternative fuel corridors that identify the near and long-term need for, and location of fueling infrastructure at strategic locations along major national highways to improve the mobility of passenger and commercial vehicles that employ electric, hydrogen fuel cell, propane, and natural gas fueling technologies across the United States.

FHWA (2021) https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/

West Coast MHD Alternative Fuel Corridors

Interstate collaboration is needed to develop west coast corridors for medium and heavy-duty alternative fuels like the one shown here for light-duty ZEVs. This would help to address:

-Emission reductions

-Fuel supply diversity

-Wider deployment of sustainable freight, public works, refuse collection, transit & school buses

-Local job creation and economic development

Goals of the WCC AFICC

1) Convene a stakeholder coalition focused on MHD alternative fuel infrastructure deployment **- Complete**
2) Conduct stakeholder workgroups and targeted outreach to identify desired/unfunded MHD alternative fuel stations **- Complete**
3) Synthesize stakeholder input into a plan document **- Complete**
4) Provide a platform for sharing MHD alternative fuel infrastructure investment needs in the western U.S. **- *Ongoing***
5) Use acquired information to inform development of applications to relevant funding assistance programs **- *Ongoing***
6) Obtain funding assistance to help implement desired infrastructure projects (i.e., electric vehicle charging, hydrogen, propane, and natural gas fueling for public and private MHD fleets) **- *TBD***

AFICC Partnership Roadmap

WCC AFICC Phase 1: Conclusions

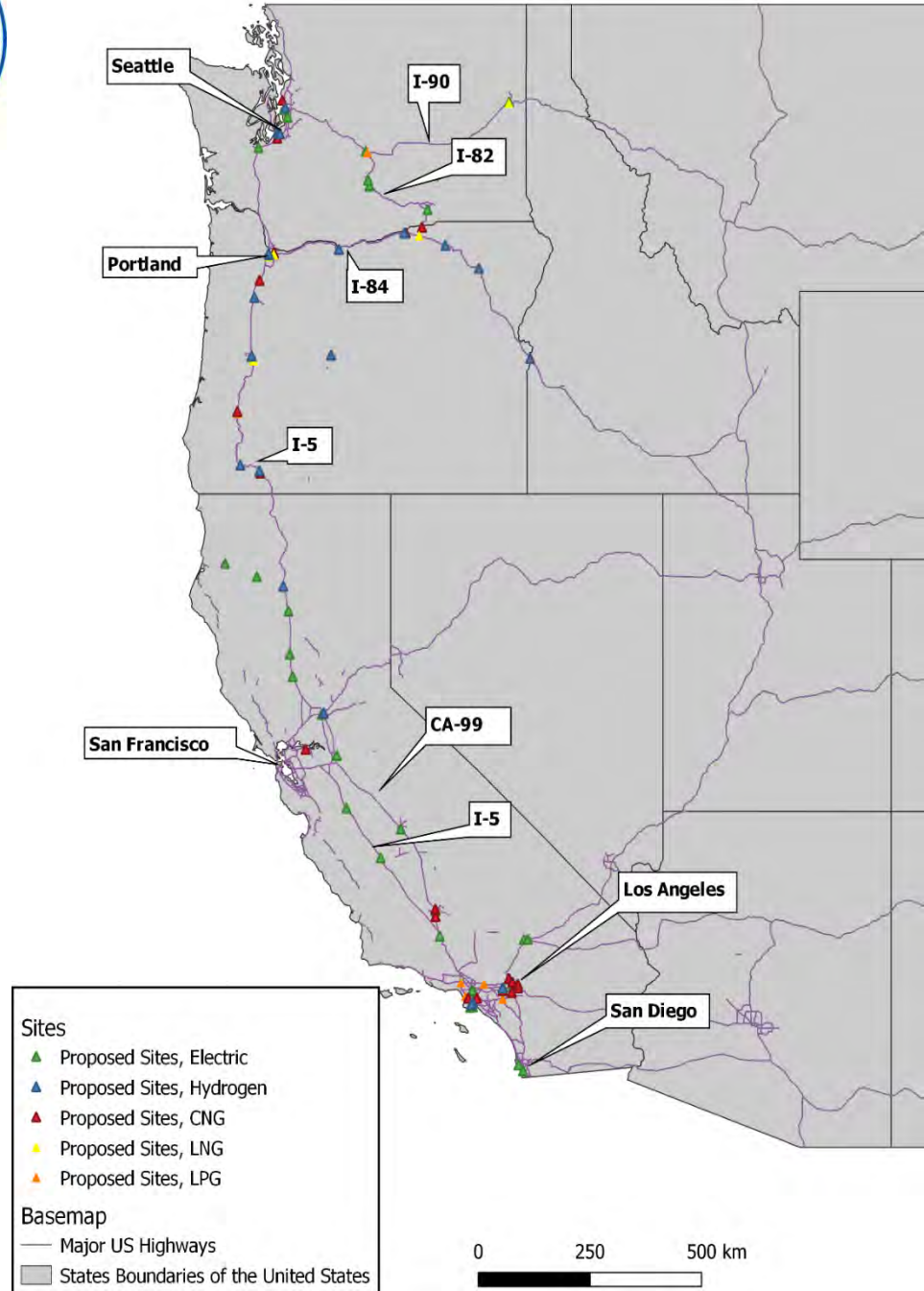
- There is significant and proven **demand for alternative fuel infrastructure** in all three west coast states.
- Survey respondents and other outreach **participants provided 141 project proposals** for targeted alternative fuel infrastructure technologies.
- There is a **need for funding assistance** to develop new and expand existing alternative fuel infrastructure.
- Alternative fuel **infrastructure development is already underway** in many locations throughout west coast states, but requires additional support to succeed.

WCC AFICC: Phase 1 Findings

1) **Proposed Stations - <u>141 proposed stations</u>** for targeted MHD alternative fuel technologies.

2) **Development Cost** - Total capital expense (CAPEX) of nearly **<u>$374,000,000</u>** to fund proposed stations.

3) **Cost-Share Needs -** 77% of proposals would be viable for development with external funding assistance ≤80% of project CAPEX.



WEST COAST COLLABORATIVE
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WCC AFICC: Phase 1 Project Proposals

Estimated Funding Needed to Build Proposed Infrastructure Projects

Fuel Type	Proposed Sites	Average Throughput Per Station	Average CAPEX Per Station	Total Cost
EV	62	750kW-1MW Peak Capacity	$2,000,000	$124,000,000
H2	23	1,000-4,800 kg/Day	$6,000,000	$138,000,000
LPG	13	1,000 gallons/Day	$1,700,000	$22,100,000
CNG	36	1,695-2,260 DGE/Day	$2,000,000	$72,000,000
LNG	7	1,695-2,260 DGE/Day	$2,500,000	$17,500,000
Total	**141**			**$373,600,000**

Estimated Funding Needed to Build Proposed Infrastructure Projects by State

State	Number of Stations by Fuel Type					Total Cost
	EV	H2	LPG	CNG	LNG	
California	34	6	6	16	0	$146,200,000
Oregon	15	14	5	17	5	$169,000,000
Washington	13	3	2	3	2	$58,400,000
Total	**62**	**23**	**13**	**36**	**7**	**$373,600,000**

1) Station CAPEX depends on project size and scope.

WCC AFICC: Next Steps

1) Distribute Phase 1 plan to WCC Partners and provide briefings as needed/requested: March 2020 and beyond

2) The Phase 1 plan can be referenced by stakeholders to support participation in relevant funding opportunities: March 2020 and beyond

3) Encourage participation in the Phase 2 survey, which solicits information on additional MHD alternative fuel infrastructure funding assistance needs in the western U.S. including: Alaska, Arizona, California, Hawaii, Idaho, Nevada, Oregon, Washington, Tribal Lands, and the U.S. Pacific Island Territories of American Samoa, Guam, and the Northern Mariana Islands.

   a) ***ACTION - Phase 2 survey closes on 9/30/2021***: https://erg.qualtrics.com/jfe/form/SV_3wm6XjtxRK7BEB7

Ideas, Comments, Questions…?

John Mikulin

Regional Lead, Electric Vehicle Deployment
Program Coordinator, Clean Air Technology Initiative
Public Fleet, Trucking and Alternative Fuels Lead, West Coast Collaborative
Region 9: Air and Radiation Division - Technology and Partnerships Office

US EPA

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http://www.westcoastcollaborative.org/

https://www.epa.gov/dera

https://www.epa.gov/cati/about-clean-air-technology-initiative-cati

https://www.epa.gov/aboutepa/epa-region-9-pacific-southwest

Alternative Fuels Corridor Program Review

DIANE TURCHETTA | U.S. DEPARTMENT OF TRANSPORTATION

U.S. Department of Transportation
Federal Highway Administration

National Alternative Fuel Corridors

To improve the mobility of alternative fuel vehicles, the U.S. Department of Transportation (DOT) has designated national corridors in strategic locations along major highways for:

- Plug-in electric vehicle charging
- Hydrogen fueling
- Propane (LPG) fueling
- Natural gas (CNG, LNG) fueling

Round 5 Fuel Criteria

EV	CNG	LNG	Hydrogen	Propane
DCFC only (CHAdeMO + CCS)	150 miles between stations	200 miles between stations	100 miles between stations	150 miles between stations
50 miles between stations	5 miles from highway	5 miles from highway	5 miles from highway	5 miles from highway
5 miles from highway	Public stations only	Public stations only	Public stations only	Public stations only
Public stations only (no Tesla)	Fast fill, 3,600 psi			Primary stations only

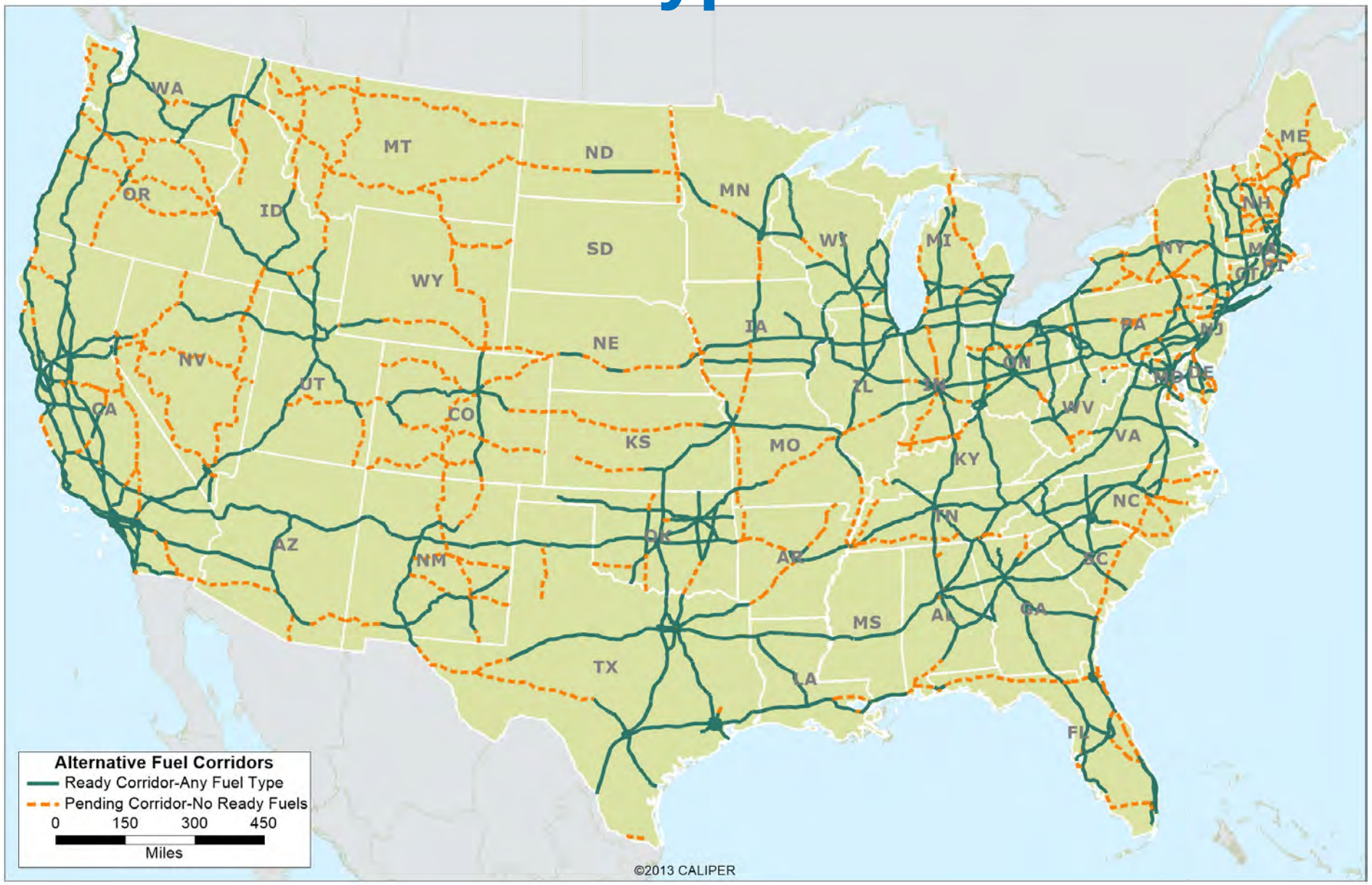
Round 5 (2020) Request for Nominations

- Last RFN under the FAST Act
- Issued on October 28, 2020
- Distributed through FHWA Division Offices
- Nominations due on February 24, 2021
- Designations made in spring 2021
- No changes in fuel criteria
  - https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/resources/rfn5.cfm

Combined Results Rounds 1-5

- Designations….
  - ✓ **125** nominations
  - ✓ Includes portions/segments of **134** Interstates, along with **125** US highways/state roads
  - ✓ Comprise **49 states plus D.C.**
  - ✓ Covers **approximately 165,772** miles of the National Highway System (all fuels combined)

All Corridors/Fuel Types: Rounds 1-5



"These routes, which connect communities large and small, signal the clear demand for cleaner, more affordable transportation across the country“ Transportation Secretary Pete Buttigieg

ALTERNATIVE FUEL CORRIDOR NETWORK

This network spans 49 states and Washington, D.C., offering drivers of electric cars and other alternative fuel vehicles new options when traveling.

2021	259 Routes	Total Miles 165.8K
2020	219 Routes	Total Miles 145.2K
2019	177 Routes	Total Miles 125.2K
2018	128 Routes	Total Miles 108.9K
2017/ 2016	72 Routes	Total Miles 86.3K

For More Information: https://www.fhwa.dot.gov/environment/alternative_fuel_corridors
Note: Total miles represent all fuels combined on the National Highway System.

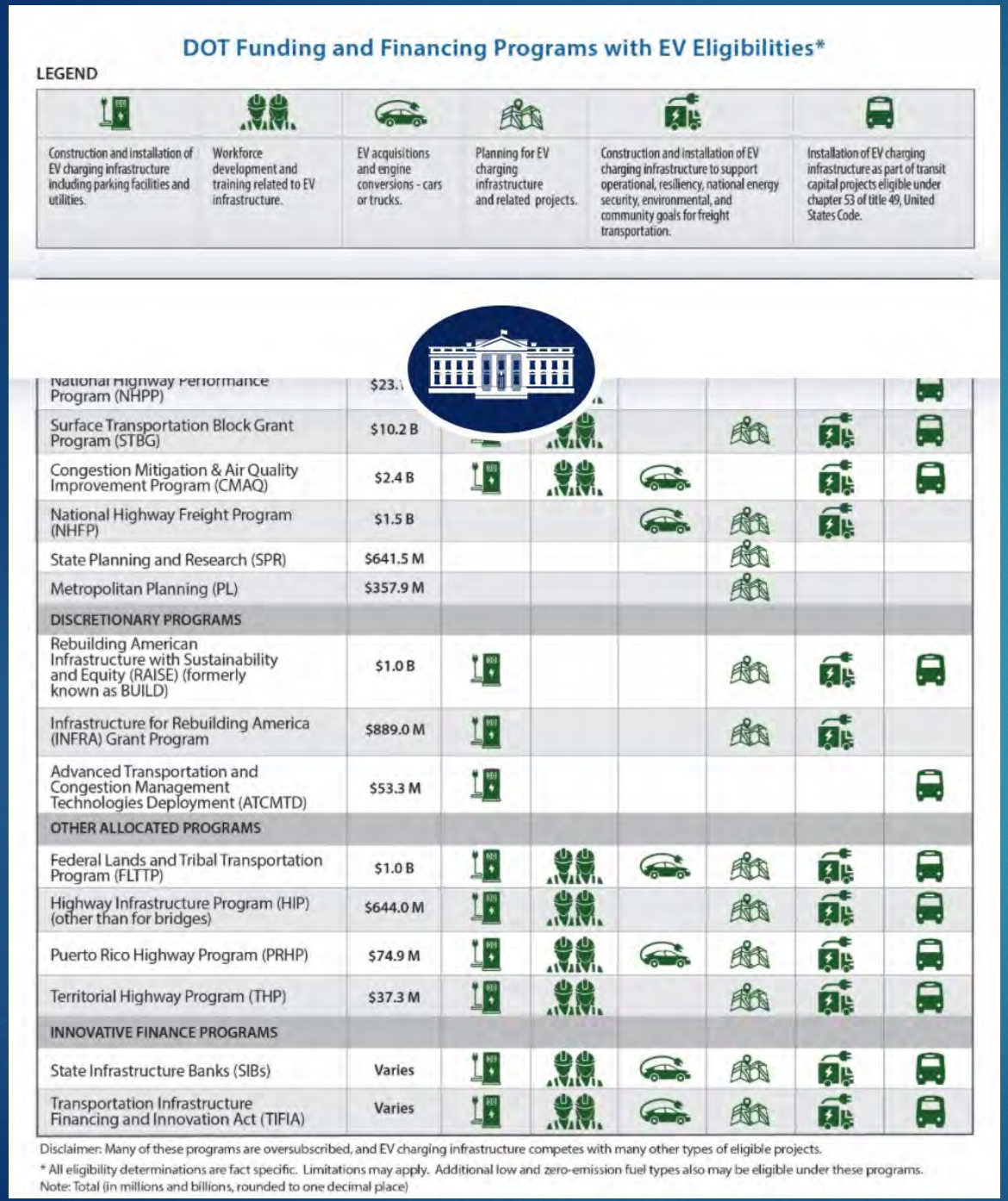
Mileage Stats by Fuel Type

ROUNDS 1- 5			
FUEL TYPE	READY	PENDING	TOTAL
EV	22,629 (10%)*	36,351 (16.5%)	58,980 (27%)
CNG	22,213 (10%)	19,737 (9%)	41,949 (19%)
LNG	3,219	18,164	21,383
LPG	17,542	12,844	30,385
HY	879	12,196	13,075
TOTAL	**66,481**	**99,291**	**165,772**

*** Percentage of NHS covered**

April 22, 2021 White House Announcement

https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-biden-administration-advances-electric-vehicle-charging-infrastructure/



DOT Funding and Financing Programs with EV Eligibilities*

LEGEND

Construction and installation of EV charging infrastructure including parking facilities and utilities.	Workforce development and training related to EV infrastructure.	EV acquisitions and engine conversions - cars or trucks.	Planning for EV charging infrastructure and related projects.	Construction and installation of EV charging infrastructure to support operational, resiliency, national energy security, environmental, and community goals for freight transportation.	Installation of EV charging infrastructure as part of transit capital projects eligible under chapter 53 of title 49, United States Code.

National Highway Performance Program (NHPP)	$23.\						
Surface Transportation Block Grant Program (STBG)	$10.2 B						
Congestion Mitigation & Air Quality Improvement Program (CMAQ)	$2.4 B						
National Highway Freight Program (NHFP)	$1.5 B						
State Planning and Research (SPR)	$641.5 M						
Metropolitan Planning (PL)	$357.9 M						
DISCRETIONARY PROGRAMS							
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) (formerly known as BUILD)	$1.0 B						
Infrastructure for Rebuilding America (INFRA) Grant Program	$889.0 M						
Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD)	$53.3 M						
OTHER ALLOCATED PROGRAMS							
Federal Lands and Tribal Transportation Program (FLTTP)	$1.0 B						
Highway Infrastructure Program (HIP) (other than for bridges)	$644.0 M						
Puerto Rico Highway Program (PRHP)	$74.9 M						
Territorial Highway Program (THP)	$37.3 M						
INNOVATIVE FINANCE PROGRAMS							
State Infrastructure Banks (SIBs)	Varies						
Transportation Infrastructure Financing and Innovation Act (TIFIA)	Varies						

Disclaimer: Many of these programs are oversubscribed, and EV charging infrastructure competes with many other types of eligible projects.

* All eligibility determinations are fact specific. Limitations may apply. Additional low and zero-emission fuel types also may be eligible under these programs.

Note: Total (in millions and billions, rounded to one decimal place)

Federal Funding is Available For Electric Vehicle Charging Infrastructure On the National Highway System

https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/resources/ev_funding_report_2021.pdf

American Jobs Plan Announcement

Transportation Secretary Pete Buttigieg speaks during a news conference held in front of new EVGo electric vehicle charging stations in the parking garage of Union Station in Washington, D.C., on Thursday. Photo by Sarah Silbiger/UPI | License Photo

The transportation sector is the number one producer of greenhouse gases in the U.S., which underscores the ability of the transportation industry and the Department to quickly and meaningfully reduce greenhouse gases and address the climate crisis. These actions are the first steps in returning the Department to its position as a leader in addressing climate change and environmental justice.

American Jobs Plan - EV Highlights

- Will fund the rapid deployment of 500,000 charging ports as a national charging network, including:
  - A National Alternative Fuels Corridor **formula** program for EV and H2
  - A community-based **discretionary grant** program for EV (DCFC & L2)
  - A joint DOT/DOE Deployment Support Program to provide technical assistance to funding recipients
- $15B over 5yrs.

House Passed INVEST Act – July 2021

- Continues corridor designation process (all fuels)
- Adds freight corridor component – established 1-yr. from enactment (EV and H2)
- Establishes Clean Corridor Program (EV and H2) **formula** Program
- FY's 2023-2026 ($1B per yr.)
- DOT/DOE guidance 90-days after enactment – 180-days published for public comment
- Requires infrastructure deployment plans from states

Bipartisan Infrastructure Bill

- Currently being debated in Congress
- $7.5 billion “for deployment of EV chargers along highway corridors to facilitate long-distance travel and within communities to provide convenient charging where people live, work, and shop”
- FACT SHEET: Historic Bipartisan Infrastructure Deal | The White House

Other AFC-Related Initiatives/Efforts

- Develop a **Rural EV Infrastructure Toolkit** as part of the USDOT's Rural Opportunities to Use Transportation for Economic Success (ROUTES) initiative.
- Toolkit will:
  - Help rural areas take advantage of the **benefits of EVs**
  - Address **barriers facing rural agencies** and small private applicants interested in developing EV charging stations and networks.
  - Provide user-friendly information to rural stakeholders on how to **plan, fund, and implement** EV charging networks.
- Review of MUTCD NPA public comments
- Completed 3 of 5 AFC infrastructure corridor deployment plans:
  - https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/deployment_plan/

For More Information

DOT Alternative Fuel Corridor Team Contact Information

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michael.scarpino@dot.gov

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Volpe Center
617-494-3852
stephen.costa@dot.gov

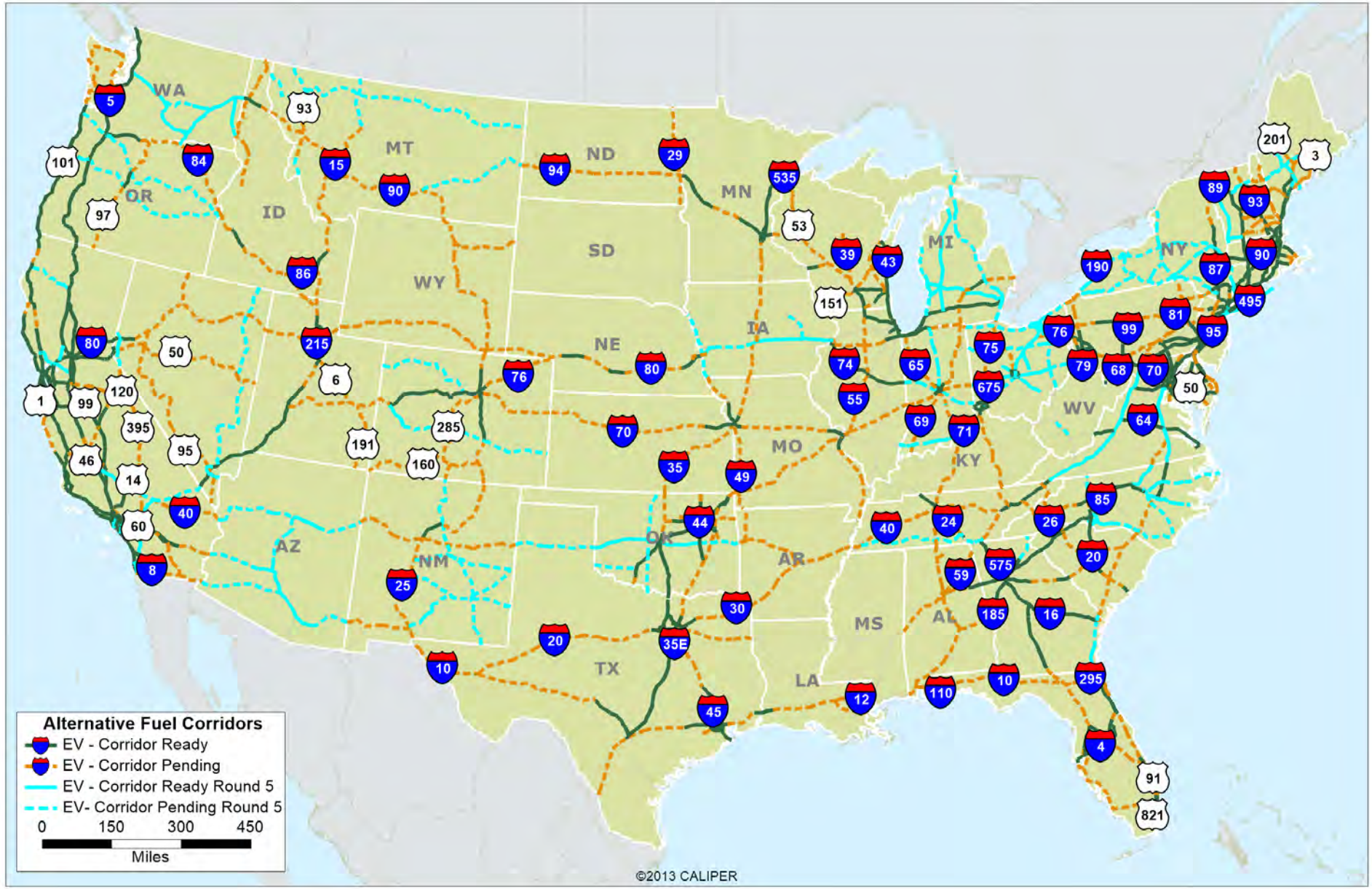
Resources

FHWA Alternative Fuel Corridor website:
http://www.fhwa.dot.gov/environment/alternative_fuel_corridors/

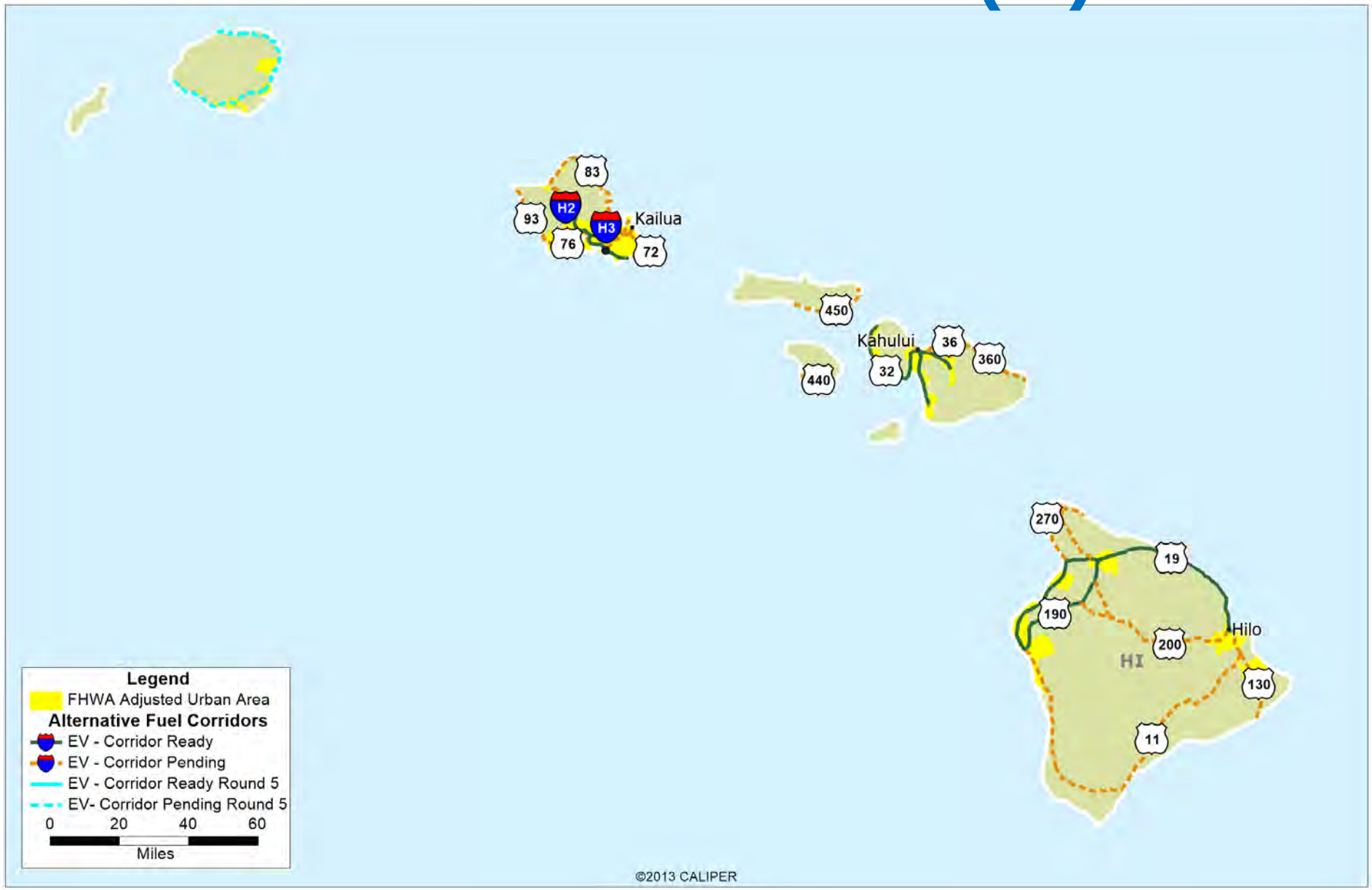
MUTCD Memorandum – Signing for Designated Alternative Fuel Corridors:
https://mutcd.fhwa.dot.gov/resources/policy/alt_fuel_corridors/index.htm

DOE/NREL Alternative Fueling Station Locator:
https://www.afdc.energy.gov/locator/stations/

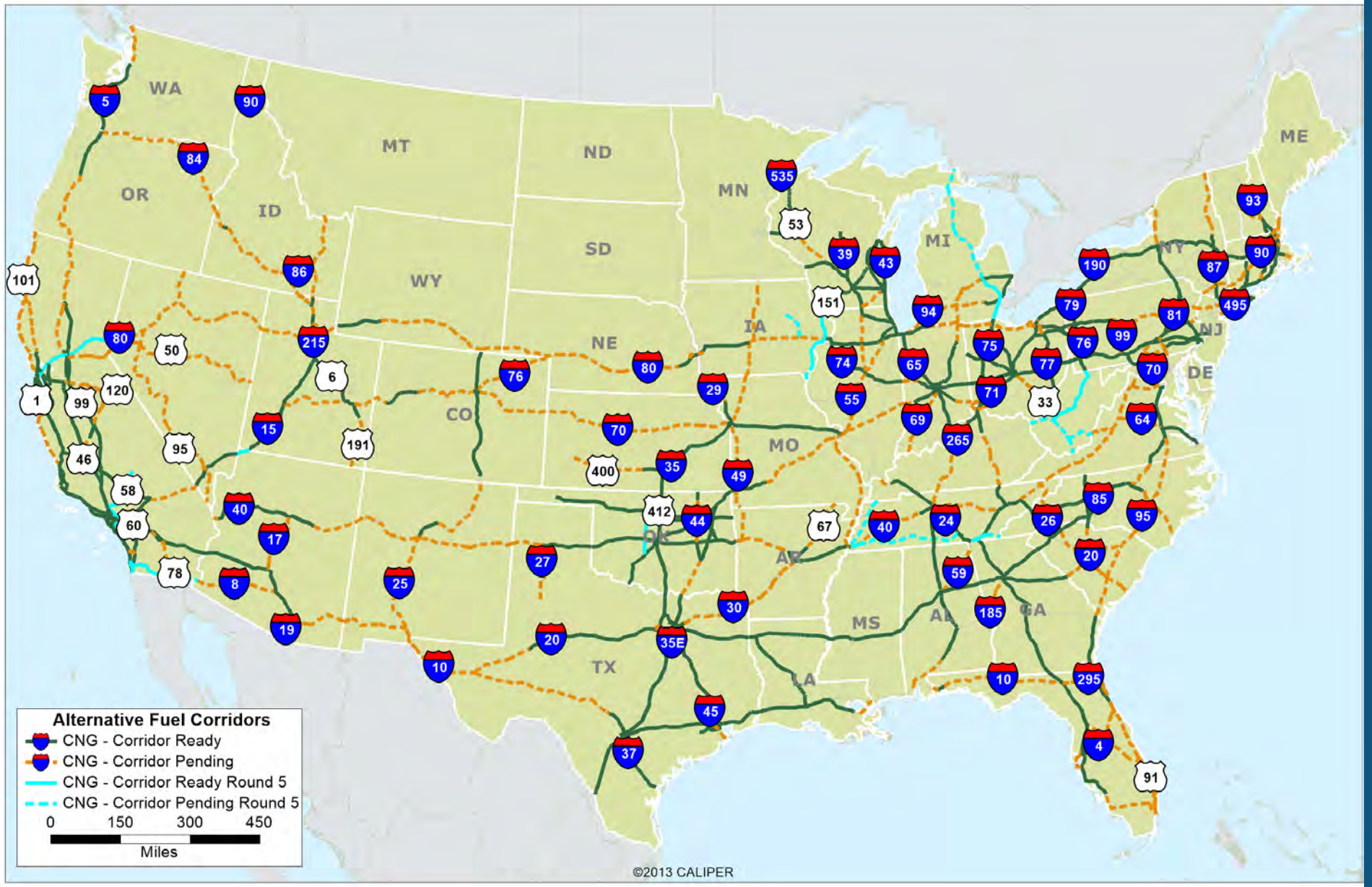
EV Corridors: Rounds 1-5



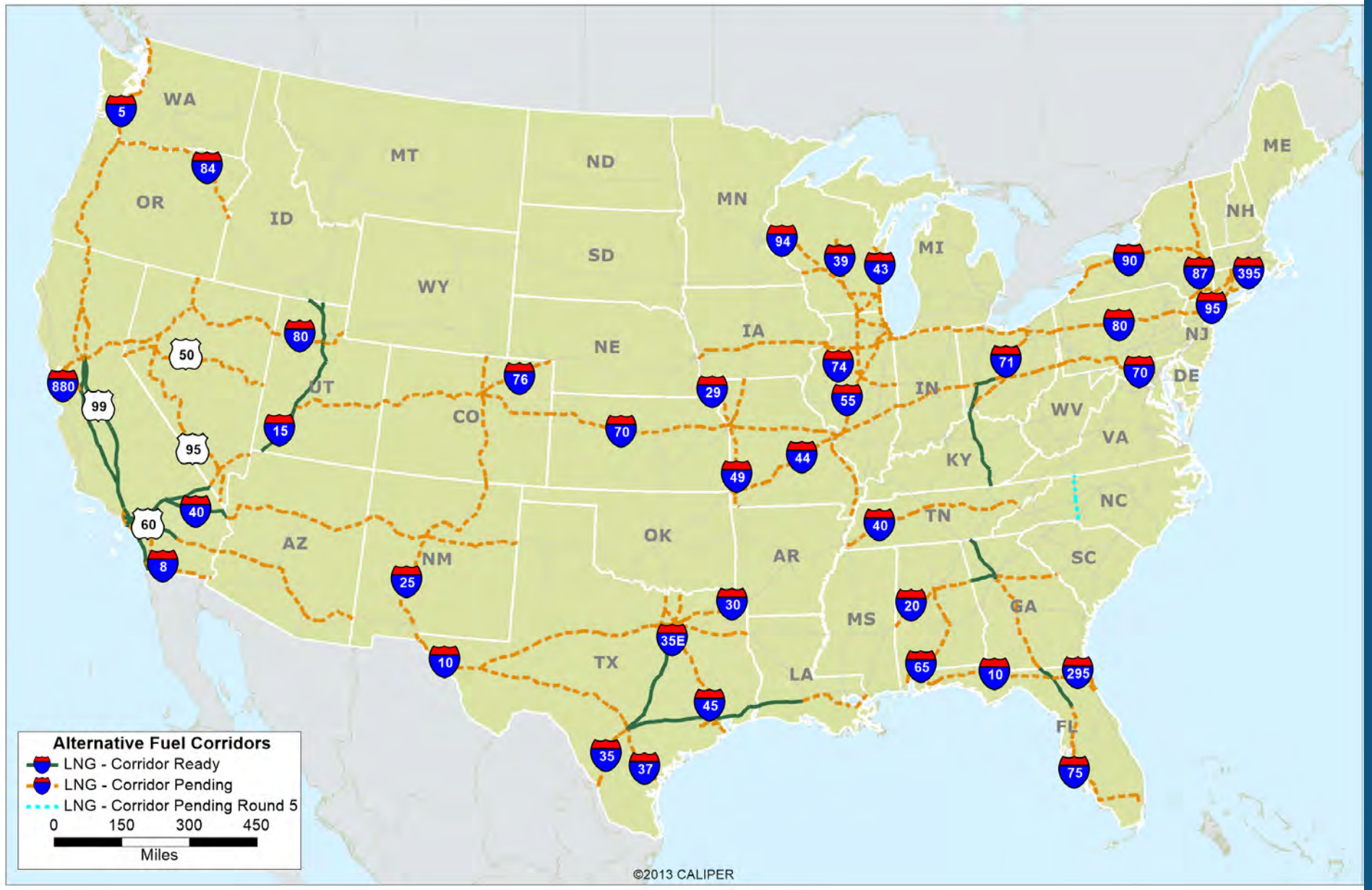
EV Corridors: Rounds 1-5 (HI)



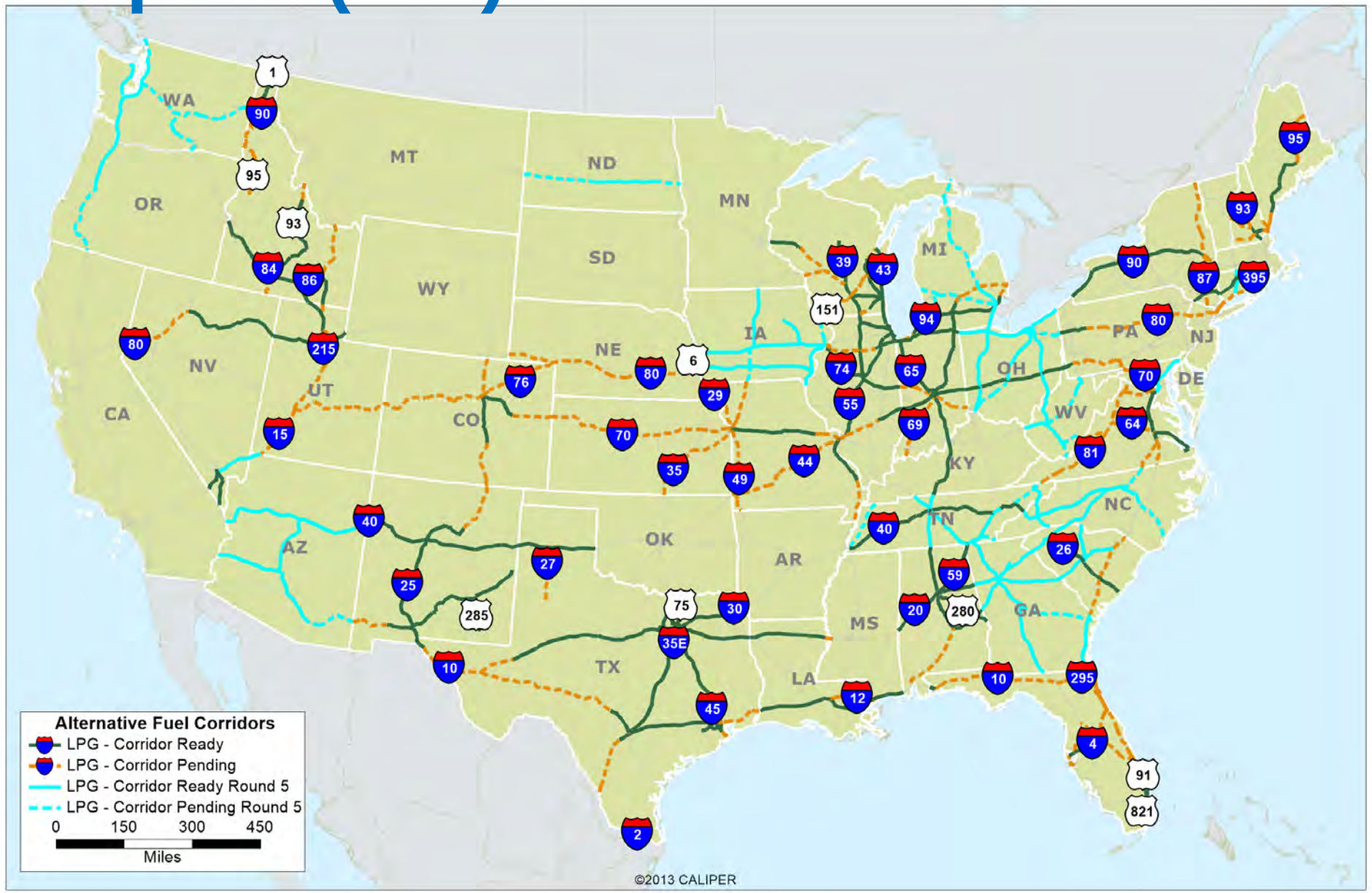
CNG Corridors: Rounds 1-5



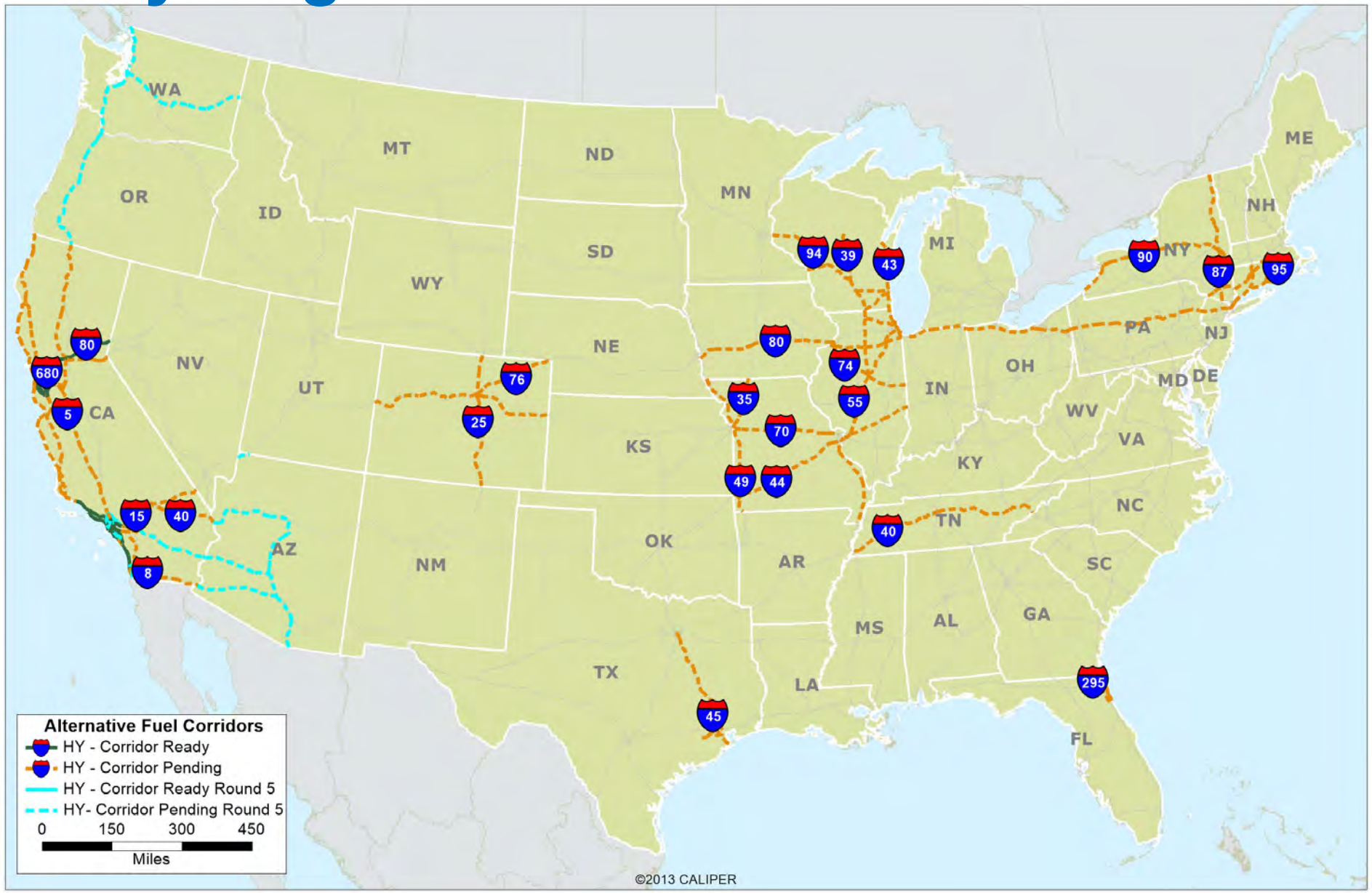
LNG Corridors: Rounds 1-5



Propane (LPG) Corridors: Rounds 1-5



Hydrogen Corridors: Rounds 1-5



Arizona I-10

Alternative Fuels Corridor Deployment Plan (AFCDP)

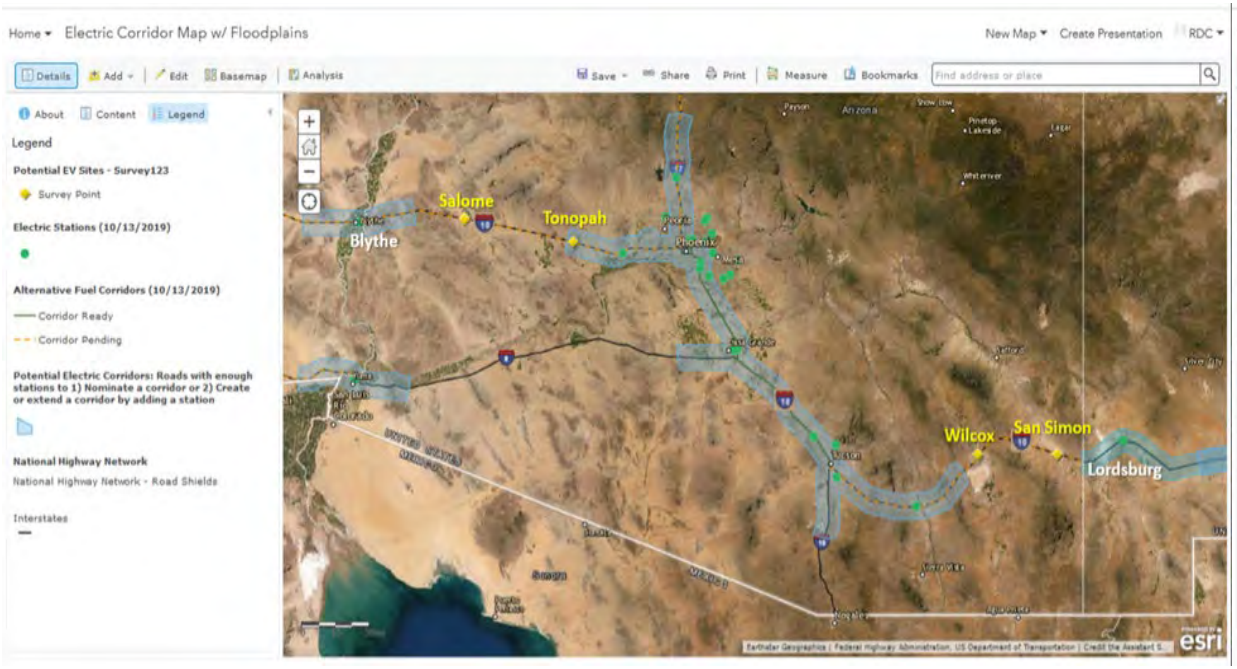
WCC AFICC Webinar
July 29, 2021
Dustin Fitzpatrick, Air Quality Planning Coordinator

Pima Association of Governments

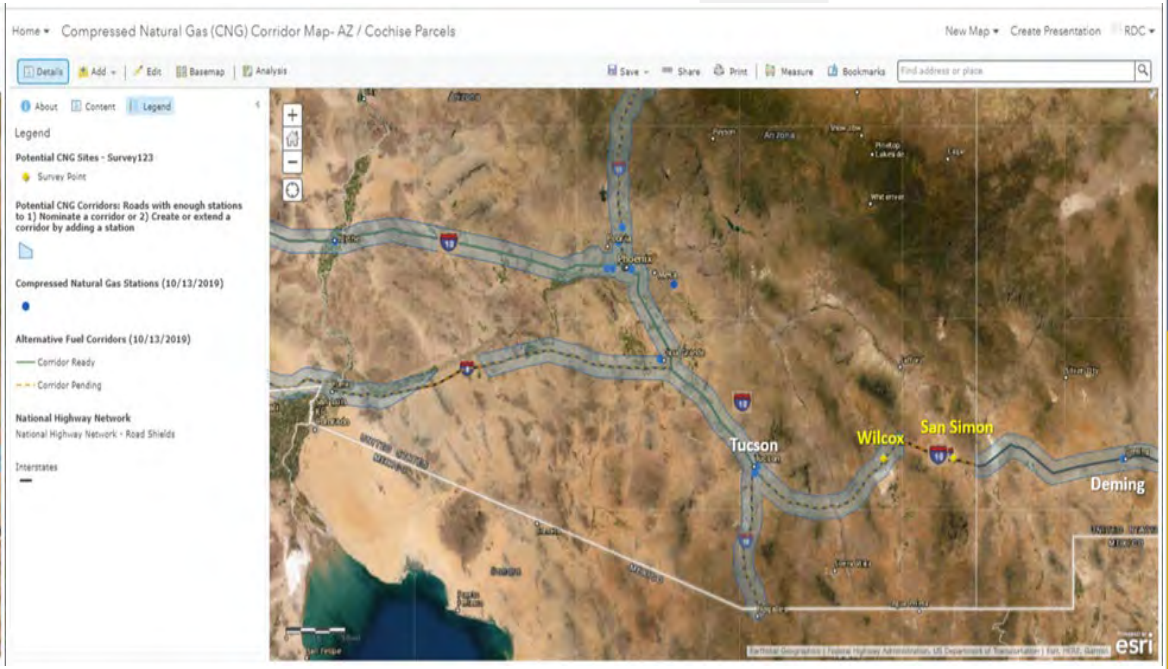
Arizona I-10 AFCDP goals and objectives

- Transition Phoenix to CA section from EV Pending to EV Ready with 2 additional DCFC sites
- Transition Tucson to NM section from EV Pending to EV Ready with 2 additional DCFC sites
- Transition Tucson to NM section from CNG Pending to CNG Ready with 1 additional fast fill site
- Consider REV West voluntary minimum station standards for the Intermountain West EV Corridor

Electric Vehicle (DCFC) Charging



Compressed Natural Gas (CNG) Fueling



FHWA AFCDP grant partners/advisory group stakeholders

Partners: Arizona Department of Transportation (ADOT)
Valley of the Sun Clean Cities Coalition (VSCCC)

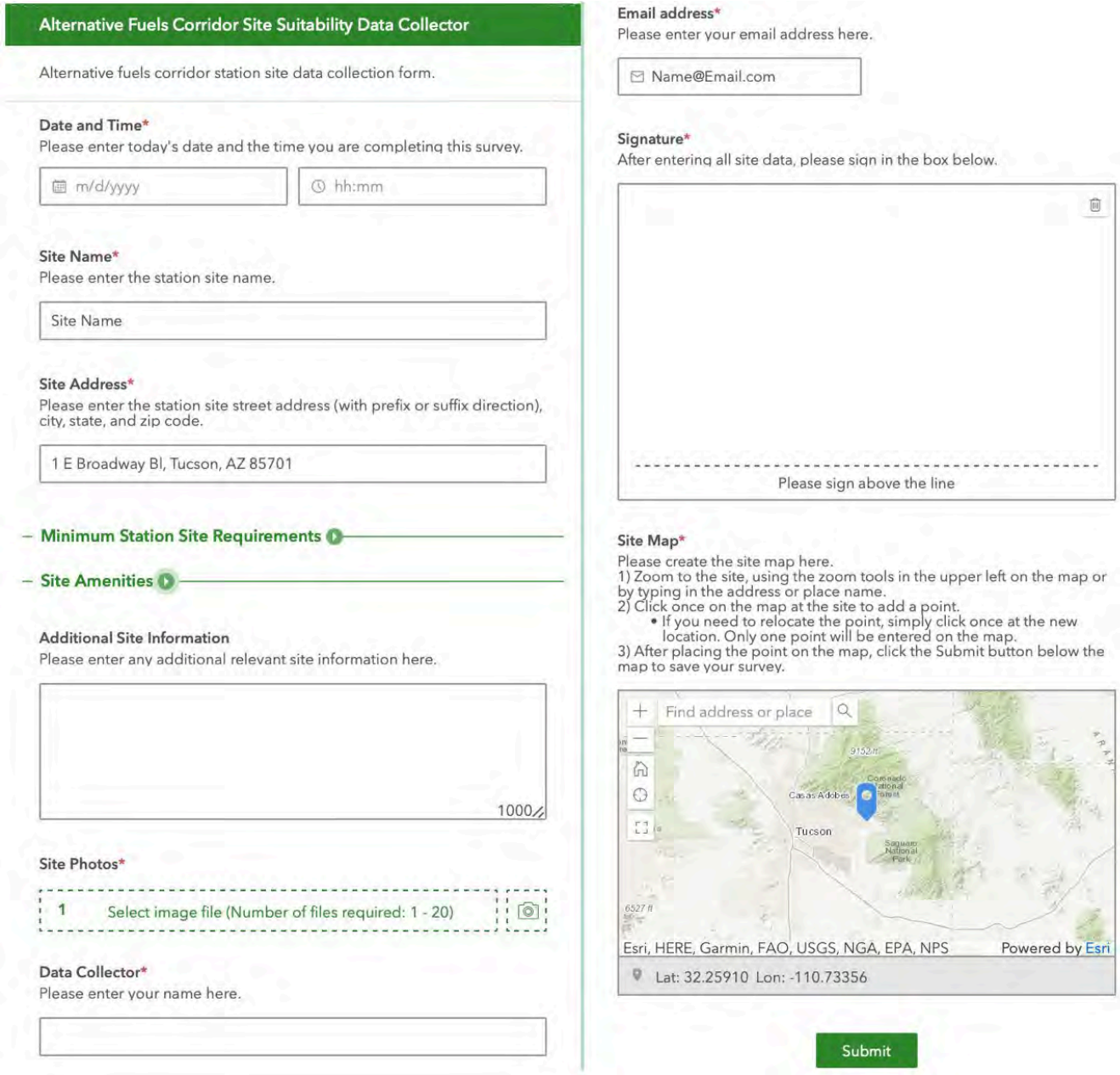
Stakeholders - Arizona Interstate/Infrastructure Collaborative (AIIC):

- **Truck stops travel centers**: Willcox Truck Stop Plaza, TA Travel Centers of America, 4K Truck Stop (Petroleum Wholesale), Pilot Co.
- **Utilities**: Sulphur Springs Valley Electric Cooperative (SSVEC), Arizona Electric Power Cooperative (AEPC), Tucson Electric Power Co. (TEP), Arizona Public Service (APS), Salt River Project (SRP), Southwest Gas Corp. (SWG)
- **Charging/Fueling Companies**: ChargePoint, Electrify America, Greenlots, Trillium CNG, CNG Services of Arizona
- **Others**: Nikola Motor Co., Arizona Trucking Association (ATA), Arizona State University (ASU), Arizona Department of Environmental Quality (ADEQ), Arizona Department of Administration (ADOA) - Arizona Governor's Office

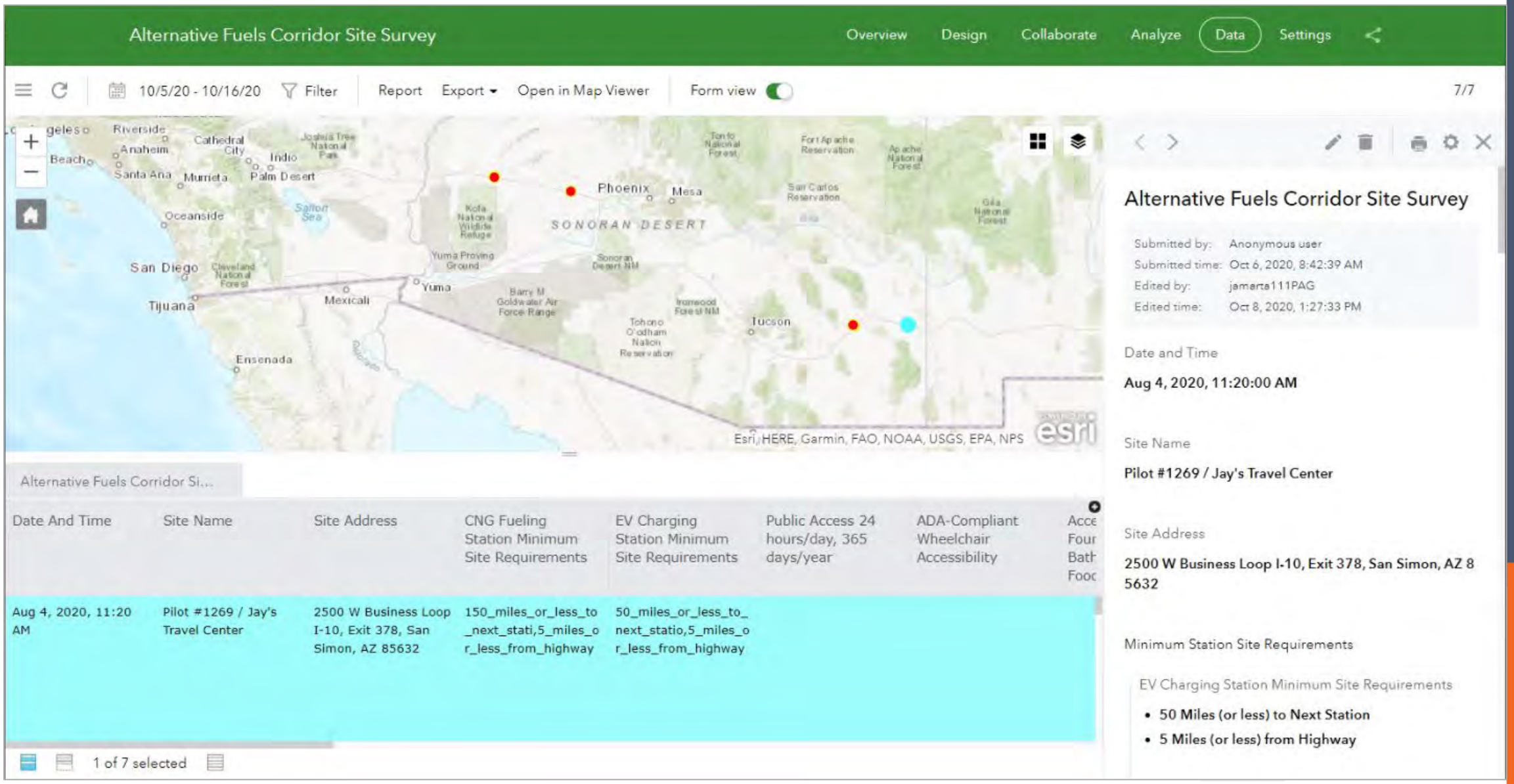
Electrify America, EV DCFC

Love’s Trillium CNG Fast Fill

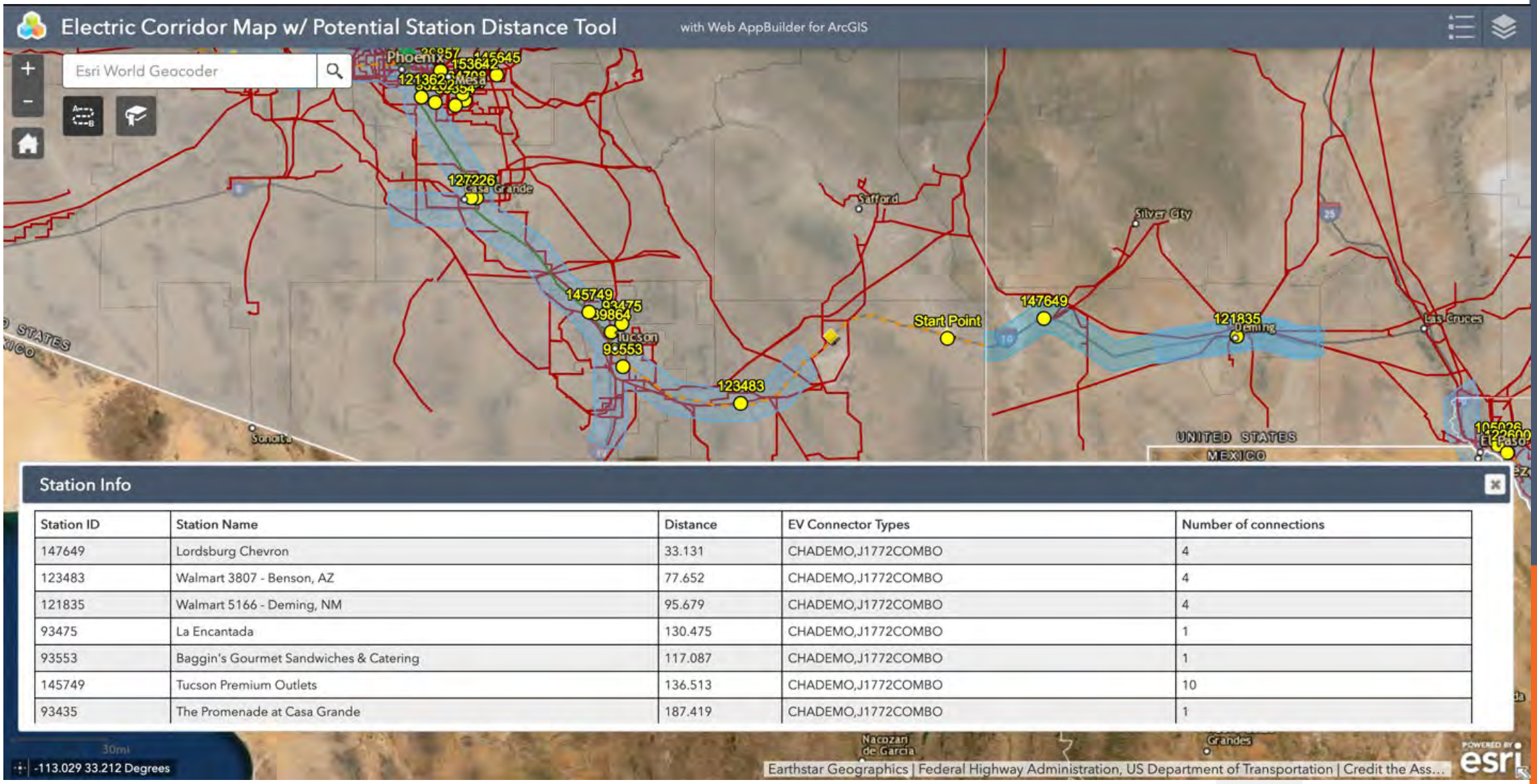
Site suitability survey tool - Survey123 application form



Survey123 application map viewer



Potential station route distance tool



Station Info

Station ID	Station Name	Distance	EV Connector Types	Number of connections
147649	Lordsburg Chevron	33.131	CHADEMO,J1772COMBO	4
123483	Walmart 3807 - Benson, AZ	77.652	CHADEMO,J1772COMBO	4
121835	Walmart 5166 - Deming, NM	95.679	CHADEMO,J1772COMBO	4
93475	La Encantada	130.475	CHADEMO,J1772COMBO	1
93553	Baggin's Gourmet Sandwiches & Catering	117.087	CHADEMO,J1772COMBO	1
145749	Tucson Premium Outlets	136.513	CHADEMO,J1772COMBO	10
93435	The Promenade at Casa Grande	187.419	CHADEMO,J1772COMBO	1

EV and CNG station cost estimates

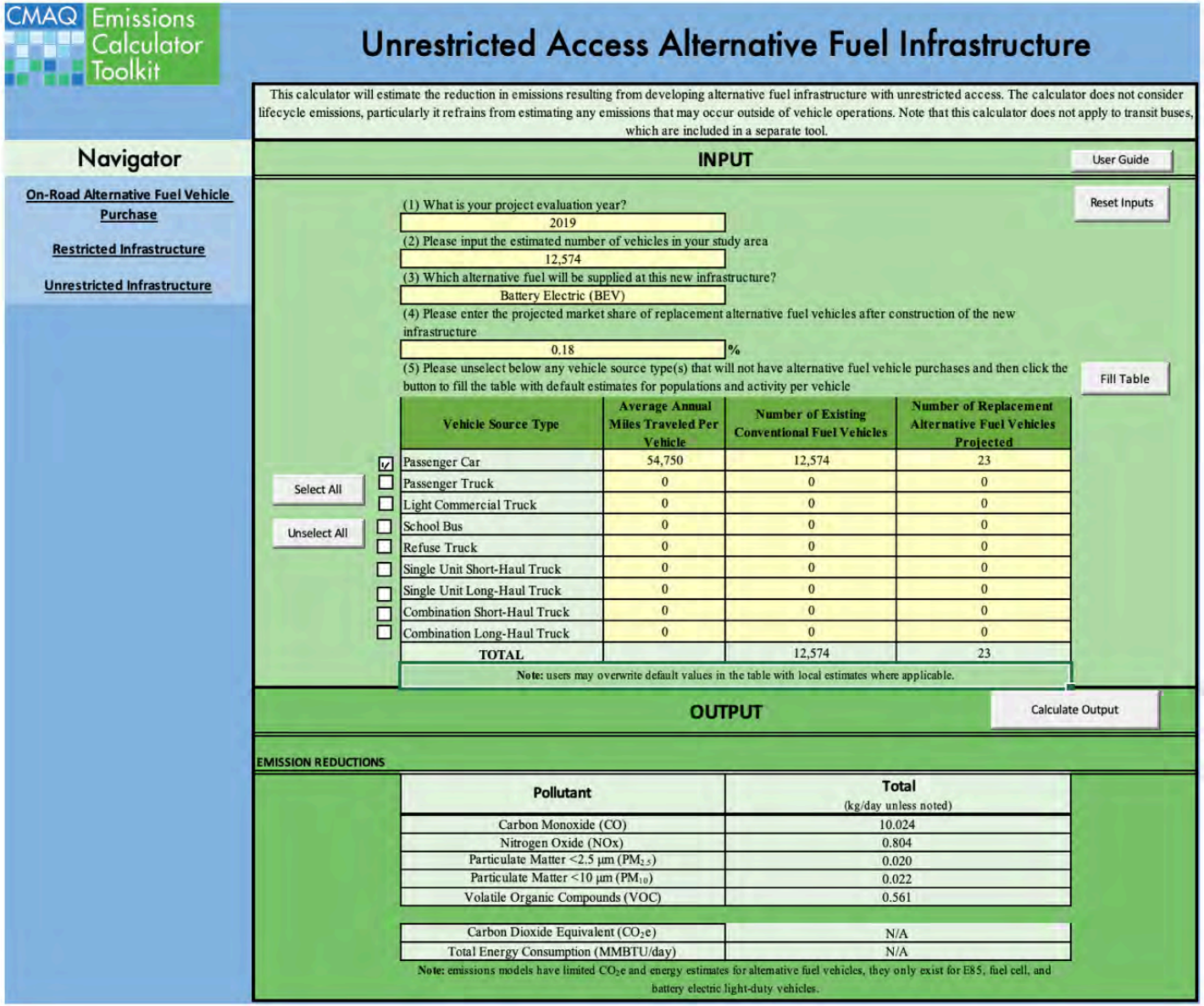
DCFC Charging Station Cost Estimates

Location	2 Chargers 1 50 kW CHAdeMO 1 150 kW CCS	4 Chargers 1 50 kW CHAdeMO 3 150 kW CCS	8 Chargers 1 50 kW CHAdeMO 6 150 kW CCS 1 350 kW CCS
Salome	$ 175,443	$ 349,361	$ 751,816
Tonopah	$ 188,443	$ 366,361	$ 781,816
Willcox	$ 162,543	$ 328,461	$ 716,016
San Simon	$ 162,543	$ 328,461	$ 716,016

CNG Compressor Station Cost Estimates

Location	Medium Station 500-800 gge/day	Large Station 850-2,000 gge/day
Willcox / San Simon	$700,000-900,000	$1,200,000-2,000,000

Congestion mitigation and air quality (CMAQ) calculation for potential EV station



CMAQ Emissions Calculator Toolkit

Unrestricted Access Alternative Fuel Infrastructure

This calculator will estimate the reduction in emissions resulting from developing alternative fuel infrastructure with unrestricted access. The calculator does not consider lifecycle emissions, particularly it refrains from estimating any emissions that may occur outside of vehicle operations. Note that this calculator does not apply to transit buses, which are included in a separate tool.

Navigator

- On-Road Alternative Fuel Vehicle Purchase
- Restricted Infrastructure
- Unrestricted Infrastructure

INPUT

User Guide

Reset Inputs

(1) What is your project evaluation year?
2019

(2) Please input the estimated number of vehicles in your study area
12,574

(3) Which alternative fuel will be supplied at this new infrastructure?
Battery Electric (BEV)

(4) Please enter the projected market share of replacement alternative fuel vehicles after construction of the new infrastructure
0.18 %

(5) Please unselect below any vehicle source type(s) that will not have alternative fuel vehicle purchases and then click the button to fill the table with default estimates for populations and activity per vehicle

Fill Table

Select All

Unselect All

	Vehicle Source Type	Average Annual Miles Traveled Per Vehicle	Number of Existing Conventional Fuel Vehicles	Number of Replacement Alternative Fuel Vehicles Projected
☑	Passenger Car	54,750	12,574	23
☐	Passenger Truck	0	0	0
☐	Light Commercial Truck	0	0	0
☐	School Bus	0	0	0
☐	Refuse Truck	0	0	0
☐	Single Unit Short-Haul Truck	0	0	0
☐	Single Unit Long-Haul Truck	0	0	0
☐	Combination Short-Haul Truck	0	0	0
☐	Combination Long-Haul Truck	0	0	0
	TOTAL		12,574	23

Note: users may overwrite default values in the table with local estimates where applicable.

OUTPUT

Calculate Output

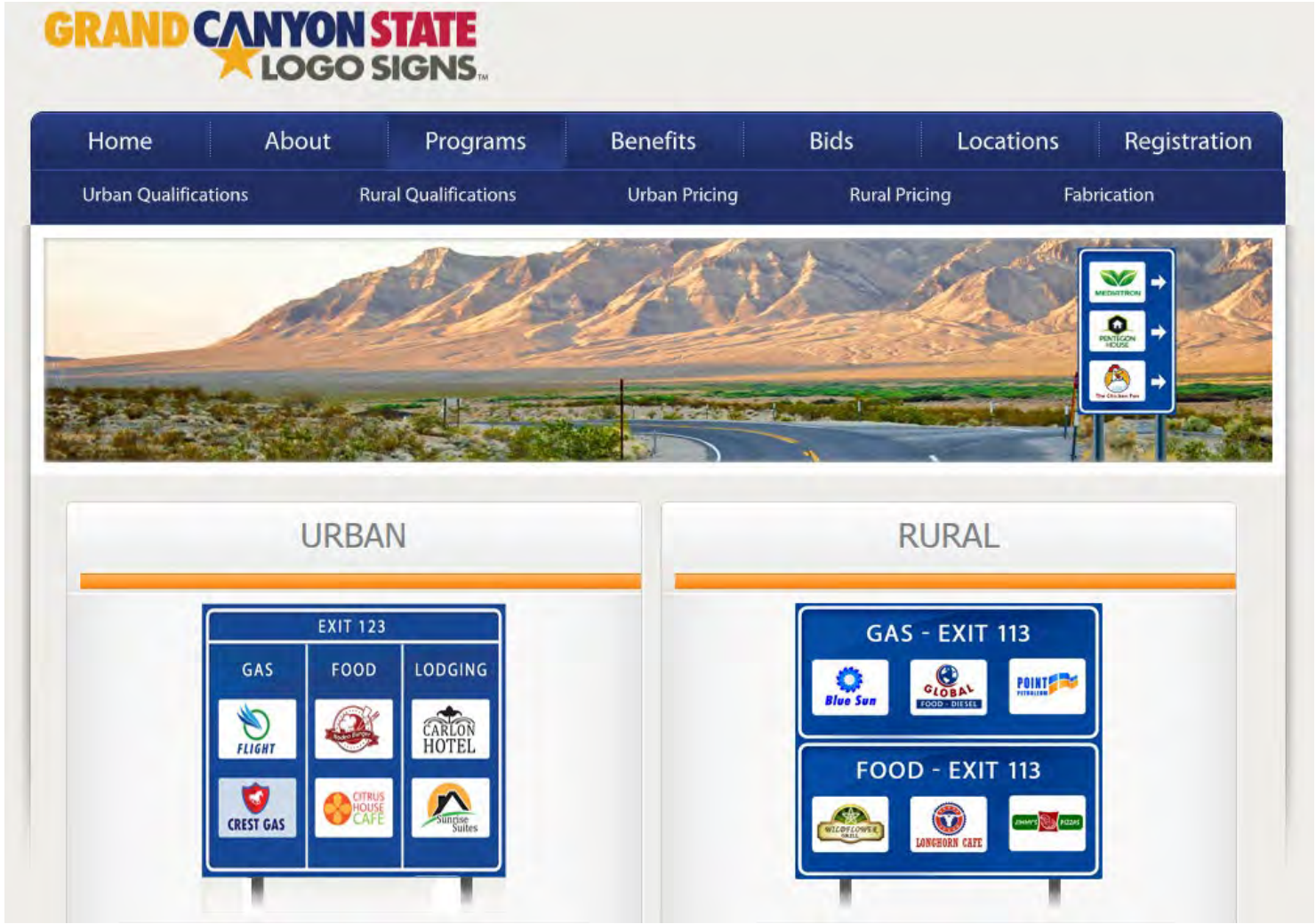
EMISSION REDUCTIONS

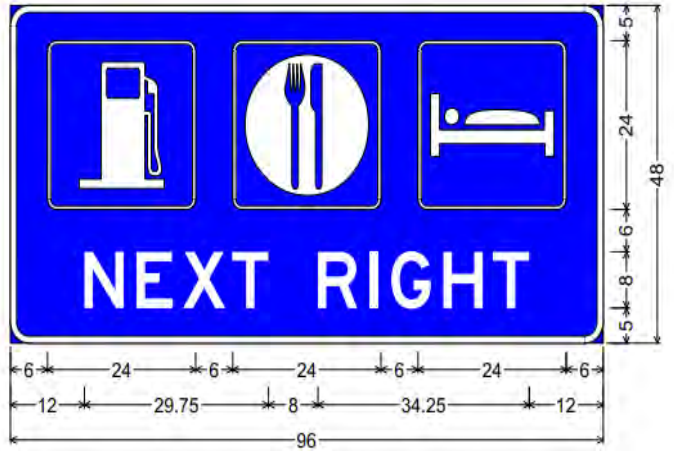
Pollutant	Total (kg/day unless noted)
Carbon Monoxide (CO)	10.024
Nitrogen Oxide (NOx)	0.804
Particulate Matter <2.5 µm ($PM_{2.5}$)	0.020
Particulate Matter <10 µm (PM_{10})	0.022
Volatile Organic Compounds (VOC)	0.561

Carbon Dioxide Equivalent (CO_2e)	N/A
Total Energy Consumption (MMBTU/day)	N/A

Note: emissions models have limited CO_2e and energy estimates for alternative fuel vehicles, they only exist for E85, fuel cell, and battery electric light-duty vehicles.

I-10 signage for EV charging/CNG fueling stations



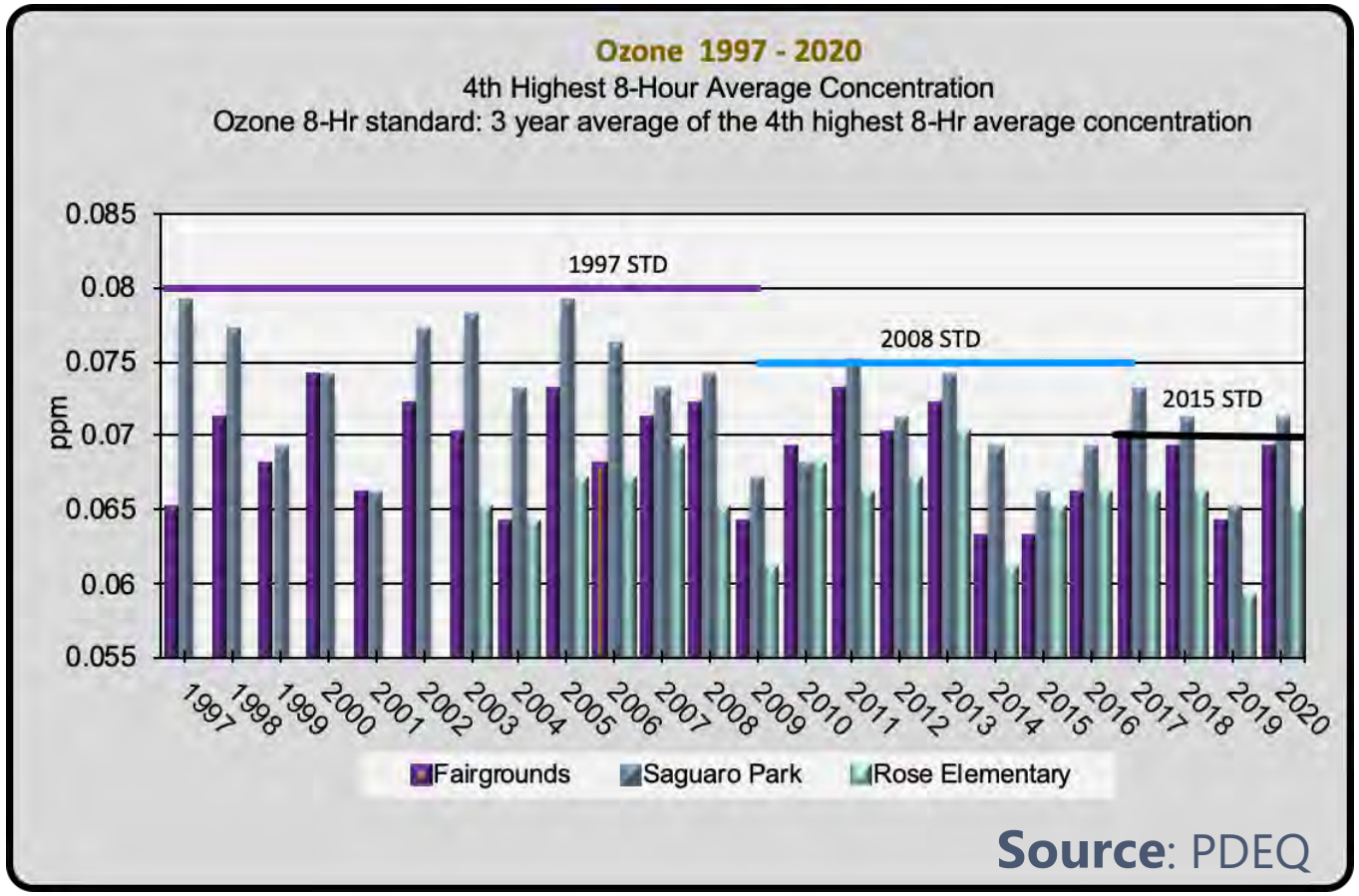


Regional air quality issues

Transportation Conformity Implications of Ozone Nonattainment Designation

- State Implementation Plan, Transportation Control Measures, Conformity Determinations

Historical Ozone Trends



Source: PDEQ

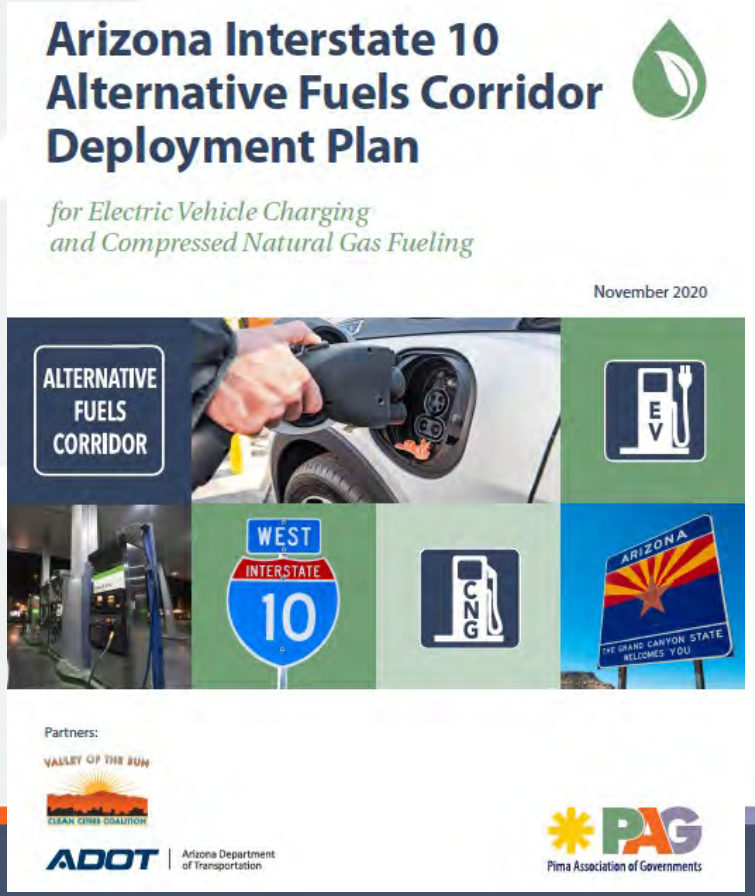
2014 Eastern Pima County NOx Emissions

Source: ERG, 2017

Arizona I-10 Alternative Fuels Corridor Deployment Plan

https://pagregion.com/sustainability/air-quality/i10-alt-fuels-deployment-plan/

Questions?



Pima Association of Governments

California Zero-Emission Vehicle Infrastructure Initiatives

Eric Fredericks

Acting Chief, Office of Sustainable Freight Planning

California Department of Transportation (Caltrans)

July 27, 2021

Sustainable Freight Guiding Executive Orders

B-30-15

- Establishing 2030 CA emissions target

B-32-15

- Sustainable Freight Action Plan

B-55-18

- Carbon Neutrality by 2045

N-79-20

- 100% ZEV Sales by 2035, 2045

California Sustainable Freight Action Plan Targets

System Efficiency Target

- Improve freight system efficiency 25 percent by increasing the value of goods and services produced from the freight sector, relative to the amount of carbon that it produces by 2030. Investing in California's

Transition to Zero Emission Technology Target

- Deploy over 100,000 freight vehicles and equipment capable of zero emission operation and maximize near-zero emission freight vehicles and equipment powered by renewable energy by 2030.

Increased Competitiveness and Economic Growth Targets

- Establish a target or targets for increased State competitiveness and future economic growth within the freight and goods movement industry based on a suite of common-sense economic competitiveness and growth metrics and models developed by a working group comprised of economists, experts, and industry.

Advanced Clean Trucks Rule

Percent of New Truck Sales by Class through 2035

Model year	Class 2b-3	Class 4-8	Class 7-8 Tractor
2024	5%	9%	5%
2025	7%	11%	7%
2026	10%	13%	10%
2027	15%	20%	15%
2028	20%	30%	20%
2029	25%	40%	25%
2030	30%	50%	30%
2031	35%	55%	35%
2032	40%	60%	40%
2033	45%	65%	40%
2034	50%	70%	40%

CA Air Resources Board

Executive Order N-79-20 - September 2020

"It shall be a goal of the State that 100 percent of in-state sales of new passenger cars and trucks will be zero-emission by 2035. It shall be a further goal of the State that 100 percent of medium- and heavy-duty vehicles in the State be zero-emission by 2045 for all operations where feasible and by 2035 for drayage trucks. It shall be further a goal of the State to transition to 100 percent zero-emission off-road vehicles and equipment by 2035 where feasible"

Caltrans Actions to Support M-HD ZEV

Freight Mobility Plan

Prioritizes using public funds to establish M-HD alt fuel corridors

Revising project list to including ZEV infrastructure projects (CAPTI action)

Planning and Research

Establishing M-HD fueling facilities on public sites in places where the private sector is not able

Research Assessment: Providing Battery Charging for Battery Electric Heavy-duty Trucks at Rest Areas

Statewide Truck Parking Study

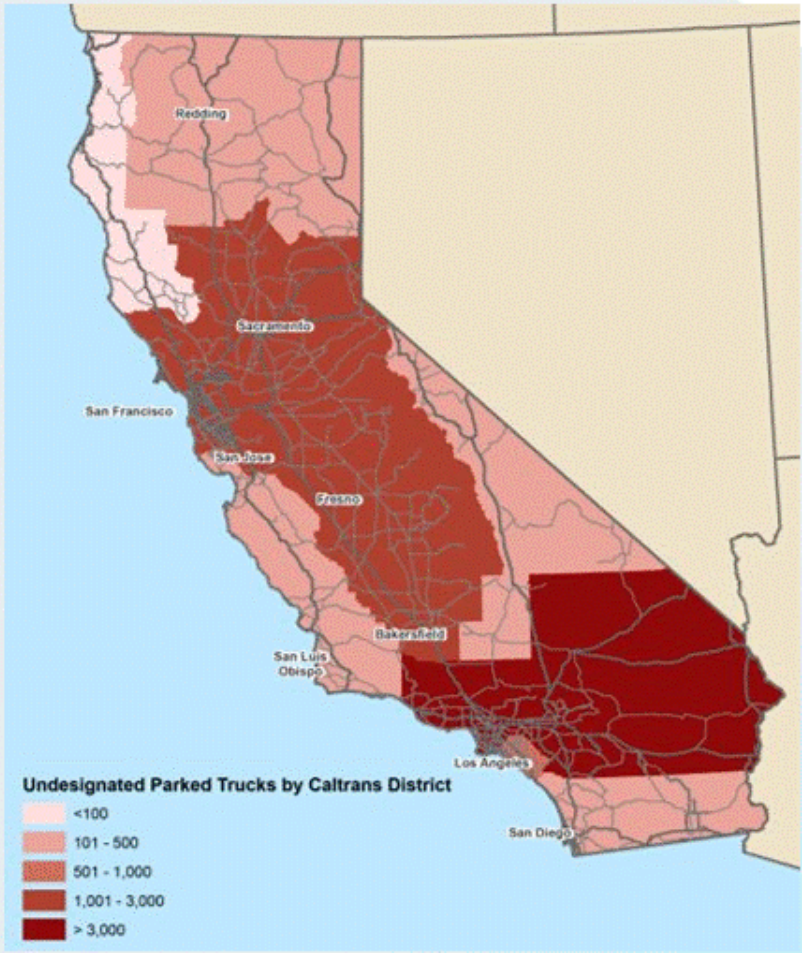
Established ZEV subcommittee

Creating Truck Parking Guidance for ZEV Infrastructure

Coordinating with CEC on charging demand needs based on parking demand

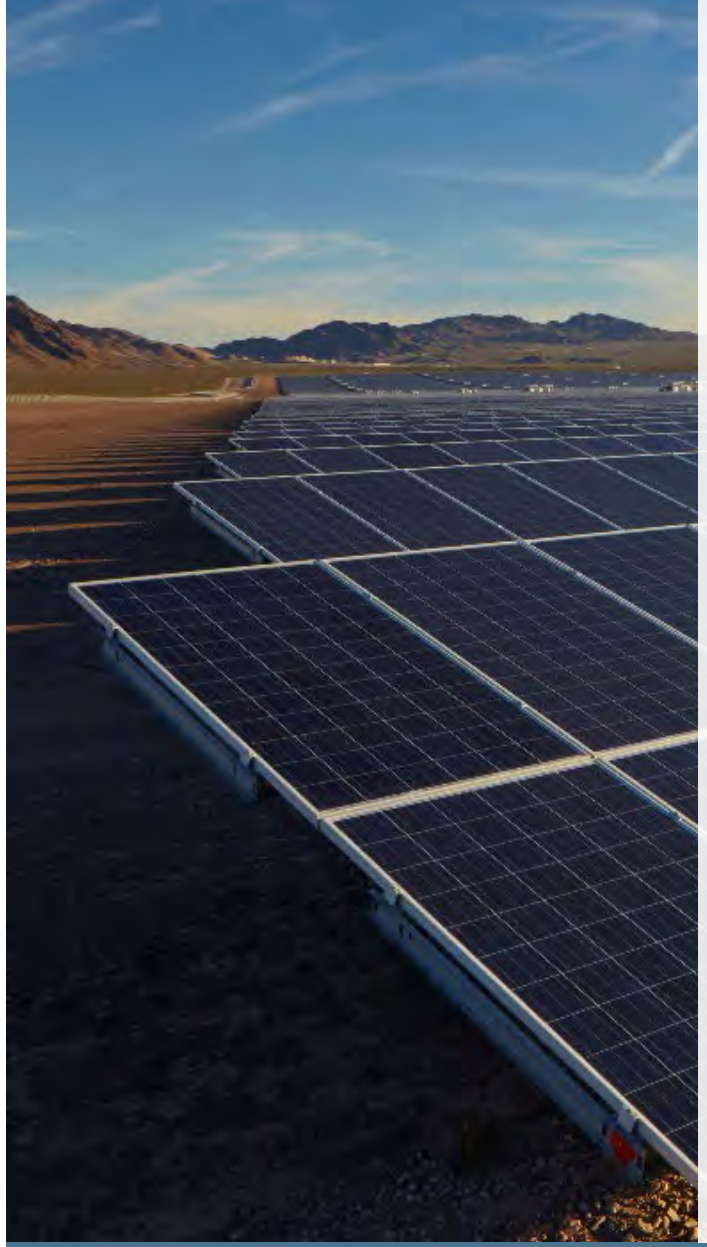
District Statistics: Truck Parking within ROW (daily average)

District/ Region	24-Hour Demand	Percent of 24-Hour Demand	Total Peak Demand
1 – North Coast	58	1%	17
2 - Redding	353	3%	191
3 - Sacramento	1,343	8%	635
4- Bay Area	1,691	13%	528
5 – Central Coast	360	2%	94
6 – Central Valley	1,140	5%	488
7 – LA	4,088	36%	1,227
8 – Inland Empire	3,459	16%	1786
9 – Eastern Sierra	204	2%	55
10 – Stockton	1,062	4%	487
11 – San Diego	393	4%	111
12 – Orange County	713	6%	156



Other State Agency Efforts of Note

Governor's Office of Business and Economic Development (GO-Biz)	California Air Resources Board (CARB)	California Energy Commission CEC	California Public Utilities Commission (CPUC)
• California Zero-Emission Vehicle Market Development Strategy	• Assembly Bill 8 – Hydrogen Station Deployment and Reporting	• Assembly Bill 2127 - Electric Vehicle Charging Infrastructure Assessment	• Senate Bill 350 - Clean Energy and Pollution Reduction Act Implementation



Governor's Office of Energy

GOE TRANSPORTATION ELECTRIFICATION

July 29, 2021

Jennifer Taylor, Esq., Deputy Director

ENERGY EFFICIENCY

Home Energy Retrofit Opportunity for Seniors (HEROS)

Green Building Tax Abatements (GBTA)

Building Energy Codes

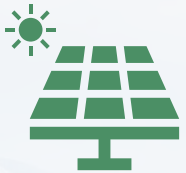
Performance Contract Audit Assistance Program (PCAAP)

RENEWABLE ENERGY

Renewable Energy Tax Abatements (RETA)

Revolving Loans

Lower Income Solar Energy Program (LISEP)



TRANSPORTATION ELECTRIFICATION

Nevada Electric Highway (NEH)

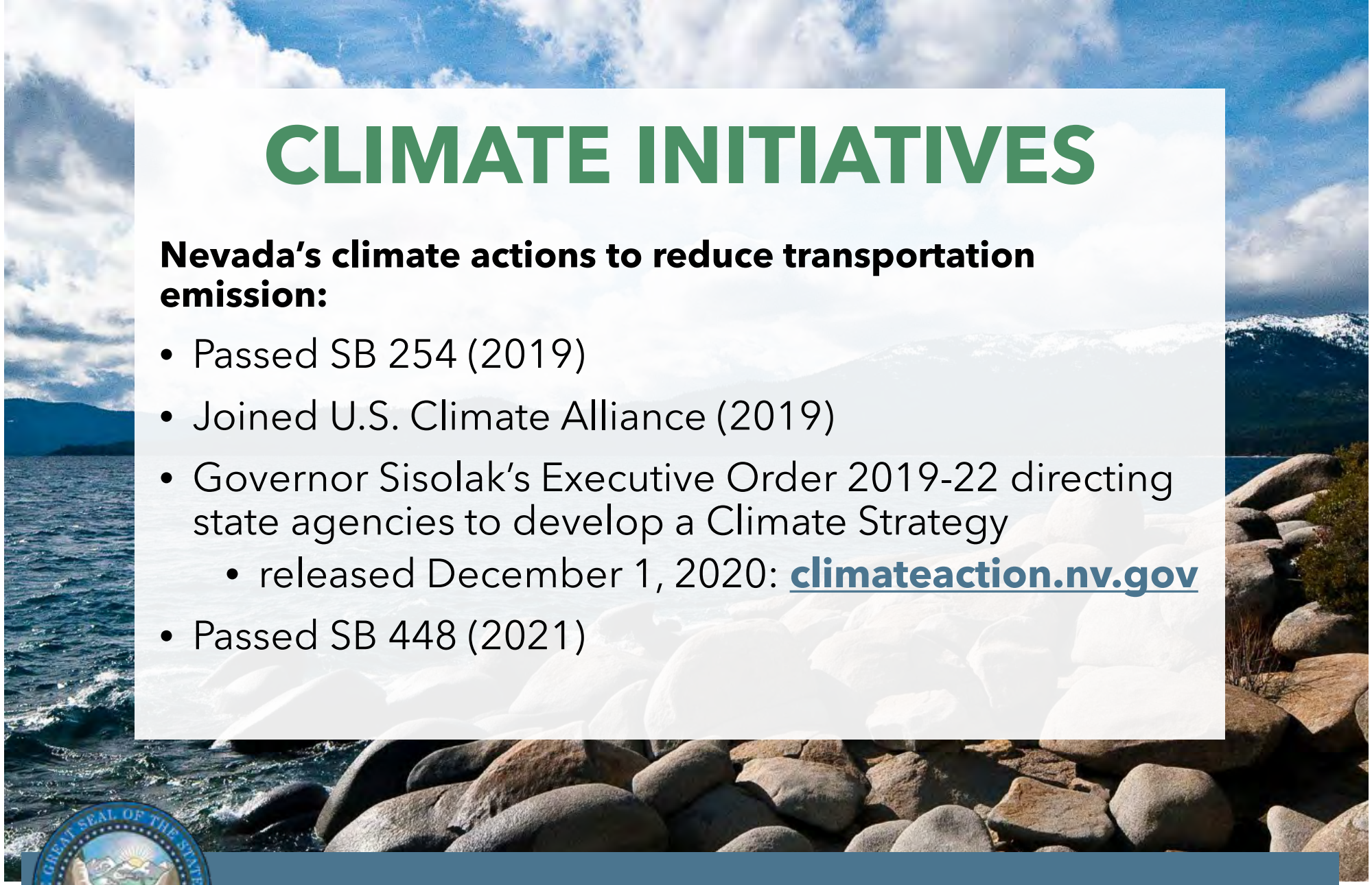
Incentives

GENERAL

DOE State Energy Program (SEP)

Targeted Grant Program

Governor's Office of Energy



CLIMATE INITIATIVES

Nevada's climate actions to reduce transportation emission:

- Passed SB 254 (2019)
- Joined U.S. Climate Alliance (2019)
- Governor Sisolak's Executive Order 2019-22 directing state agencies to develop a Climate Strategy
  - released December 1, 2020: climateaction.nv.gov
- Passed SB 448 (2021)

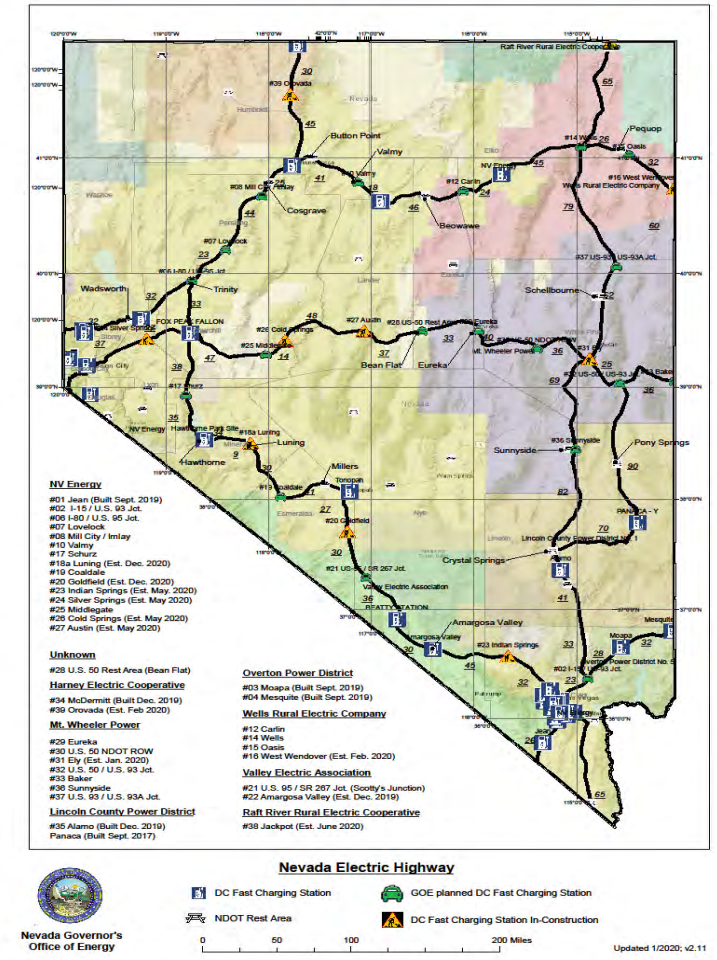
TRANSPORTATION ELECTRIFICATION

GOE programs include:

- Nevada Electric Highway
- Incentive and investment partnerships with NV Energy
- Senate Bill 448 (2021)

TRANSPORTATION ELECTRIFICATION

- Nevada Electric Highway
  - Partnership with NVE Energy and rural power providers.
  - Rev West
  - Alternative Fuel Corridors



Incentive Programs

- GOE's Incentive partnerships with NV Energy for FY 2022
  - Governmental Charging
  - Low Income Multi-family housing

Senate Bill 448 (2021)

- Electric vehicle infrastructure funding that directs NV Energy to invest up to $100 million to accelerate transportation electrification and support economic recovery from 2022-2024:
  - Interstate Corridor Charging Depot Program
  - Urban Charging Depot Program
  - Public Agency EV Charging Program
  - Transit, School Bus and Custom Program
  - Outdoor Recreation and Tourism Program
- 40 % dedicated to historically underserved communities.

Governor's Office of Energy

CONTACT US

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energy.nv.gov

twitter.com/NevGOE

Governor's Office of Energy

Department of Transportation
Medium / Heavy Duty GHG Reduction Efforts

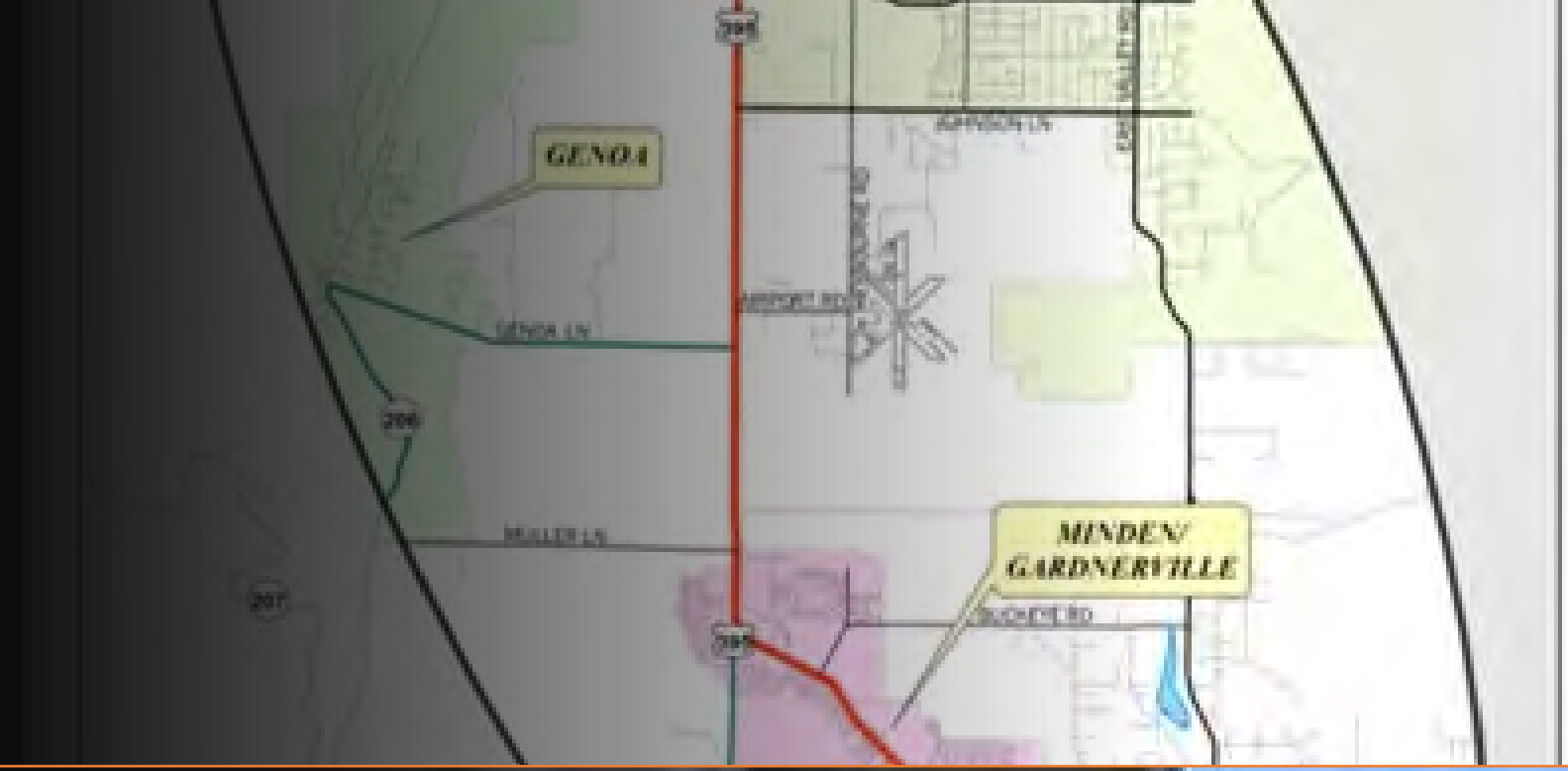
Kandee Bahr-Worley, Division Chief NV2X

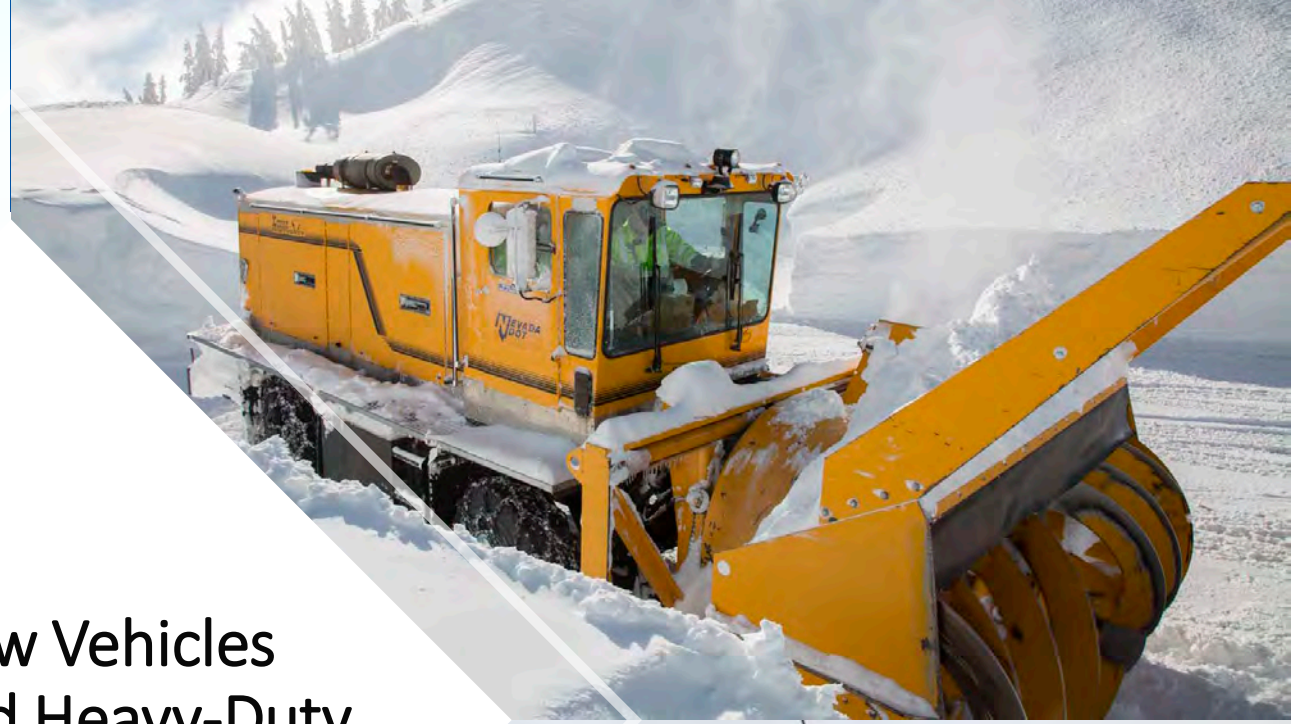
July 29, 2021

Nevada Department of Transportation Planning Efforts

- Working with the Nevada Trucking Association for educational opportunities with local fleets. Using FedEx and UPS as mentors in the industry.
- Meeting with Nicola and its use of Hydrogen as a heavy-duty alternative fuel
- As a California port pass through, we are monitoring the Advanced Clean Truck Program for learning opportunities.
- National Alternative Fuels Corridor Designations in Nevada

Rural Nevada Pilot Program





Fleet Crew Vehicles
Medium and Heavy-Duty
Asset Management

Kandee Bahr-Worley, Division Chief – NV2X
kworley@dot.nv.gov| 775-888-7323

Oregon's Alternative Transportation Efforts

Oregon Department of Environmental Quality: Morgan Schafer, Eric Feeley

Oregon Department of Transportation: Mary Brazell

Oregon Department of Energy: Jessica Reichers

Oregon Alternative Fuel Actions

- Senate Bill 1044 (2019)
- Multi-state Medium and Heavy Duty ZEV MOU
  - In July 2020, Oregon signed onto a multi-state Medium- and Heavy-Duty ZEV MOU with 14 other signatory states and Washington D.C.
  - Goal of 100 percent of all new medium- and heavy-duty vehicle sales be zero emission vehicles by 2050 with an interim target of 30 percent zero-emission vehicle sales by 2030.
- Governor's Executive Order 20-04

OREGON DEPARTMENT OF ENERGY

OREGON DEPARTMENT OF TRANSPORTATION

DEQ

Commitment to Every Mile Counts

Inter-Agency Effort

Oregon Department of Transportation

OREGON Department of Land Conservation & Development

Statewide Transportation Strategy

State of Oregon Department of Environmental Quality

OREGON DEPARTMENT OF ENERGY

Every Mile Counts Priority Efforts

Transportation Options

- Statewide Trip Reduction Policy
- Parking Management

Local GHG Reduction Planning

- Climate Friendly and Equitable Communities / TPR
- Scenario and Local Climate Pollution Reductions Planning
- GHG Reduction Performance Measures

Cleaner Fuels

- Clean Fuels Program
- Truck Alternative Fuels Study
- Emissions Standards and ZEV Requirements for Trucks

Transportation Electrification

- Interagency ZEV Action Plan
- Transportation Electrification Infrastructure Needs Analysis

Alternative Fuel Study

- **Survey of MHD Fleet Owners**
- **Develop Fleet Profiles**
- **Identify Barriers to Alternative Fuel Adoption**
- **Recommend Actions to Remove Barriers**

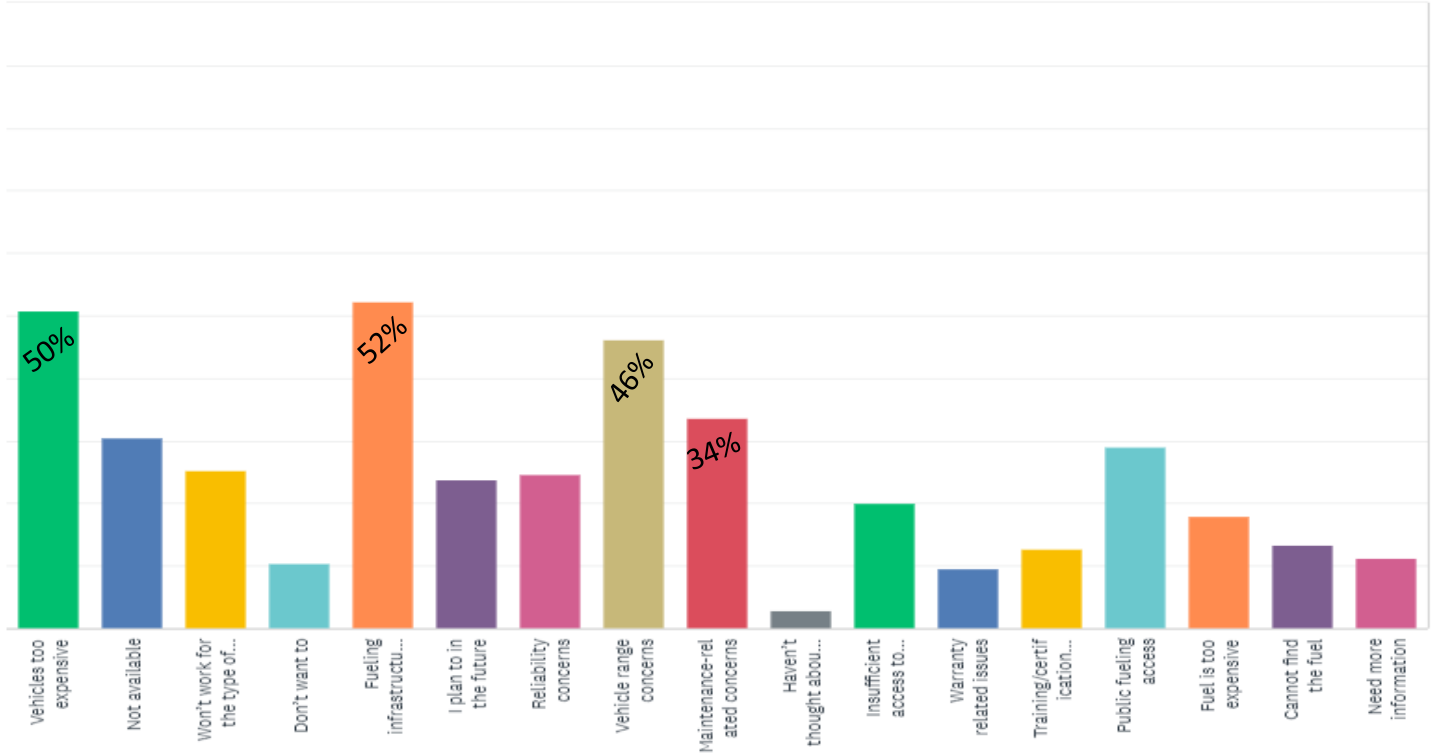
OREGON DEPARTMENT OF ENERGY

OREGON DEPARTMENT OF TRANSPORTATION

DEQ

Alternative Fuel Study: Barriers to Adoption

Q16 Why haven't you switched your fleet to alternative fuels?Select all that apply



Q18 What would aid in converting your vehicles to alternative fuels? Select all that apply

Education/ information on vehicles and warranties	15.30%
Grant funds for infrastructure	57.92%
Incentives for fuel	53.01%
Incentives for equipment/vehicles	62.30%
Rebate for vehicles	46.99%
Nothing, I have no intention to switch	11.48%
Contract/ bid preference or other non-monetary benefits	8.74%
Education/ information on alternative fuels	15.85%
Incentives for infrastructure	45.36%
Grant funds for equipment/vehicles	53.55%
Vehicle availability	40.98%
Fuel availability	54.10%
Training	13.66%
Fleet regulation	6.01%

Electric and Alternative Fuel Transit Bus Lifecycle Cost Analysis Tool

Electric and Alternative Fuel Transit Bus Lifecycle Cost Analysis Tool

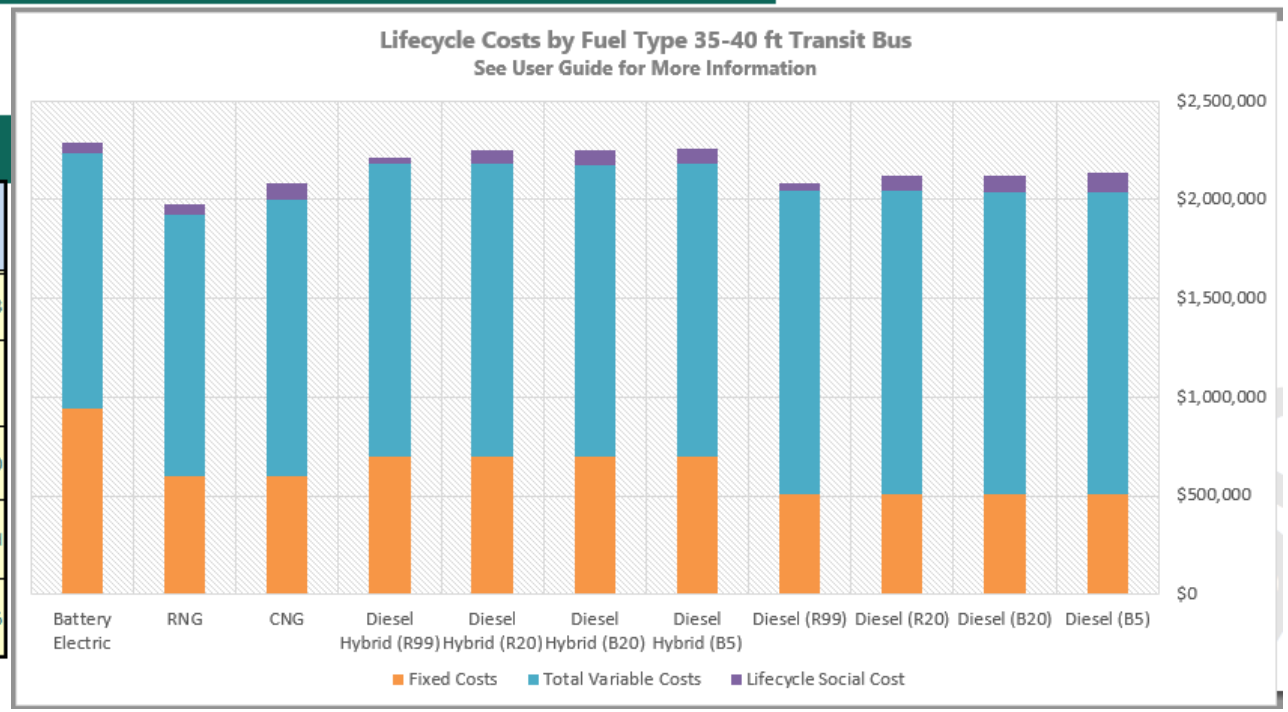
This tab enables users to input all costs associated with bus procurement, operation, maintenance, and fueling infrastucture. Once a bus and fuel type is selected default values will populate in all subsequent entries in columns B and C. If known, the user can also enter their own fleet-specific values into this column. Default values will remain in column C next to each entry for the user's reference. It is **highly** recommended that the user start with a fresh, unedited spreadsheet for each analysis to ensure that all calculations are performed correctly.

Bus and Fuel Type

Select the bus and fuel type you want to analyze from the pulldown menu)	Battery Electric

Bus, Service, Driver, and Environment

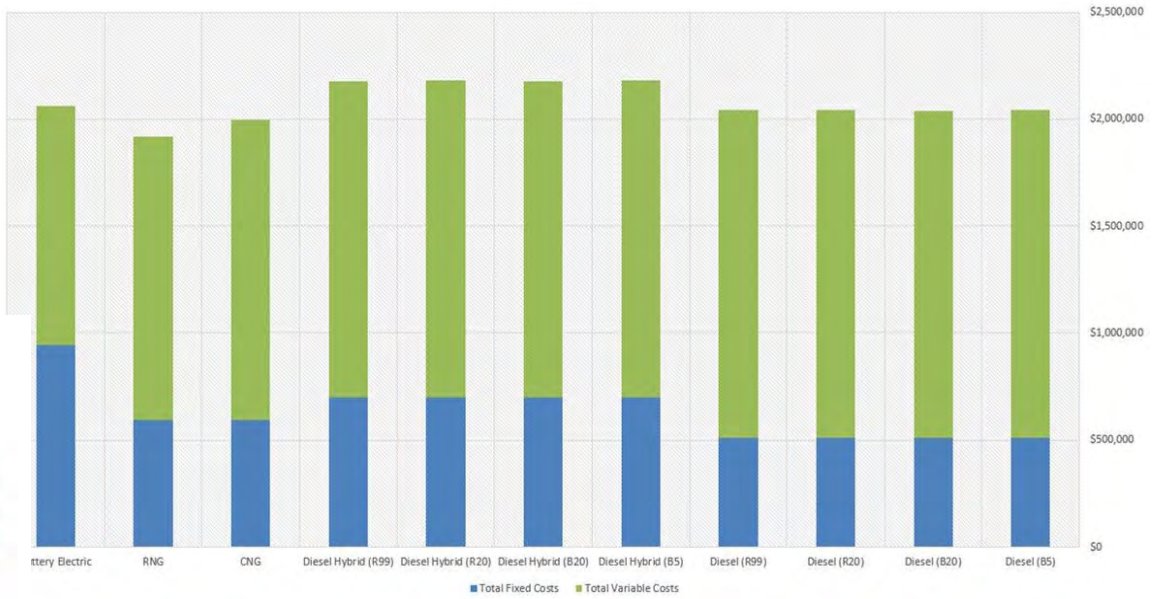
	Use Default Values or Enter Your Own Values	Default Values *NOTE - cells are locked, editing will impact calculations*
Bus Price	$837,608	$837,608
Useful Life (Years) *NOTE - this field cannot be edited from the default value*		12
Full Burden Labor Costs per Hour	$30.00	$30.00
Asphault Conditions *NOTE - this affects the default values for fuel economy costs*	Good	Good
Inflation rate	2.4%	2.4%



Electric and Alternative Fuel School Bus Lifecycle Cost Analysis Tool

Operating Costs Bus 1										Social Costs Bus 1	
Diesel (B5)	Capital, Operational, and Maintenance Costs					Potential Clean Fuels Program Revenues			Total Cumulative Costs	Social Economic Costs of Operating Bus	
	Fixed Cost Buses	Fixed Cost Fueling Infrastructure	Fuel Costs	Maintenance & Other Operating	Total Capital, Operational, and	Credits Earned (MT)	Credit Value per credit	Monetized Credits		Social Costs- (GHG, NOx, PM)	Social Costs Cumulative

Operating Costs Bus 2										Social Costs Bus 2	
Battery Electric	Capital, Operational, and Maintenance Costs					Potential Clean Fuels Program Revenues			Total Cumulative Costs	Social Economic Costs of Operating Bus	
	Fixed Cost Buses	Fixed Cost Fueling	Fuel Costs	Maintenance & Other	Total Capital, Operational,	Credits Earned (MT)	Credit Value per credit	Monetized Credits		Social Costs- (GHG, NOx, PM)*	Social Costs Cumulative*



DAS DEPARTMENT OF ADMINISTRATIVE SERVICES

OREGON DEPARTMENT OF ENERGY

OREGON DEPARTMENT OF TRANSPORTATION

Oregon Public Utility Commission

DEQ

Transportation Electrification Infrastructure Needs Analysis (TEINA)

Study Objectives

- Charging Infrastructure needs & actions
- Focus on light duty vehicles
- Overview of medium, heavy duty, micro-mobility
- Rural and underserved communities

Scenarios

1. Business as Usual
2. Rapid Recovery from COVID
3. Slow Recovery from COVID

9 Use Cases

1. Urban LDV
2. Rural LDV
3. Corridor
4. Commercial Delivery
5. Long-Haul Trucking
6. TNCs
7. Transit and School Buses
8. Micro-Mobility
9. Disadvantaged Communities

Analysis Procedure

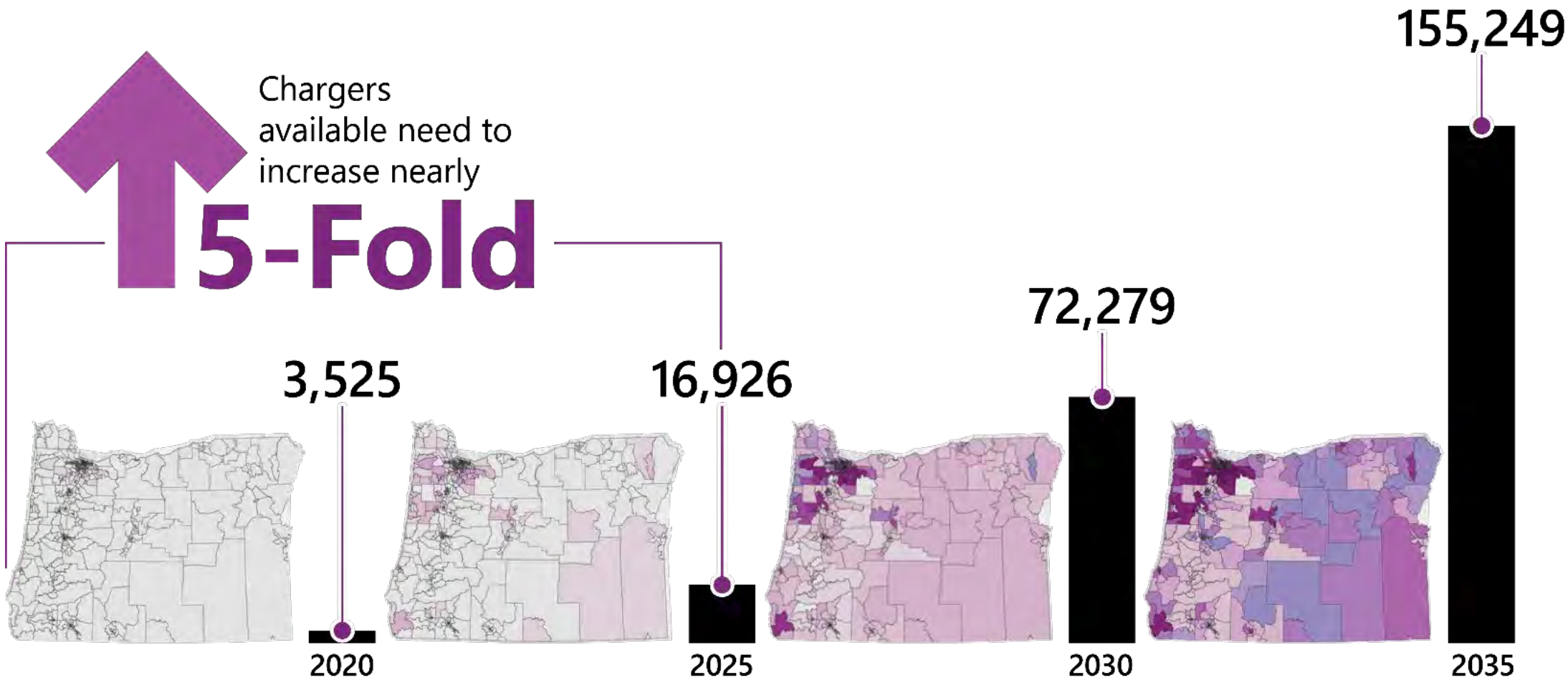
Step 1
Vehicle Forecast

Step 2
ZEV Forecast

Step 3
Chargers Assessment

Step 4
Chargers Allocation

TEINA Modeling Results for All Nine Use Cases



Other efforts in Oregon

Daimler Trucks North America, Portland General Electric Announce Public Heavy-Duty Electric Truck Charging Site

Download Press Release PDF

Share

Dec 01, 2020

Contact: fred.ligouri@daimler.com or elizabeth.lattanner@pgn.com

"Electric Island" planned to feature charging for commercial electric vehicles up to four times the speed of today's chargers, energy storage and generation and technology showcase

Portland General Electric announces five electric school bus winners

Beaverton, Newberg, Portland, Reynolds, Salem/Keizer school districts will have an electric school bus to serve their students next year

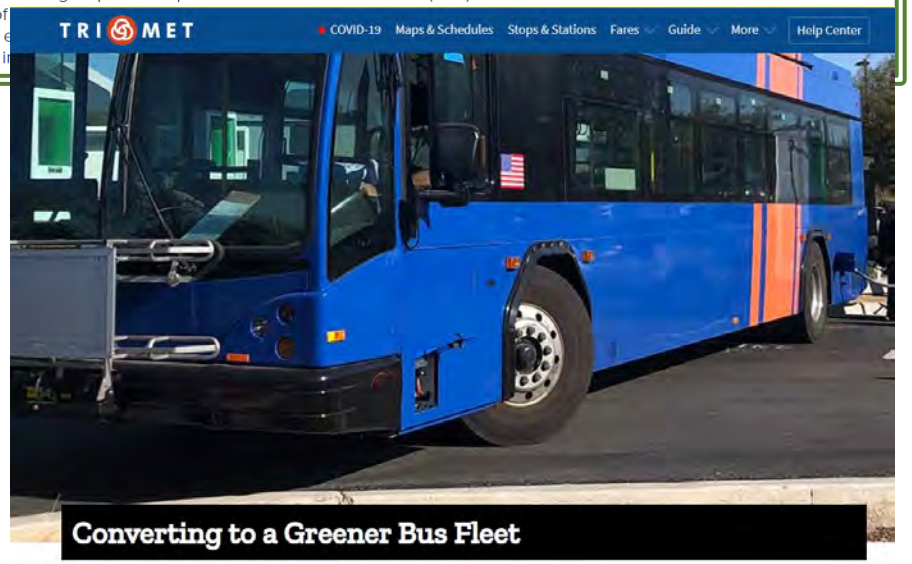
May 05, 2020

Portland, Ore.—Looking ahead to the future when students can safely return to school, Portland General Electric (NYSE: POR) announced five winners of the 2020 School Bus Electrification Project, putting the first five electric school buses on the road serving Oregon students in 2021. Using funding from the Oregon Clean Fuels Program, the Beaverton, Newberg, Portland, Reynolds and Salem-Keizer school districts were chosen based on their commitments to meet the needs of underserved communities and incorporate the buses more broadly into student education around climate science. The five districts will each receive funding to purchase an electric school bus, install charging infrastructure, and provide technical and training support. The partnerships demonstrate PGE's commitment to community collaboration and to future-oriented projects amid the COVID-19 crisis.

"Oregon students want to see action on climate change. PGE is answering that call by partnering with five school districts to put their first electric school buses on the road next year, lowering greenhouse gas emissions and helping schools reduce their operating costs," said Maria Pope, president and CEO of Portland General Electric. "If we are going to meet Oregon's climate goals, we must work together to build a clean energy future and electrify our transportation system for all."

Salem-Keizer Schools Superintendent Christy Perry said, "We are so excited about this tremendous opportunity. Asthma is one of the leading causes for student absences, so by exploring electric school buses that have clean emissions, we are improving the health of our community."

Beaverton School District Superintendent Don Grotting said, "We are very excited to have been chosen to participate in the introduction of electric school buses in Oregon through a partnership with Portland General Electric (PGE). Electric buses have zero emissions and lower operational cost over the life of
and our community. During an e
equity, we plan to use the bus i



Transit plays a leading role in reducing greenhouse emissions, replacing millions of car trips every year. Yet, with about 700 diesel buses in our fleet as of June 2021, we're the largest purchaser of diesel fuel in Oregon. We're well on the way to changing that, and it's important to decide carefully which technologies best meet our region's needs for the future. We're committed to having a 100 percent zero-emission fleet by 2040.

Thank you!

- **ODOT**

  Mary Brazell: Mary.BRAZELL@odot.state.or.us

- **ODOE**

  Jessica Reichers: Jessica.Reichers@oregon.gov

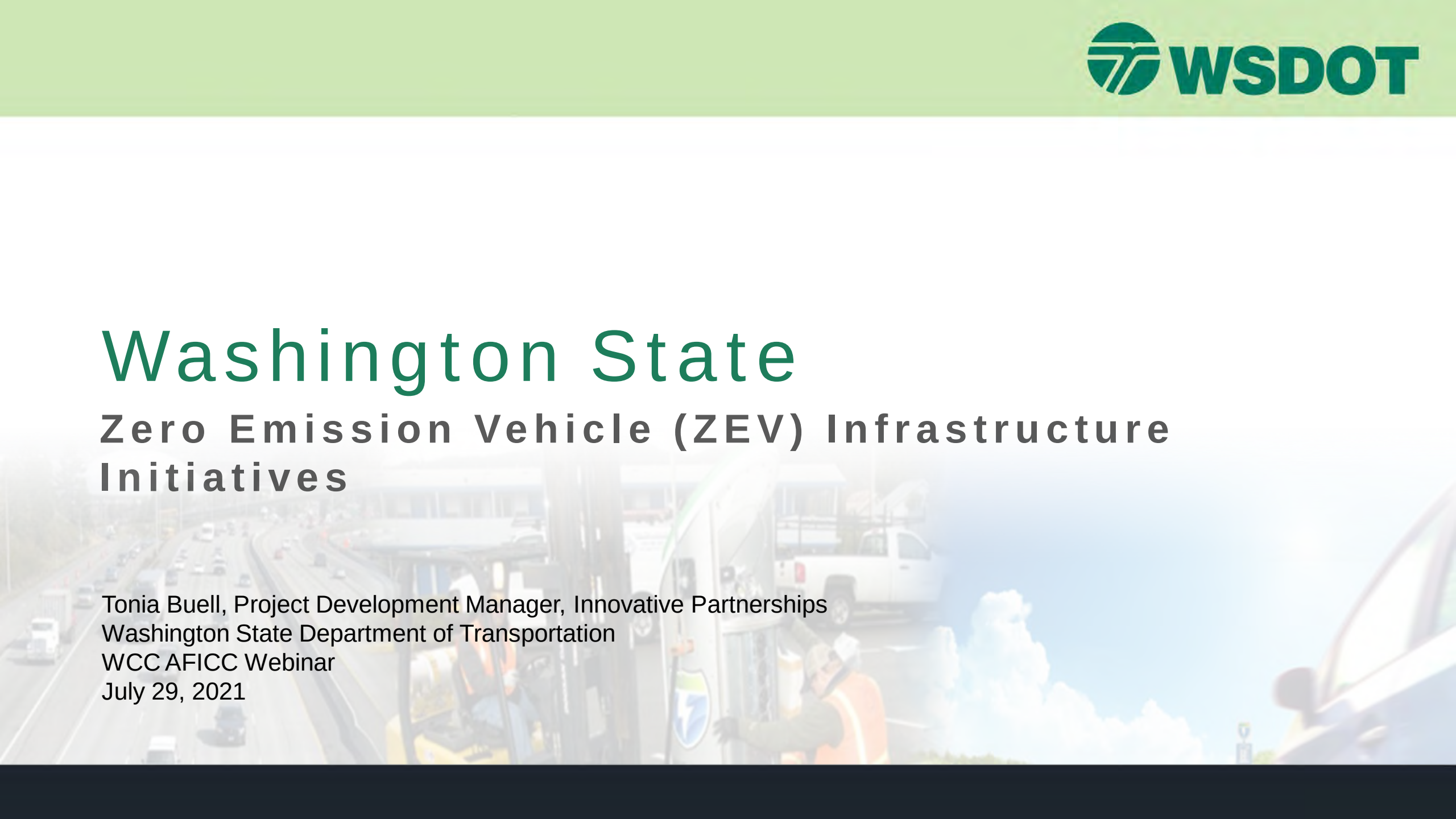
- **DEQ**

  Morgan Schafer: Morgan.Schafer@state.or.us

  Eric Feeley Eric.Feeley@deq.state.or.us

Washington State

Zero Emission Vehicle (ZEV) Infrastructure Initiatives



Tonia Buell, Project Development Manager, Innovative Partnerships
Washington State Department of Transportation
WCC AFICC Webinar
July 29, 2021

Freight and Trade Drive Washington's Economy

Washington is one of the most trade-dependent states in the nation per capita

- $126 billion in total imports and exports value
- 11,352 small and medium sized goods exporters

Freight-dependent industries have major economic effect

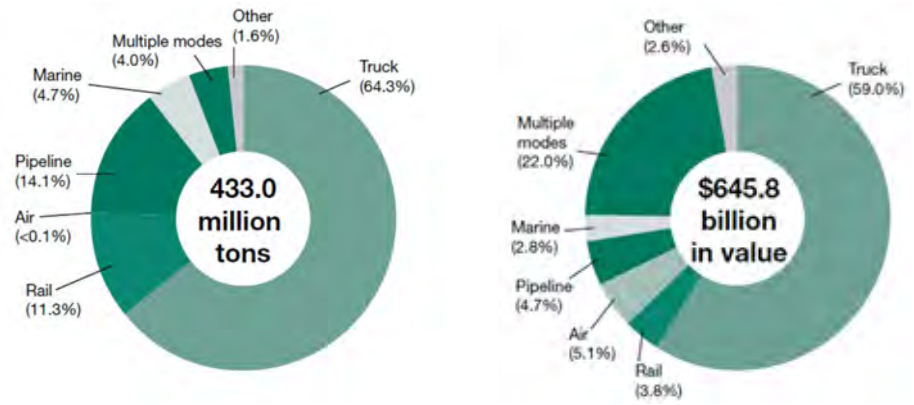
- 1.4 million jobs in freight-dependent industries (wholesale/retail, manufacturing, construction, transportation, agriculture, forest products)
- $550 billion in gross business income for freight-dependent sectors

Freight System Components

❖ **Global gateways:** access to national and international markets
- Asia - $37B in value
- Alaska - $5B in value
- Canada - $19B in value

❖ **Made in Washington**: freight manufactured or produced statewide
- Manufacturing - $176B in value
- Food and Agriculture - $49B in value

❖ **Delivering goods:** local delivery for businesses and residents
- Warehousing and Distribution - $302B in value



Freight and Goods Transportation System

Marine Rail Truck

Pacific Coast Collaborative Vision and Roadmap for a Low-Carbon Transportation System

British Columbia, Washington, Oregon and California partnership to accelerating the transformation of energy systems, buildings, and transportation.

For Medium- and Heavy-Duty Vehicles:

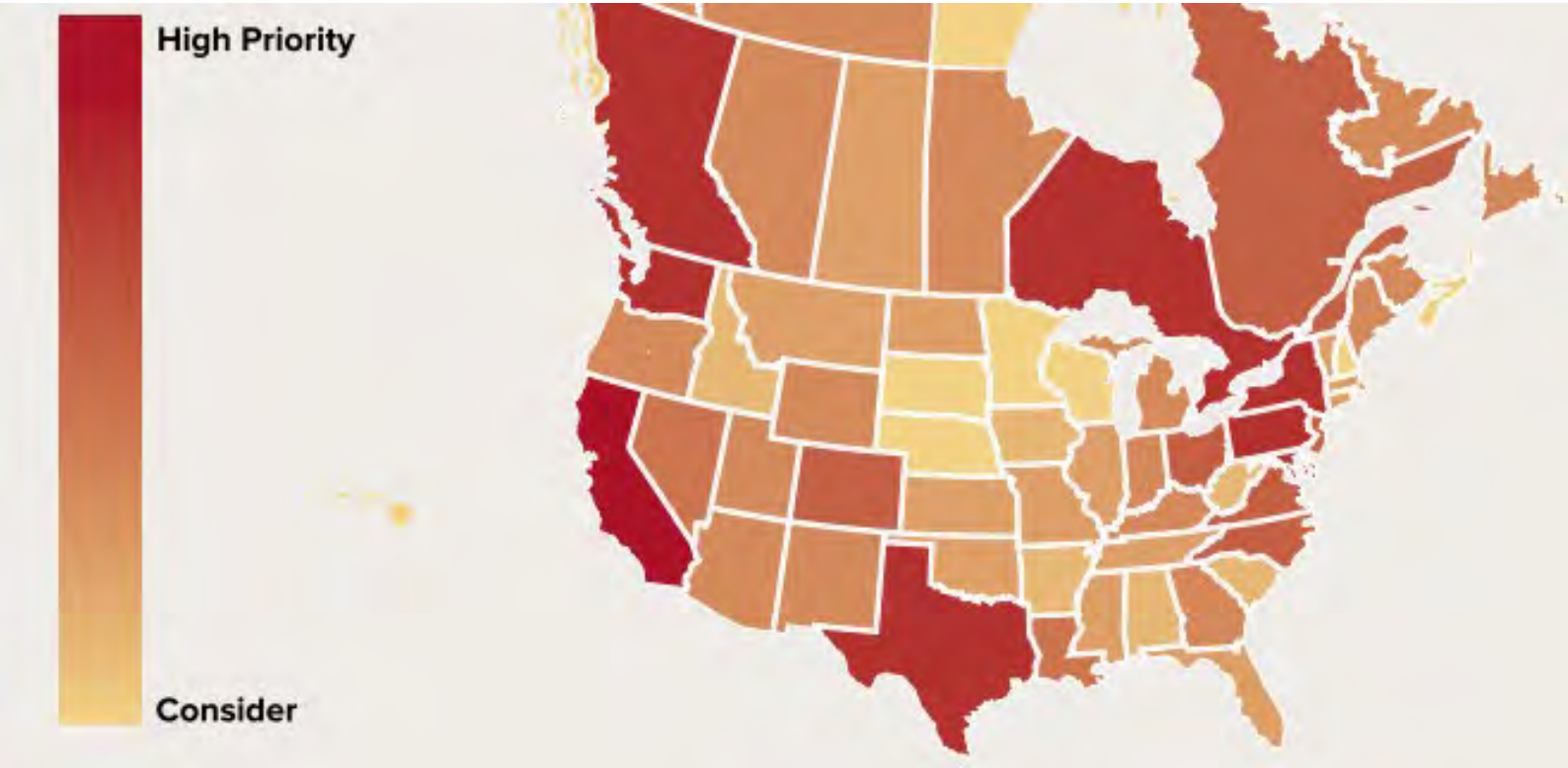
- Transitioning to low-carbon and zero emission alternatives to fossil diesel fuel in trucks, ships, ferries, and other modes.
- Shifting freight transport from heavy-duty diesel vehicles to more fuel-efficient modes, such as rail or sea.
- Developing West Coast low-carbon and zero emission fuel corridors within our region and connecting to the rest of North America.
- Electrifying non-road equipment at ports, airports, and other public and private facilities, including encouraging and supporting development of new technologies.

WSDOT supports all alternative fuels

Source: www.pacificcoastcollaborative.org

Cascadia Megaregion is Prime for Electric Trucks

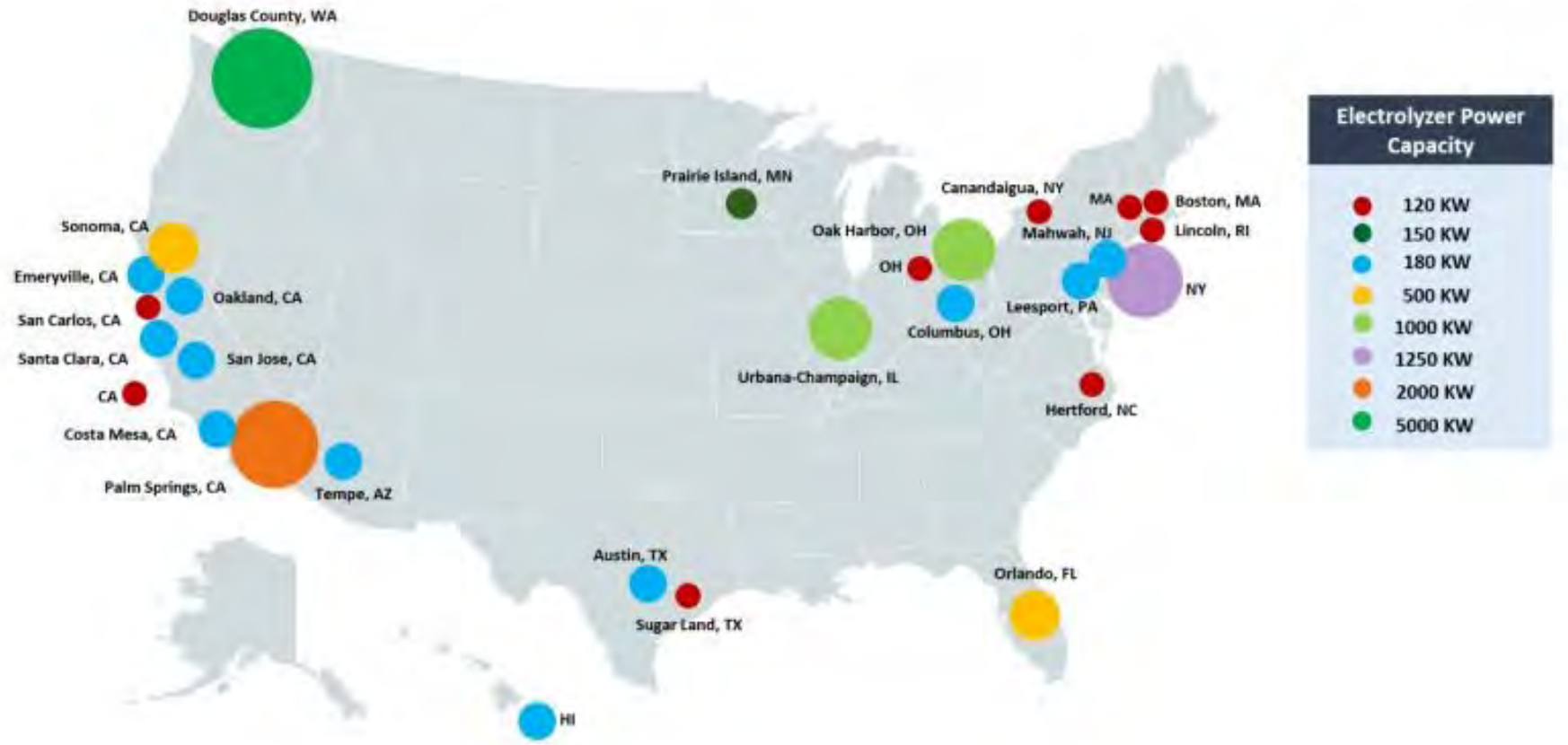
High Potential Regions for Electric Truck Deployments



Source: Jessie Lund and Mike Roeth, High-Potential Regions for Electric Truck Deployments, Rocky Mountain Institute, 2020, [High Potential Regions for Electric Truck Deployments - RMI]

Washington is poised to lead in Hydrogen production

Hydrogen Electrolyzer Locations and Capacity



Source: U.S. Department of Energy Hydrogen and Fuel Cell Technologies Office Maps
www.energy.gov/eere/fuelcells/downloads/us-hydrogen-electrolyzer-locationsand-capacity

Benefits of Alternative Fuel Vehicles

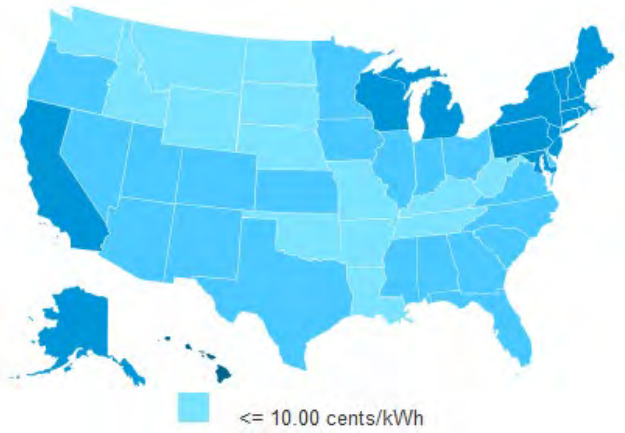
For state, advancing Zero Emission Vehicles:

- uses clean, renewable, low-cost hydropower
- reduces fuel and maintenance costs
- reduces greenhouse gas emissions
- helps meet state and federal clean air goals
- provides mobility choices
- creates green jobs, supports a green economy
- advances energy independence

Fleets deploying Zero Emission Vehicles can benefit from:

- Clean, Low-cost electricity compared to diesel
- Supportive policies and incentives
- State investments
- Forward-thinking Governor, Legislators, City of Seattle
- Home to PACCAR, Amazon, Boeing, Microsoft
- Utility authority to rate base infrastructure investments
- Reduce business carbon footprint

BPA federal hydroelectric power project in the Columbia River Basin.



Source: U.S. Energy Information Administration

Policies Supporting Transportation Electrification

ZEV Mandate

Washington to Adopt California's ZEV Mandate. In 2019, Washington state legislators provided authority for the state to expand its Low Emission Vehicle regulations to include California's light-duty ZEV mandate. Ecology conducting rulemaking.

ZEV Truck MOU

Washington signed on to the multi-state Medium- and Heavy-Duty Zero Emission Vehicle MOU to work collaboratively toward the decarbonization of commercial vehicles. (30% of new commercial truck and bus sales to be zero-emission by 2030 and 100% of new commercial truck and bus sales to be zero-emission by 2050) https://www.nescaum.org/documents/multistate-truck-zev-governors-mou-20200714.pdf/

Climate Commitment Act

Senate Bill 5126 establishes a comprehensive program to cap greenhouse gas emissions in Washington, gradually reduce that carbon pollution, while investing in climate resiliency, clean transportation, and reducing the disproportionate burdens pollution places on some of our state's communities.

Clean Fuel Standard

Tool to cut greenhouse gas emissions by gradually reducing the carbon intensity of transportation fuels by 2.7 million metric tons a year by 2030.

Incentives for Alternative Fuel Vehicles

- Clean alternative fuel and plug-in hybrid vehicles - sales/use tax exemptions on the purchase of new and used alternative fuel vehicles.
- Clean alternative fuel commercial vehicle and vehicle infrastructure B&O or PUT tax credit (As of 6/30/21: remaining available: $5,464,217)
- Electric vehicle infrastructure (charging stations), batteries, and fuel cells – sales/use tax exemption, leasehold tax exemption
- Electric vessel and marine batteries and shoreside infrastructure sales/use tax exemption
- Electric vessel and marine propulsion system sales/use tax exemption

Department of Licensing Alternative Fuel Vehicles and Plug-In Hybrids Washington State Tax Exemptions
https://www.dol.wa.gov/vehicleregistration/altfuelexemptions.html
Department of Revenue Renewable Energy/Green Incentives
https://dor.wa.gov/taxes-rates/tax-incentives/incentive-programs#1133

PACCAR is manufacturing hydrogen semi trucks out of its Renton, Washington facility. Kenworth's hydrogen fuel cell Zero Emissions Cargo Transit (ZECT) T680 tractor is a 10-truck, $7 million project between the truck-maker, the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy, and Southern California's South Coast Air Quality Management District.

Investments in ZEVs & Infrastructure

Ecology grant awards through $141 million Volkswagen settlement fund:

- 39 workplace electric vehicle charging stations — $0.4 million
- 17 cleaner drayage trucks at public ports — $50,000
- 130 electric vehicles to state fleets — $6 million
- 336 cleaner diesel school buses — $12 million
- 40 all-electric school buses — $13 million
- 66 zero emission electric transit buses — $24 million
- Hybrid-electric Jumbo Mark II ferry — $35 million

WSDOT programs:

- Zero Emission Vehicle Infrastructure Partnerships — $9 million
- Green Transportation Grants for Zero Emission Buses — $20 million
- Hydrogen fueling and DC fast charging in North Central Washington — $1.5 million

Alternative Fuel Vehicle Stakeholders

Investor-owned utilities--Avista, Puget Sound Energy (PSE), Pacificorp
Public Utility Districts
Federal and state agencies—Ecology, Commerce Energy, Enterprise Services
Regional transportation planning organizations
Counties, Cities
Ports and Port Association (70+)
Transit systems
Trucking Association
Tribes
Drive Electric Washington, Seattle EV Association
Clean Air Districts
Clean Technology and Energy Orgs
Western Washington Clean Cities
Environmental Advocacy Groups
Convention and Visitors' centers
Economic Development Associations

Businesses, retail chains, shopping centers, outlet stores, restaurants, casinos, wineries, resorts, hotels, tourist destinations.
OEMs, truck manufacturers, automakers, dealers, leasing companies
Funders and financial organizations
EV charging/refueling equipment manufacturers and service providers
Fueling stations
Consultants, researchers, national labs
Commercial real estate owners
Employment centers, worksites
Fleet managers
Transportation network companies (TNC's)
Tourism boards
Universities
Elected Officials
Connecting states and provinces
Other interested parties

WCC AFICC Resources

- Visit the WCC alternative fuels webpage for additional information: https://westcoastcollaborative.org/workgroup/wkgrp-fuels.htm
- Contact – John Mikulin/US EPA: 415-972-3956 / mikulin.john@epa.gov

Phase 2 Survey

- Landing Page: https://westcoastcollaborative.org/workgroup/wkgrp-fuels.htm#recommend
- ***ACTION - Survey closes on 9/30/2021***: https://erg.qualtrics.com/jfe/form/SV_3wm6XjtxRK7BEB7

Phase 1 Plan

- Full Plan Document: https://westcoastcollaborative.org/files/sector-fuels/wcc-aficc-mhd-infrastructure-development-plan-2020-03-12.pdf
- Executive Summary: https://westcoastcollaborative.org/files/sector-fuels/wcc-aficc-mhd-plan-exec-summary-2020-03-12.pdf
- Highlights Fact Sheet: https://westcoastcollaborative.org/files/sector-fuels/wcc-aficc-mhd-plan-highlights-2020-05-19.pdf
- California Fact Sheet: https://westcoastcollaborative.org/files/sector-fuels/wcc-aficc-mhd-plan-ca-factsheet-2020-05-19.pdf
- Oregon Fact Sheet: https://westcoastcollaborative.org/files/sector-fuels/wcc-aficc-mhd-plan-or-factsheet-2020-05-19.pdf
- Washington Fact Sheet: https://westcoastcollaborative.org/files/sector-fuels/wcc-aficc-mhd-plan-wa-factsheet-2020-05-19.pdf