



MEMORANDUM

TO: THE TRANSPORTATION COMMISSION
FROM: KAY KELLY, DIRECTOR, OFFICE OF INNOVATIVE MOBILITY
DATE: JANUARY 20, 2021
SUBJECT: MOBILITY SYSTEMS COMMITTEE - ELECTRIC VEHICLE CHARGING CORRIDORS

Purpose: This memorandum provides an overview of electric vehicle (EV) charging corridor programs.

Action: Informational briefing, no action necessary.

Background: The Electrification and Energy area within the Office of Innovative Mobility works with partners in the public and private sectors to facilitate the expansion of both electric vehicles and infrastructure across Colorado. This work is in alignment with state recommendations in the greenhouse gas (GHG) roadmap for increased vehicle electrification and with CDOT goals to:

- Work collaboratively with other state agencies and local partners to reduce statewide GHG pollution by 26% by 2025, 50% by 2030 and 90% by 2050 relative to 2005 state GHG pollution levels.
- Collaborate with other state agencies to increase EV registrations to support a future fleet of at least 940,000 light-duty EVs by 2030.
- Work with other state departments, transit agencies and electric utilities to meet the transit vehicle goals specified in its 2020 Electric Vehicle Plan to convert the state transit fleet to 100% zero emission vehicles (ZEVs) by 2050, with an interim target of at least 1,000 ZEVs by 2030.
- Collaborate with other state agencies, local governments, and private companies to increase the percentage for total state highways within a 30-mile travel buffer of DC fast-charging stations from 40% in fiscal year 2020 to 100% by 2030.
- Coordinate with other state agencies, the Colorado Scenic and Historic Byways Commission, local governments and individual site hosts to increase the number of Colorado Scenic and Historic Byways classified as electrified byways from 3 today to 26 by the end of fiscal year 2025.

This briefing will provide background information on the increasing range and capability of EVs available to Colorado drivers, the expected EV adoption curves and the EV charging infrastructure programs that are underway to deploy the necessary levels of charging infrastructure to support the growing population of EVs in Colorado's fleet.

Attachments: Attachment A - January OIM Workshop Presentation - Colorado EV Charging Corridors





COLORADO
Department of Transportation

Vehicle Electrification in Colorado



ILLUSTRATION BY ALEXANDER STOKLOSA / CAR AND DRIVER



CDOT's EV Goals

PD 14 Environmental Impact Objectives & Targets

CDOT will work collaboratively with other state agencies and local partners to **reduce statewide GHG pollution** from the transportation sector by 26% by 2025, 50% by 2030, 90% by 2050 relative to 2005 statewide GHG pollution levels.

Collaborate with other state agencies to **increase electric vehicle registrations** to support a future fleet of at least 940,000 light-duty EVs by 2030.

Work with other state departments, transit agencies, and electric utilities to meet the transit vehicle goals specified in its 2020 Electric Vehicle Plan to **convert the state transit fleet to 100% ZEV** by 2050, with an interim target of at least 1,000 ZEVs by 2030.

Collaborate with other state agencies, local governments, and private companies to **increase the percentage of total state highway miles within a 30-mile travel buffer of DC fast-charging stations** from 40% in FY 2020 to 100% by FY 2030.

Coordinate with other state agencies, the Colorado Scenic & Historic Byways Commission, local governments, and individual site hosts to **increase the number of Colorado Scenic & Historic Byways classified as electrified byways** from 3 in FY 2020 to 26 by the end of FY 2025.





Why Electric Vehicles?

CDOT Vision

To enhance the quality of life and the environment of the citizens of Colorado by creating an integrated transportation system that focuses on safely moving people and goods by offering convenient linkages among modal choices.

Electric Vehicles (EVs) offer several benefits:

- No tailpipe emissions
- Cheaper maintenance and operations
- Additional consumer choice



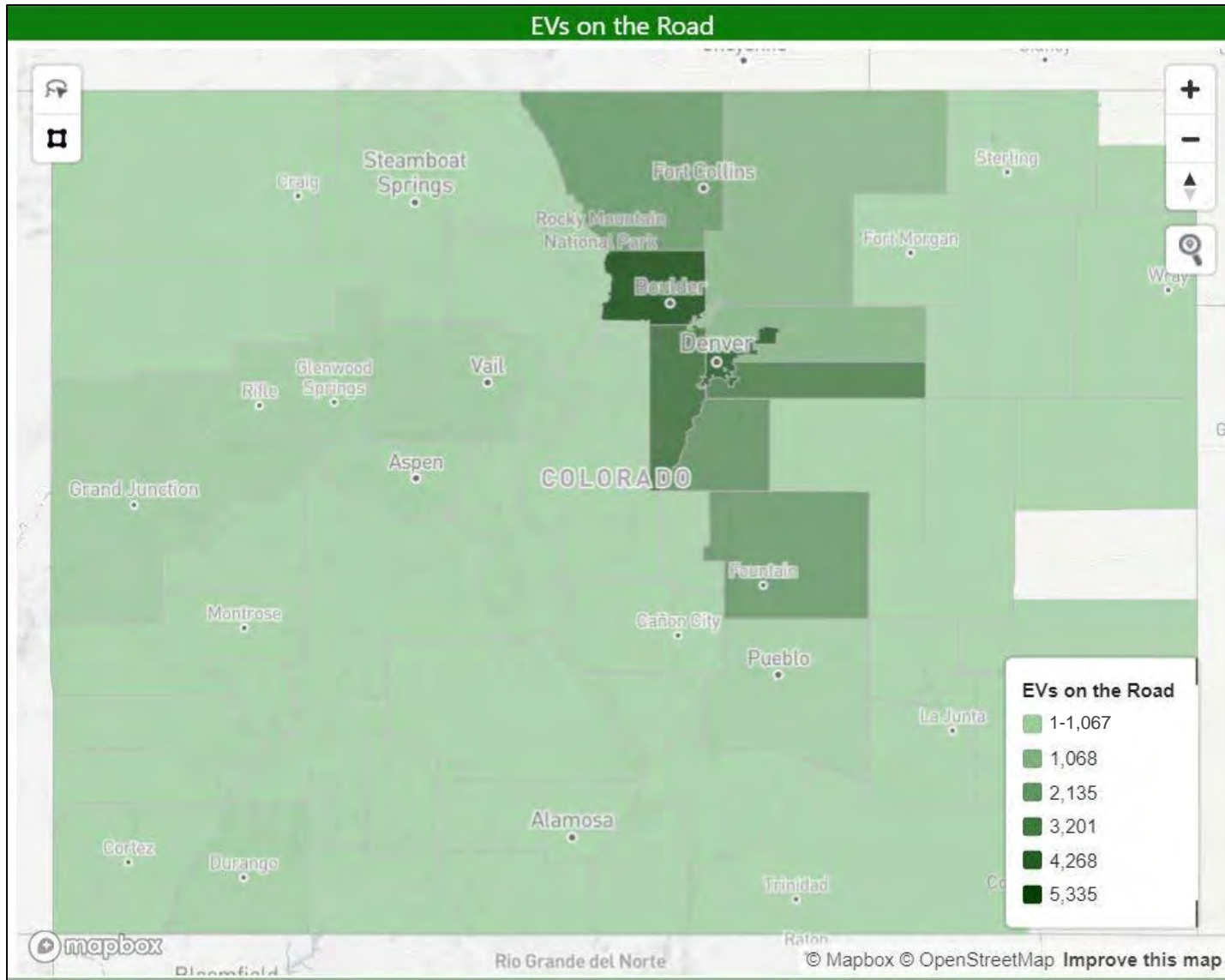


Types of Zero-Emission Vehicles

- Battery Electric Vehicles (BEVs): use batteries which can be charged externally and store recovered braking energy. BEVs use an electric motor as opposed to an internal combustion engine.
- Plug-In Hybrid Electric Vehicles (PHEVs): use both an internal combustion engine and an electric motor, whose battery can be recharged by its combustion engine, regenerative braking, or externally by the power grid.
- Hydrogen Fuel Cell Electric Vehicles (FCEVs): produce electricity using hydrogen gas and produce no harmful tailpipe emissions, just water vapor.
- Hybrid Electric Vehicles (HEVs): powered primarily by an internal combustion engine, but with a relatively large battery that can provide supplemental power and regenerative braking to significantly boost fuel efficiency. Cannot run exclusively on electricity. *Not classified as ZEVs by Colorado, but still beneficial.*
- Other Options: renewable natural gas (RNG) and other renewable fuel types *may* be zero-emission, depending on the method of fuel production. Other tools such as hybrid refrigeration units could also help reduce emissions.



EV Market Background

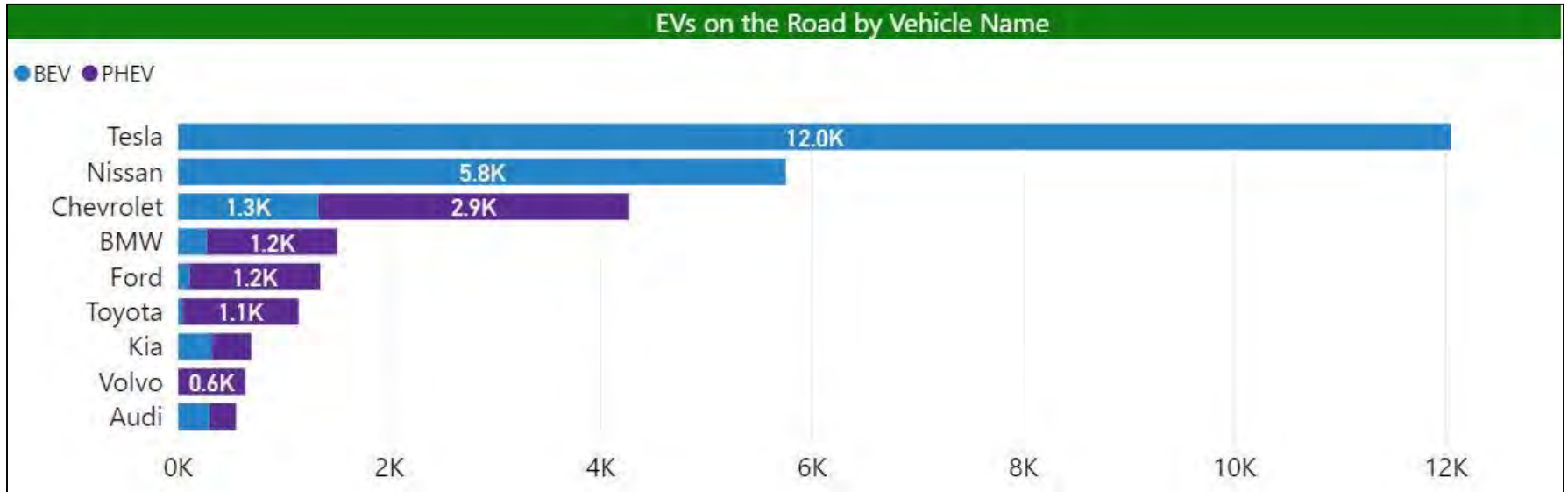


32,730 EVs in Colorado

- 22,577 BEVs
- 10,153 PHEVs



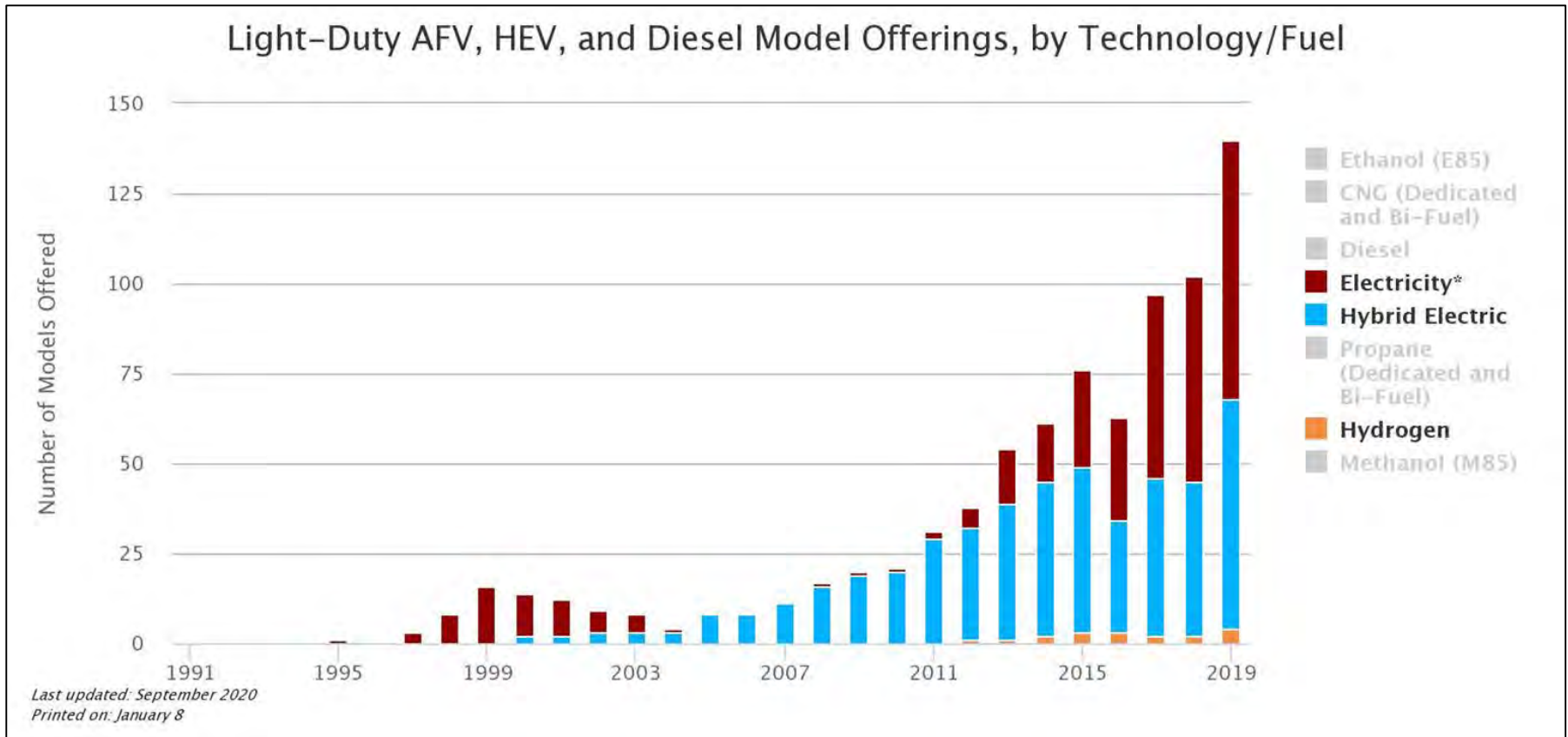
EV Market Background





Increasing Vehicle Availability

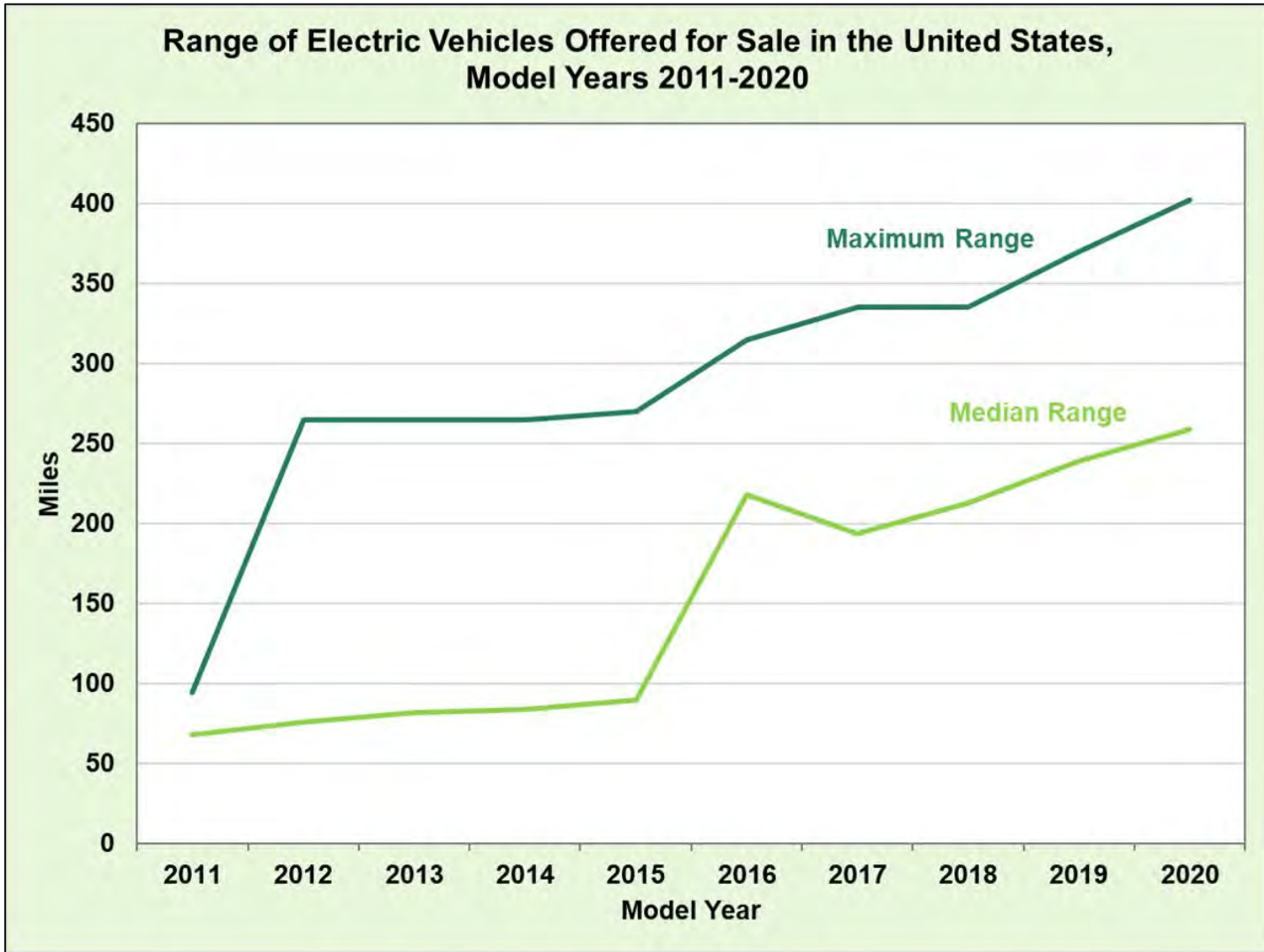
- In 2019, Colorado adopted the Zero-Emission Vehicle standard that will require automakers to make a greater number and variety of ZEVs for sale in Colorado, increasing consumer choice



Source: U.S. Department of Energy Alternative Fuels Data Center website (as of 1/8/2021)



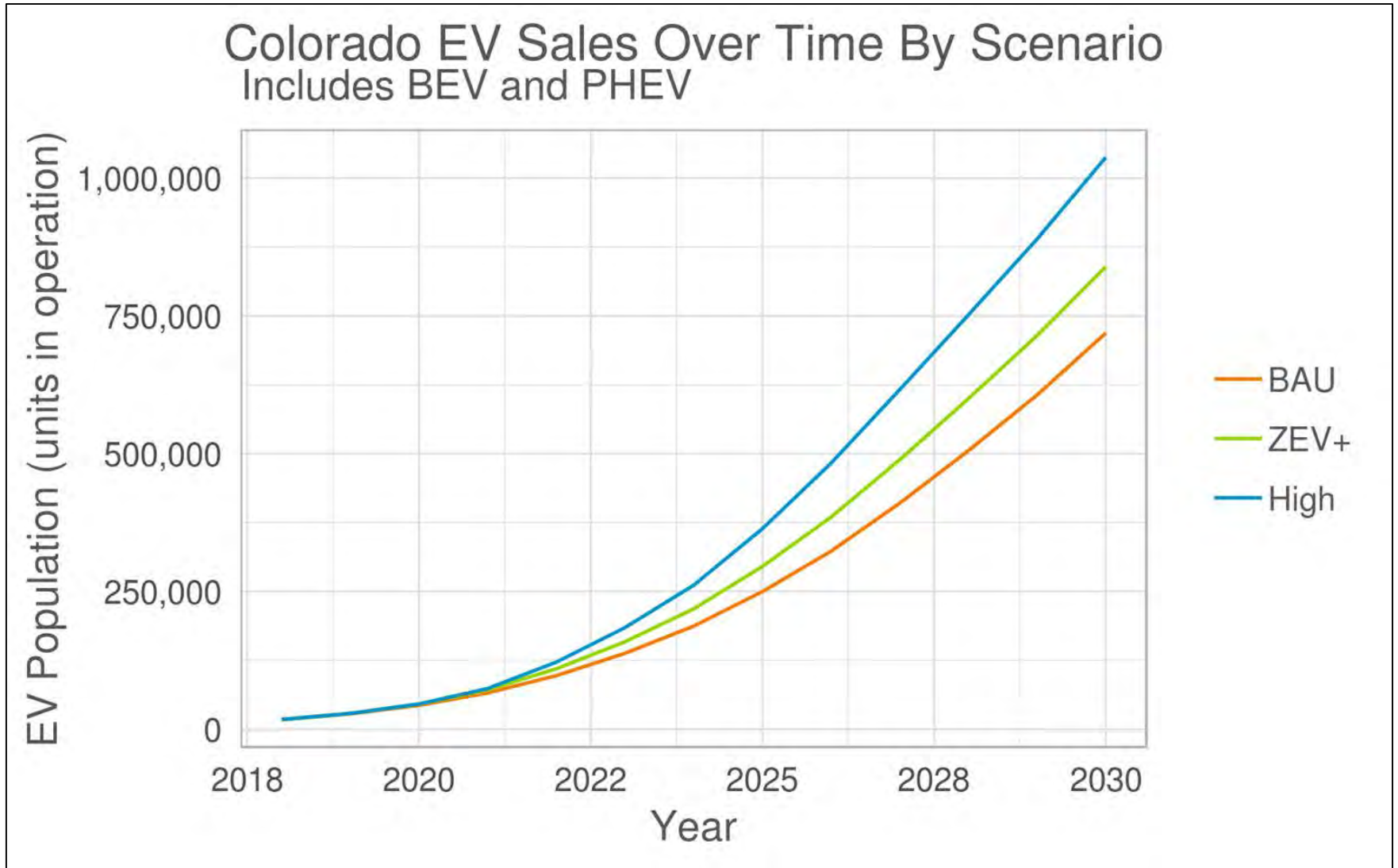
EV Technology Improvement



Source: U.S. Department of Energy and U.S. Environmental Protection Agency, Fuel Economy website (as of 10/30/20)



EV Growth Projections



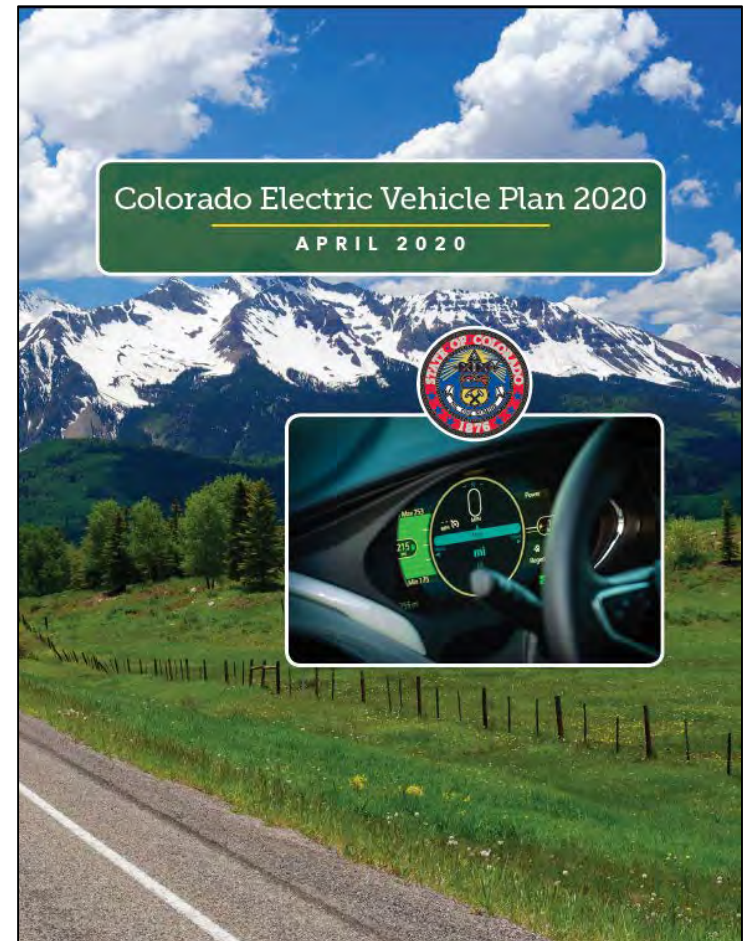
Source: Navigant



Colorado's EV Goals

Colorado's [2020 Electric Vehicle Plan](#) established a state target of **940,000 registered ZEVs** by 2030

The plan also includes strategies to explore related issues like the hydrogen fuel market, supporting EV equity, and working with dealers and technical schools to promote and support this market over the longer-term.



<https://energyoffice.colorado.gov/zero-emission-vehicles/colorado-ev-plan-2020>



Vehicle Incentives & Grants

**FORT COLLINS-LOVELAND
ELECTRIC VEHICLE
GROUP BUY**
SEPTEMBER 2020

PRESENTED BY:

- Clean Cities
- DRIVE electric

SAVE ON
2020 BMW X3 30E
& 2021 X5 45E
&
SAVE ON
2020 NISSAN
LEAF S, SV & SL

Co's BMW Center
fortcollins.com

FORT COLLINS

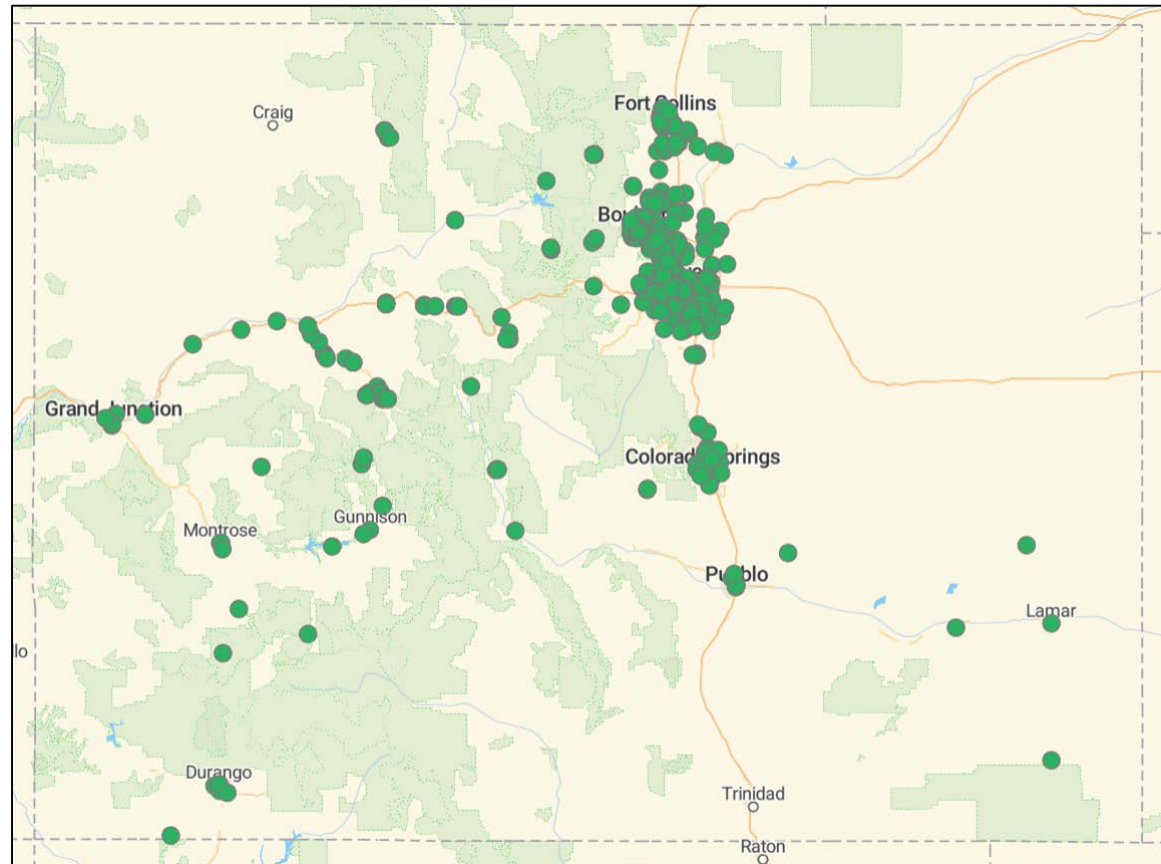
The advertisement features a background image of an electric vehicle charging station. It lists the event title, date, and sponsors. It also highlights specific vehicle models and models that will be available, along with the local BMW and Nissan dealerships.

- Colorado has a \$2,500 tax incentive available for BEVs and PHEVs, one of the highest in the country (but it will decrease over time)
- Can be combined (in some cases) with the \$7,500 federal tax incentive
- Many electric utilities also offer additional incentives or programs, including for home charging equipment/installation
- Group Buy opportunities can bring down the up-front cost even further



Charge Ahead Colorado Grants

- Partnership between the Colorado Energy Office and Regional Air Quality Council.
- Grants for community-based Level II and DC fast-charging stations across the state.
- Grants for EVs in 7-county metro area – public/non-profit fleet owners.
- Over 1,000 charger grant awards to-date.

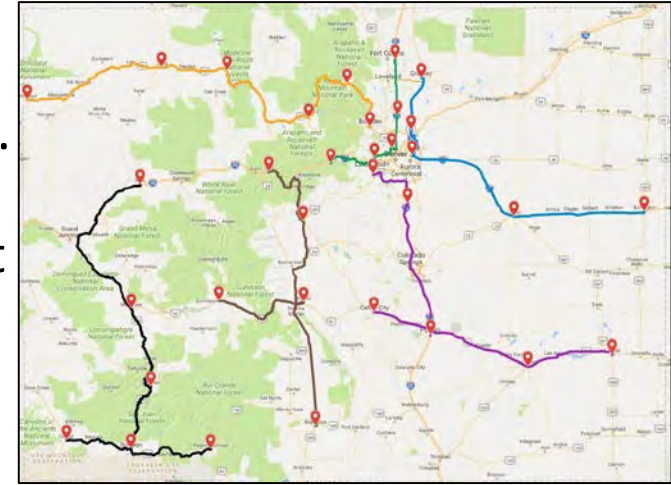


Source: Alternative Fuels Data Center <https://afdc.energy.gov/>



DC Fast-Charging Corridor Grants

- \$10.33 million award made to ChargePoint to build 34 DCFC across the state highway network.
- 2-4 chargers at each site; capable of providing at least 50 kW and up to 150 kW charging.
- Statewide network ensures a consistent driver experience at every station.
- Committed site hosts: retail, grocery, c-store, and local governments.
- State-of-the-art modular technology allows for expansion.
- Anticipated opening of all sites by summer 2021.

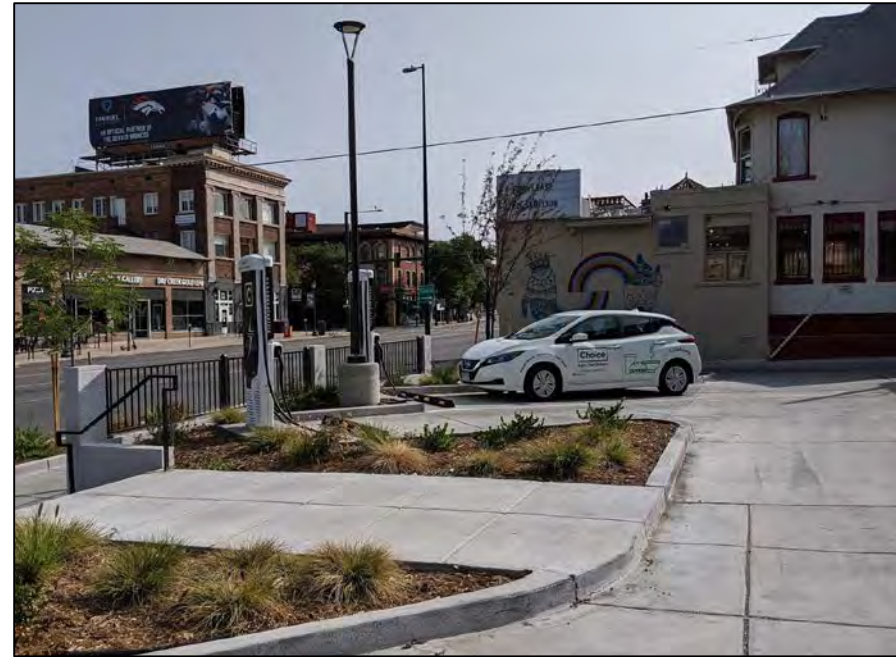


DC fast-chargers at the Dinosaur Welcome Center



DC Fast-Charging Plaza Grants

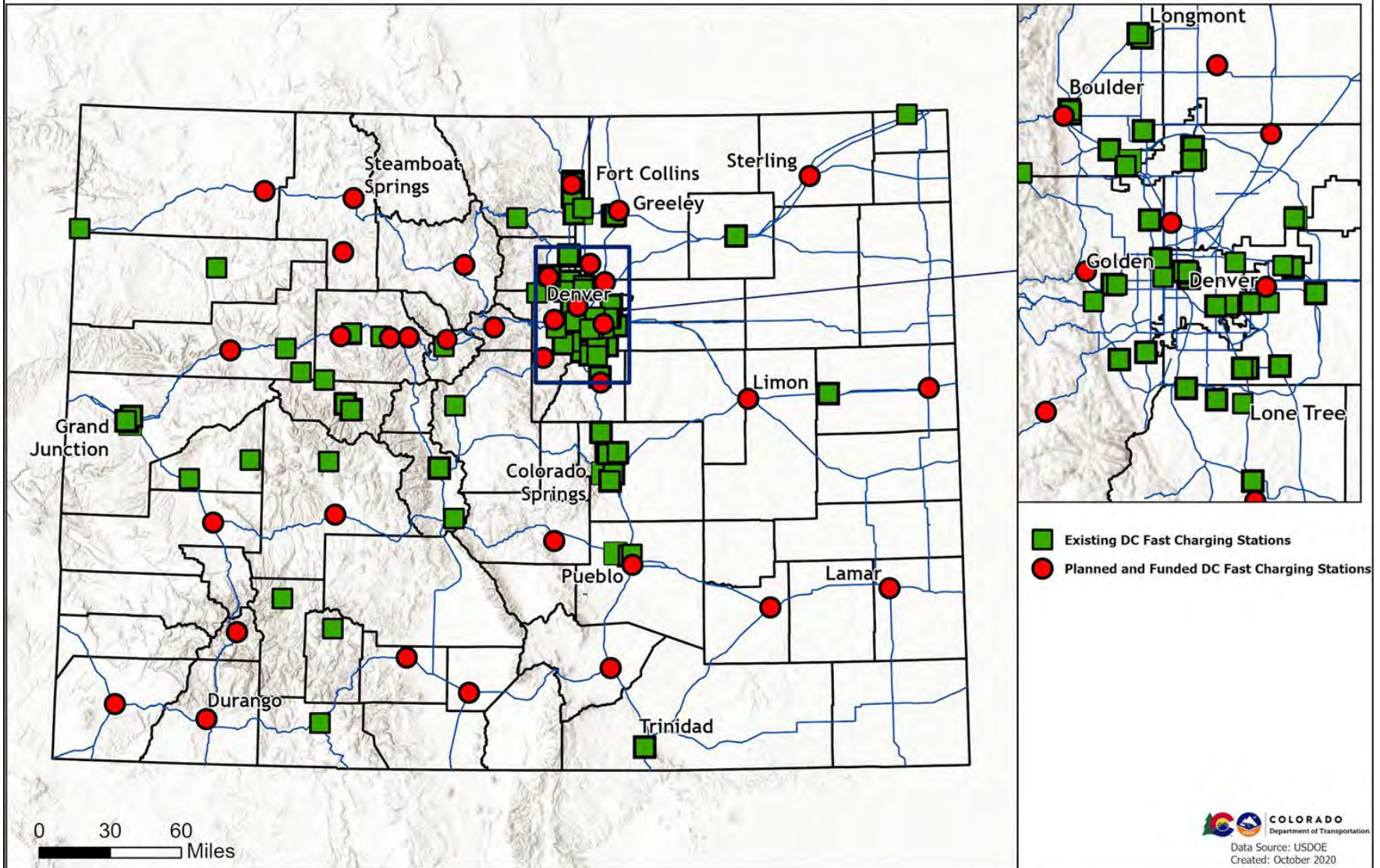
- Round 1 awarded roughly \$2 million to 3 applicants across 7 Denver Metro area sites.
- Targeting drivers without regular access to home or workplace charging or in need of quick, opportunity-based charging.
- Focus around downtown areas, near high density housing and commercial developments, near transit hubs, and in locations where there is a high density TNC usage.
- A second RFA for remaining funds will be issued in early 2021.





Statewide EV Fast Charging Corridors

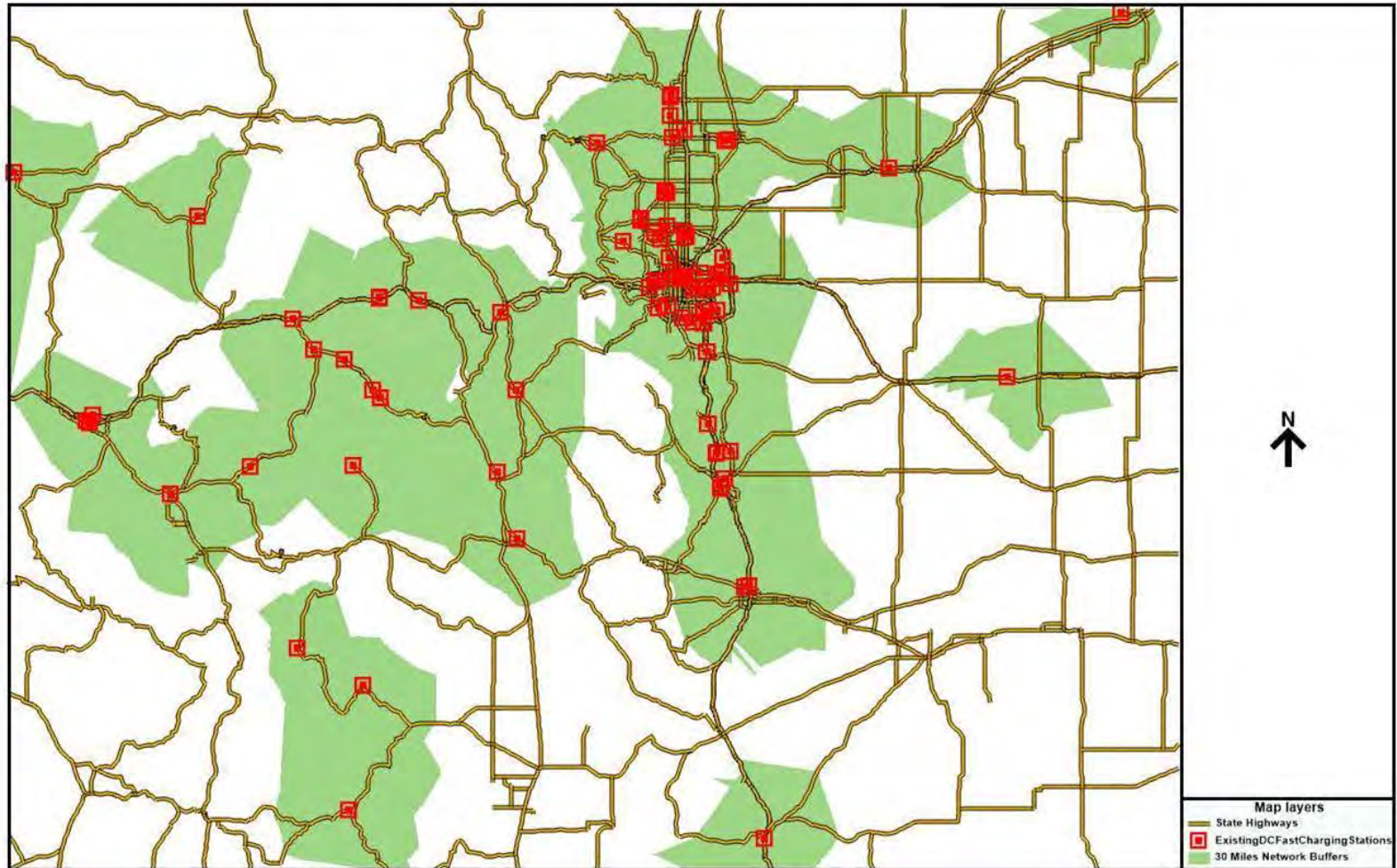
Publicly Accessible EV Fast Charging Network 2020





Statewide EV Fast Charging Corridors

Colorado Existing EV Fast Charging Stations (86) with 30 Miles Travel Buffers *Updated 11/13/2020*



Total State Hwy Miles	30 Miles Network Buffer's Miles	% of State Hwy Miles In Buffers
9,067	4,166	46%



Scenic Byways Electrification & Rural Economic Development

Completed

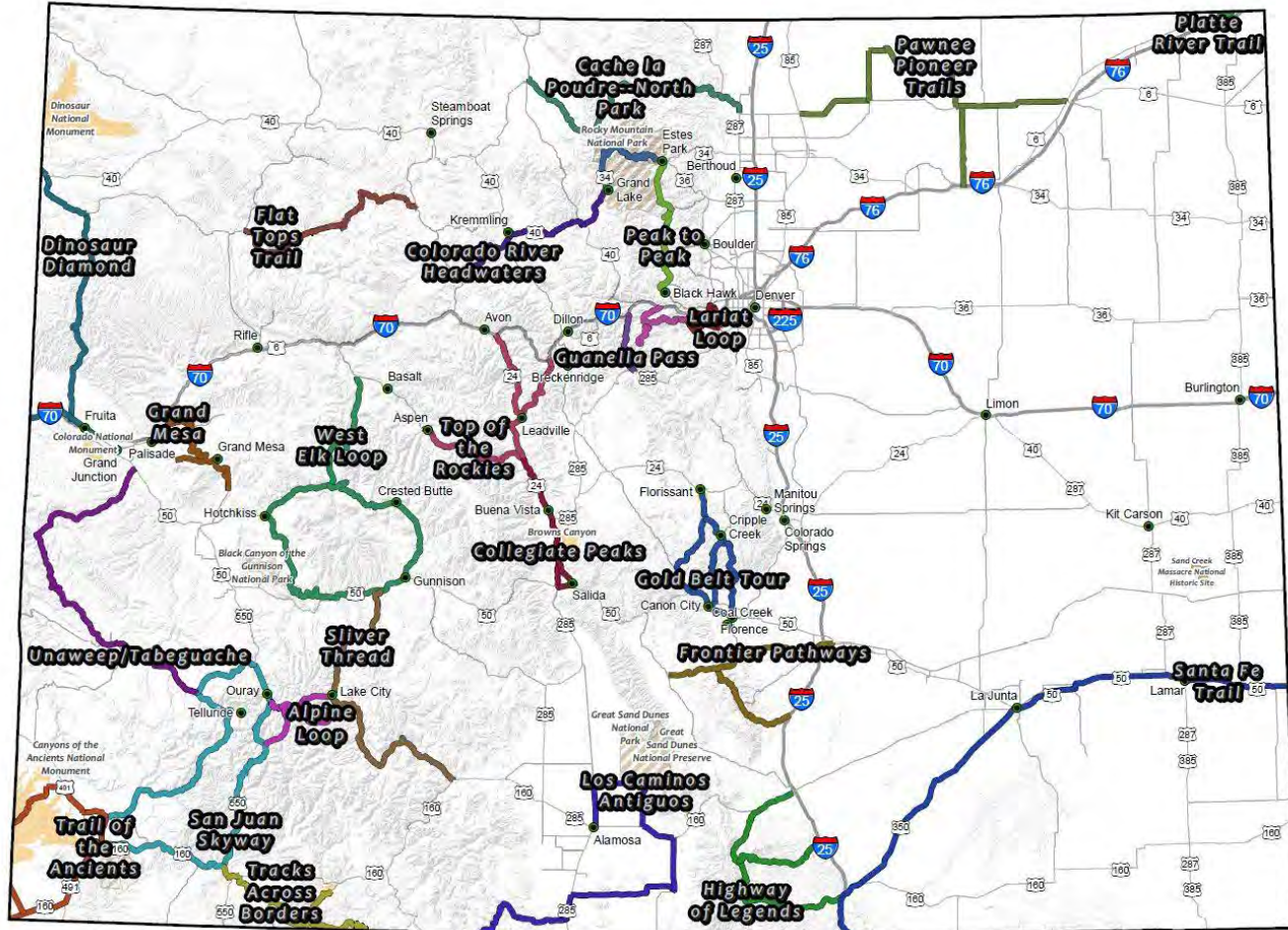
- Lariat Loop
- Grand Mesa
- Silver Thread

In-Progress

- Flat Tops Trail
- Top of the Rockies
- West Elk Loop

Upcoming Priorities

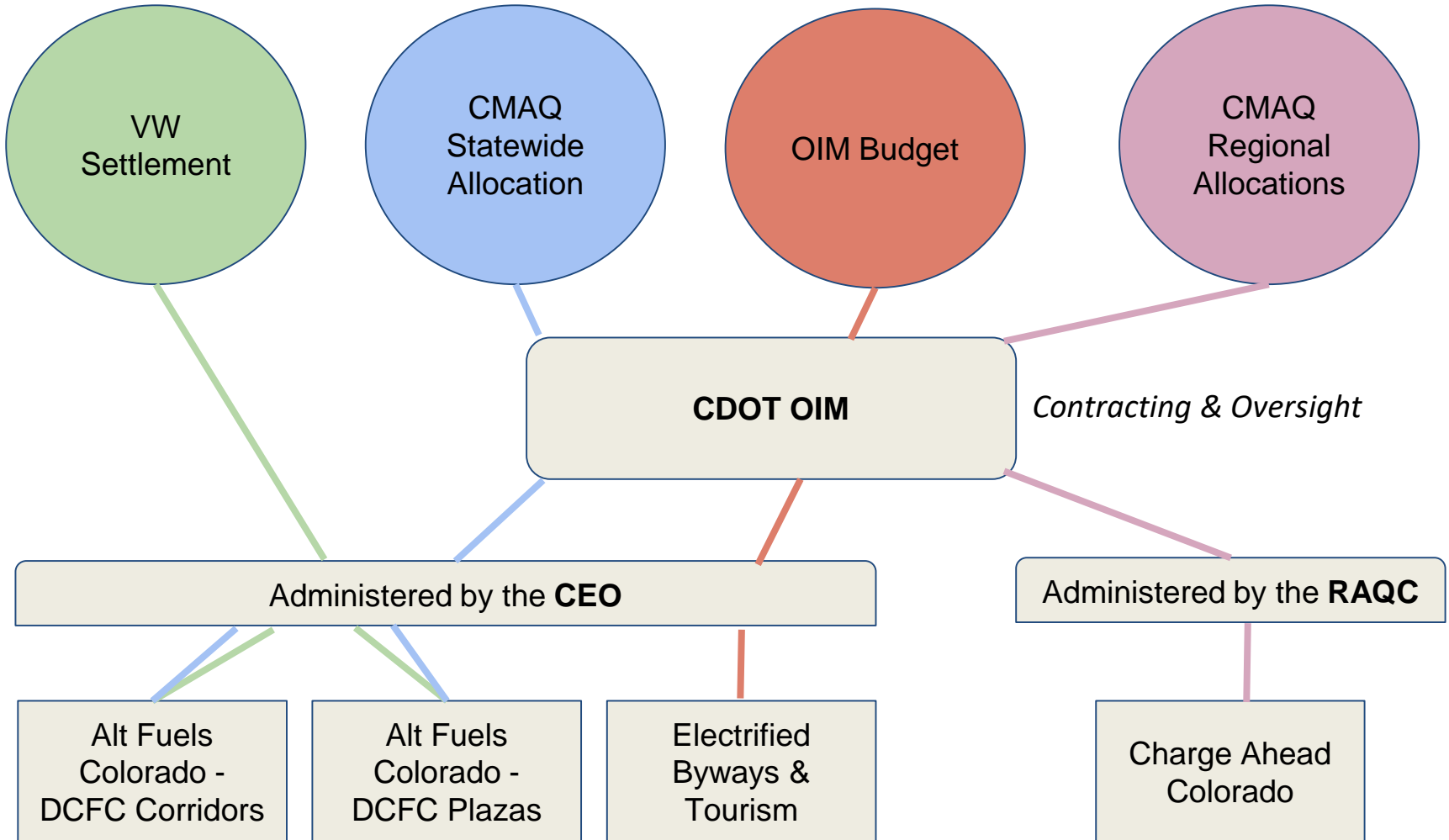
- Colorado River Headwaters
- Collegiate Peaks
- Trail Ridge Road
- Trail of the Ancients
- Peak to Peak





Funding Streams & Programs

Transportation Commission & STAC





Summary of EV Infrastructure Funding

Funding Type	Program Name	Administered by	Funding Levels
CMAQ Statewide Allocation (FY14 - 17)	Alt Fuels Colorado - Corridors & Plazas	CEO	<u>Original</u> : \$15 M <u>Remaining</u> : \$2.1 M
Volkswagen Settlement	ZEV Supply Infrastructure	CEO	<u>Original</u> : \$10.3 M <u>Remaining</u> : \$0 M
Regional CMAQ Allocation (FY17 - 20)	Charge Ahead Colorado	RAQC	<u>Original</u> : \$8.1 M <u>Remaining</u> : \$5.7 M
Office of Innovative Mobility (FY 20)	EV Byways & Tourism	CDOT OIM / CEO	<u>Original</u> : \$1.5 M <u>Remaining</u> : \$.75 M
Office of Innovative Mobility (FY 21)	Electrification & Energy	CDOT OIM	<u>Original</u> : \$1.5 M <u>Remaining</u> : \$1.5 M
CMAQ Statewide Allocation (FY 21)	Electrification & Energy	CDOT OIM	<u>Original</u> : \$1.4 M <u>Remaining</u> : \$1.4 M
Total Remaining			\$11.5 M



NREL Infrastructure Gap Analysis

Your Results

In Colorado, to support 470,000 plug-in electric vehicles you would need:

10,217 Workplace Level 2 Charging Plugs

6,500 Public Level 2 Charging Plugs

There are currently 2,412 plugs with an average of 2.8 plugs per charging station per the Department of Energy's [Alternative Fuels Data Center Station Locator](#).

917 Public DC Fast Charging Plugs

There are currently 431 plugs with an average of 3.4 plugs per charging station per the Department of Energy's [Alternative Fuels Data Center Station Locator](#).



Other Investing Organizations

FUELS

NATSO, ChargePoint Team Up on Truckstop Charging Network

Collaboration would aid development of charging sites near highway and rural areas

By **Samantha Oller** on Feb. 12, 2020



Photograph: Shutterstock

Walmart has more than 120 ultra-fast EV charging stations in 34 states

Electrify America promises that more are on the way.

Xcel Energy wins approval to advance Colorado EV plans

Utility regulators approved Xcel Energy's plan to spend \$102 million over three years to build charging stations, incentivize homeowners to install charging equipment and provide support for converting school buses, government and business fleets to electric.

DECEMBER 28, 2020 **DAVID WAGMAN**

EV **POLICY** **COLORADO**



Electrify America finishes first cross-country fast-charging route for EVs



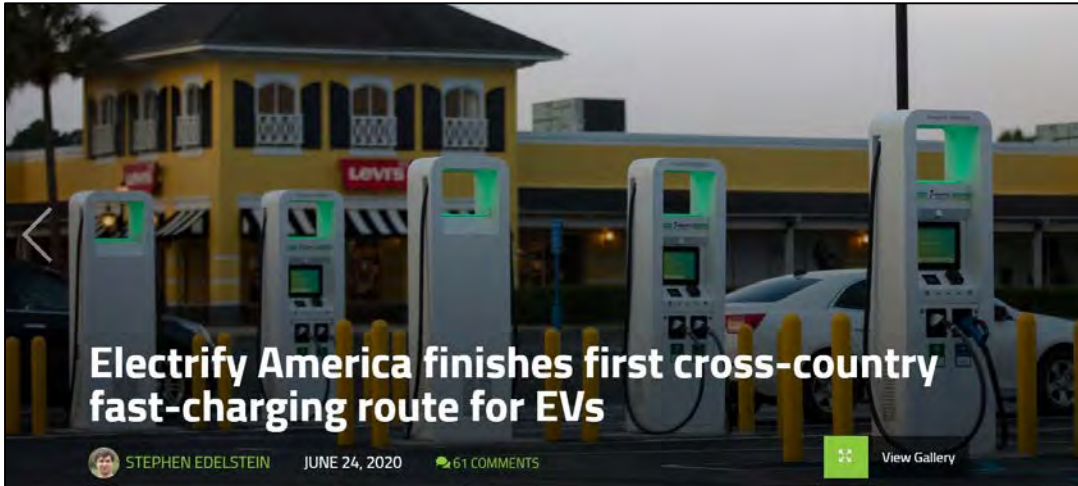
STEPHEN EDELSTEIN

JUNE 24, 2020

61 COMMENTS



View Gallery



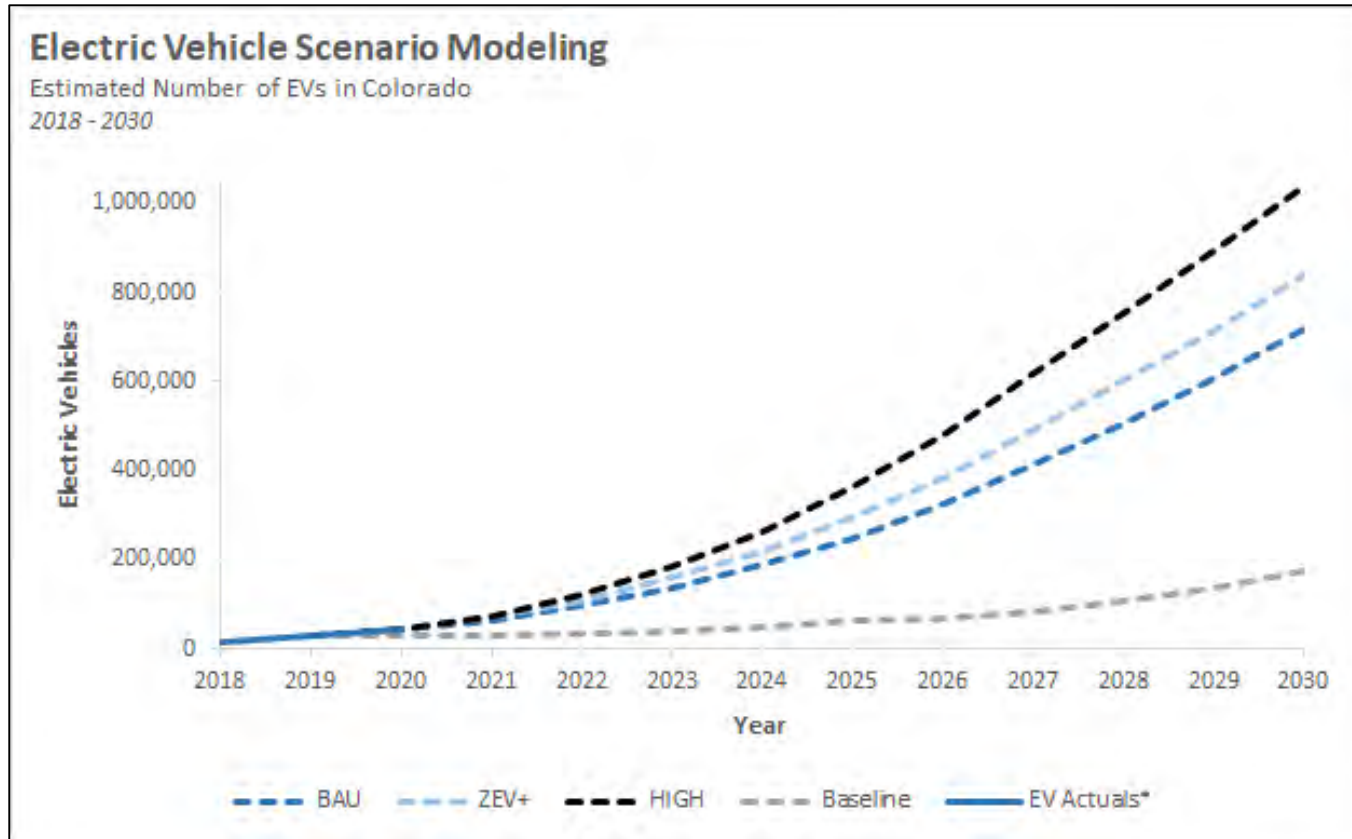


Future Planning & Research

- Colorado Clean Trucking Strategy
 - Managed by CDOT OIM
 - Work ongoing, results of technical analysis anticipated in spring 2021
- EV Charging Infrastructure Gap Analysis
 - Managed by CEO
 - Work underway with ICCT, results anticipated in spring 2021
- Statewide Transit Zero-Emission Vehicle Roadmap
 - Managed by CDOT DTR
 - Work underway with FHU, anticipated completion in summer 2021
- EV Equity Study
 - Managed by CEO
 - Consultant selection in-progress, anticipated completion in fall 2021
- Colorado Hydrogen Roadmap
 - Managed by CEO
 - Consultant selection in-progress, anticipated completion summer 2021



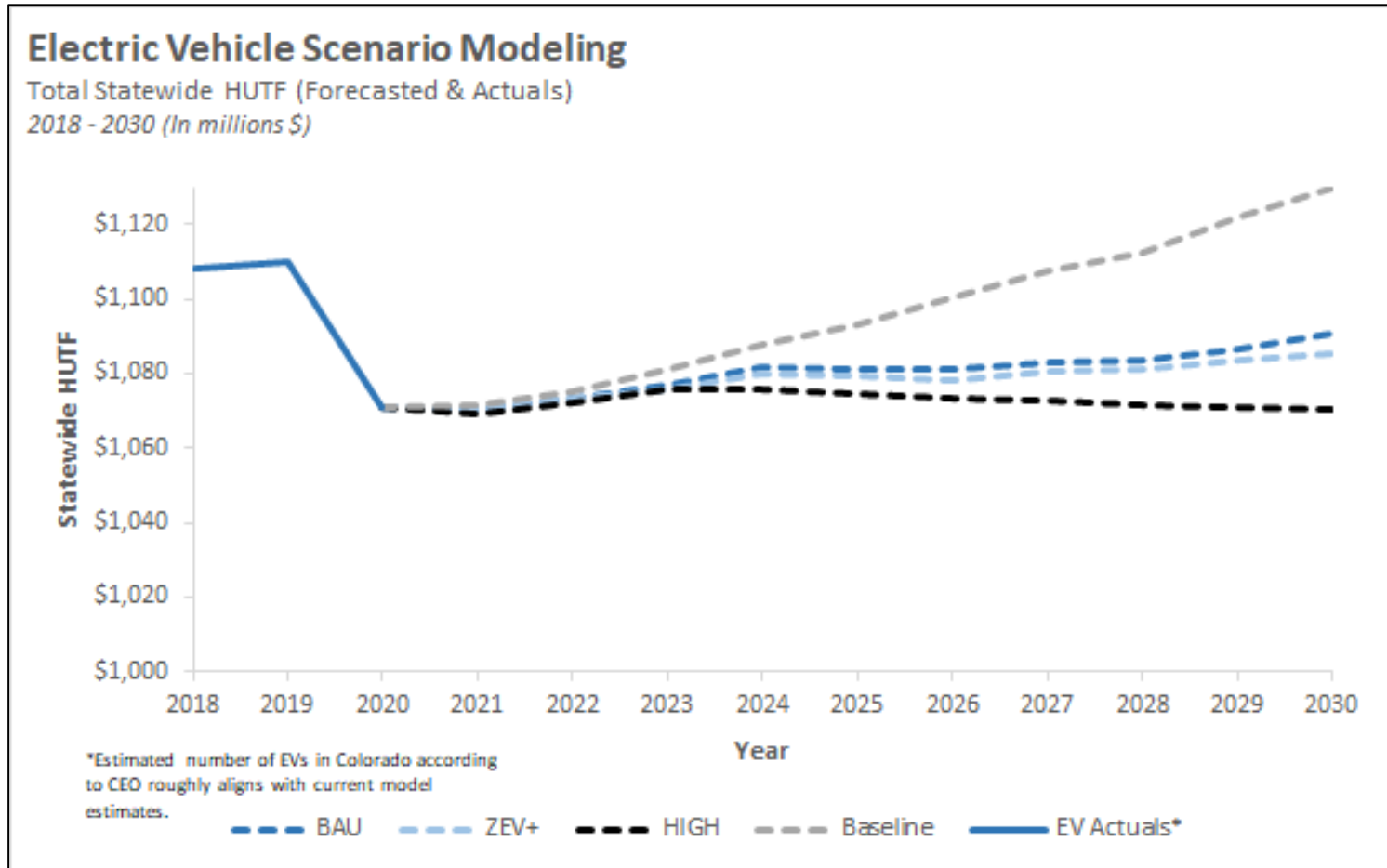
CDOT Revenue Impacts



- CDOT Accounting & Finance staff integrated EV adoption forecasts into the existing CDOT revenue model to assess high-level impacts
- Scenarios included the model's baseline plus 3 scenarios developed by Navigant for the CEO in 2019



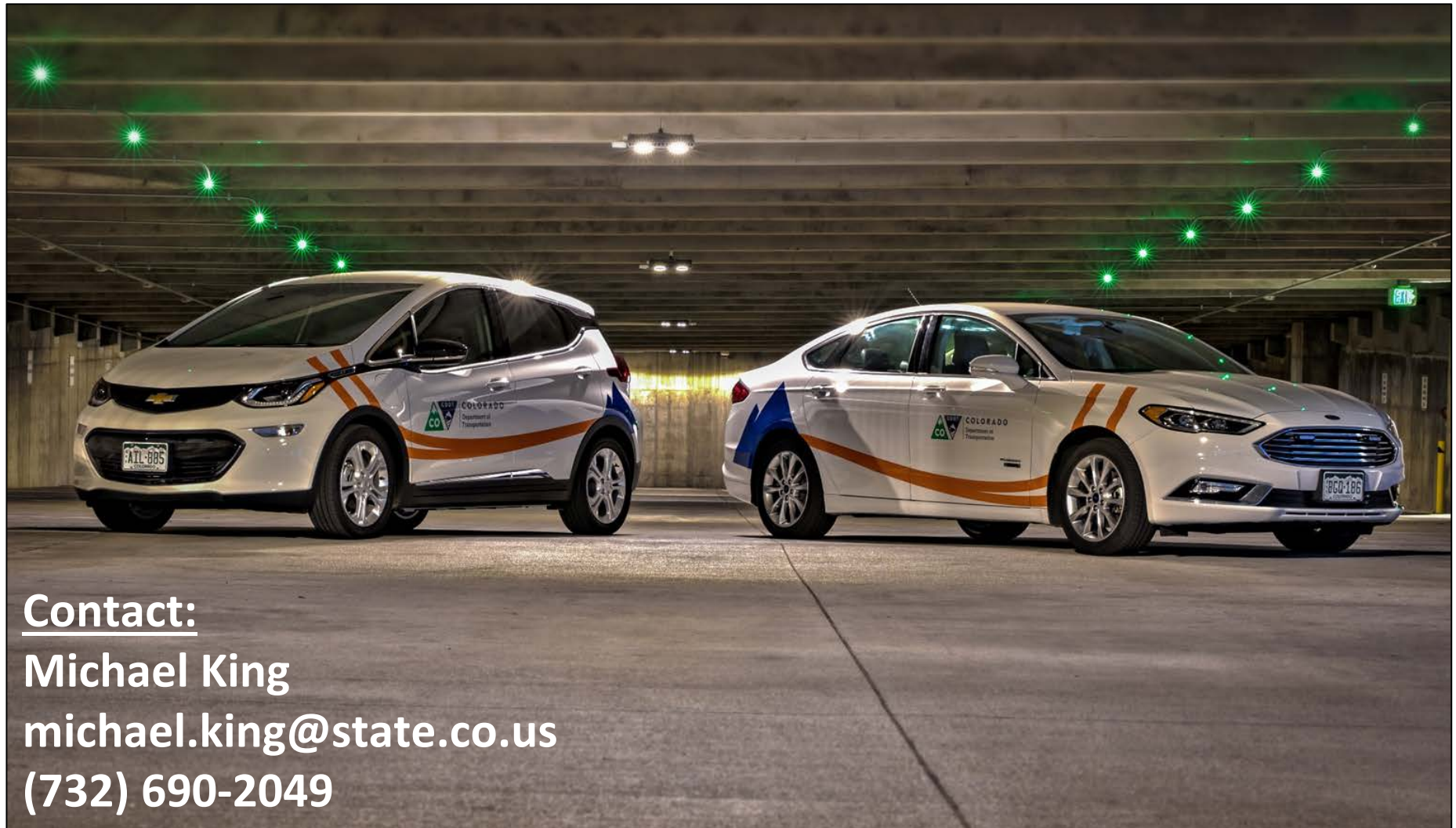
CDOT Revenue Impacts



- Results indicated that under the highest EV adoption scenario, overall HUTF decreases by approximately \$19 million in 2025 and \$59 million in 2030 (out of \$1.07 billion) compared to the baseline scenario



Questions & Contact



Contact:

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(732) 690-2049



CDOT Fleet Vehicles

- Currently CDOT's light-duty fleet includes (273 out of 906 total, approx. 30%):
 - 79 Natural Gas (CNG) vehicles (sedans and trucks)
 - 17 plug-in hybrid electric vehicles (Ford Fusions and Mitsubishi Outlanders)
 - 12 battery electric vehicles (Chevy Bolts)
 - 165 hybrid electric vehicles (sedans, SUV's and trucks)
 - 26 dual-port chargers at 11 CDOT locations



Alt Fuel Vehicles Within CDOT Fleet

