Colorado Electric Vehicle Plan 2020

APRIL 2020

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At the time of this plan's release, the world is navigating a COVID-19 global pandemic—timelines and deadlines may be impacted and modified.

Colorado Electric Vehicle Plan 2020

Executive Summary

In 2018, Colorado released its first electric vehicle (EV) plan,[1] setting forth goals, actions and strategies to develop EV fast-charging corridors across the state and establishing a target of 940,000 EVs by 2030. The state has seen significant achievements in the two years since the plan's release, including:[2]

- Award of a contract to ChargePoint for the build-out of EV fast-charging stations at 33 sites along Colorado's major transportation corridors;
- State investment to install 351 EV chargers across Colorado;
- Adoption of a zero emission vehicle (ZEV) standard in August 2019 with the support of the auto manufacturing industry;
- Dedication of all remaining state Volkswagen diesel settlement funds to ZEV charging infrastructure and zero emission buses, shuttles and trucks including first round grant awards totaling $13.9 million to six transit agencies for 23 battery electric buses and supporting infrastructure—with a second round of awards to be announced in spring 2020; and
- More than doubling the number of EVs registered in Colorado from 11,238 in August 2017 to over 24,000 in June 2019.

Despite these achievements, more needs to be done. Environmental impacts from the transportation sector—and the resulting health and economic consequences—are a major concern. Greenhouse gas emissions from vehicles will soon be the top source of emissions in Colorado and a significant portion of the state is classified as an ozone non-attainment area by the US Environmental Protection Agency. Transportation is one of the two largest sources of ozone precursors along with oil and gas production, and reducing transportation emissions is a critical strategy to meet federal health-based air quality standards.

The vision for the **Colorado Electric Vehicle Plan 2020** is: **Large-scale transition of Colorado's transportation system to zero emission vehicles, with a long-term goal of 100% of light-duty vehicles being electric and 100% of medium- and heavy-duty vehicles being zero emission.**

This will be accomplished by taking actions to meet five goals:

1. Increasing the number of light-duty EVs to 940,000 by 2030;
2. Developing plans for transitioning medium-duty (MDV), heavy-duty (HDV) and transit vehicles to ZEVs;
3. Developing an EV infrastructure goal by undertaking a gap analysis to identify the type and number of charging stations needed across the state to meet 2030 light-duty vehicle (LDV), MDV and HDV goals;
4. State government agencies meeting directives and goals related to EVs from the updated Greening State Government Executive Order; and
5. Developing a roadmap to full electrification of the light-duty vehicle fleet in Colorado.

1 Colorado Energy Office, *Colorado Electric Vehicle Plan,* January 2018: https://drive.google.com/file/d/1tY5p3xrjLLlvYO8JOc3nskL7zQ3ejGva/view

2 See Part II Background for more information on these achievements

PART I: INTRODUCTION

The Urgent Need to Reduce Emissions from the Transportation Sector with Zero Emission Vehicles

Greenhouse gas (GHG) emissions from the transportation sector are projected by the Colorado Department of Public Health and Environment (CDPHE) to be the largest source of GHGs in the state by 2020.[3] The real world environmental and financial impacts of climate change are already being felt and measured in Colorado. The Climate Center at Colorado State University reports Colorado has not seen a year with below-average temperatures since 1993,[4] and there is the potential for a 50% reduction in the water flow through the Colorado River by the end of the century (Udall and Overpeck, 2017). Applying the social cost of carbon established by Senate Bill 19-236 for utility regulation to annual GHG emissions from cars and trucks in Colorado results in an estimated annual impact of $1.5 billion in public health effects, agricultural losses, flood risk and energy system costs.

In December 2019, the US Environmental Protection Agency (EPA) reclassified the Denver Metro/North Front Range ozone area from a Moderate to a Serious non-attainment area. Children and adults with asthma and other chronic health conditions such as heart and lung diseases are particularly sensitive to ozone pollution. Research shows ozone pollution can affect worker productivity[5] resulting in lost work days. Since vehicles are the largest source of nitrogen oxides (NOx), one of the two main precursors to ozone formation, it will be imperative for the state to dramatically reduce vehicle emissions in order to reduce ozone formation and its resulting impacts.

3 Regional Air Quality Council; Colorado Department of Public Health & Environment, *Draft Colorado Greenhouse Gas Inventory 2019*

4 Colorado State University, Colorado Climate Center, *Colorado's Normals and Extremes,* https://climate.colostate.edu/normals_extremes.html

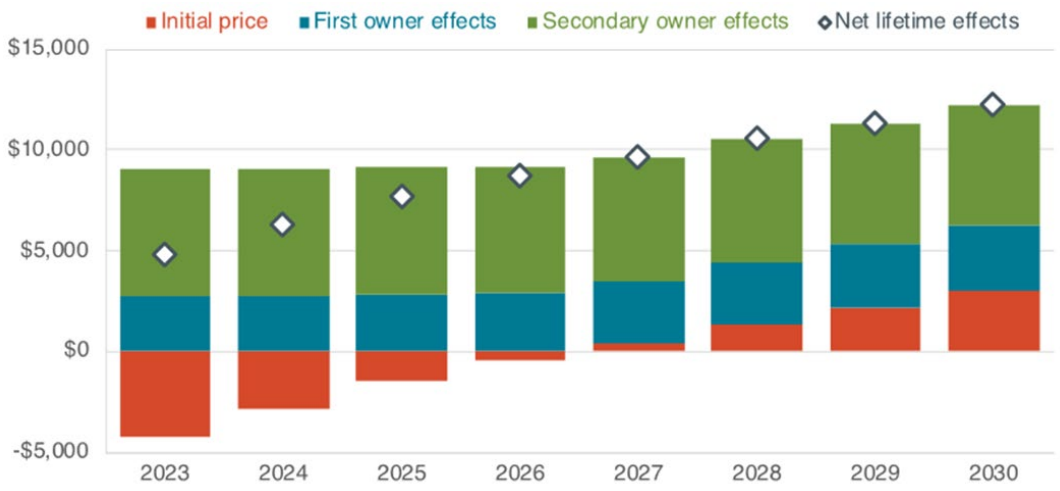
5 Neidell, M. Air pollution and worker productivity. IZA World of Labor 2017: 363 doi: 10.15185/izawol.363

The Environmental and Economic Benefits of Transportation Electrification for Coloradans

By achieving its goal of 940,000 EVs by 2030, the state could see significant environmental benefits that include emission reductions. As noted in the 2018 Colorado Electric Vehicle Plan, Colorado could experience an annual reduction of ozone forming pollutants estimated at 800 tons of NOx, 800 tons of volatile organic compounds (VOC), and up to 3 million tons of GHG.[6]

The transition to EVs will also result in significant financial benefits. A study conducted on behalf of Colorado Energy Office (CEO) in 2019[7] by MJ Bradley & Associates concluded that transportation electrification could lower utility bills for all Xcel Energy customers as a result of increased utility revenues from EV charging. Xcel Energy customers who are EV owners will see additional annual cost savings from reduced fuel and maintenance costs of approximately $260–$276. While the study only looked at Xcel Energy's service territory, similar results could be expected for other utility customers. An International Council for Clean Transportation (ICCT) study conducted on behalf of CEO in 2018 examined EV price impacts to Coloradans as a result of a ZEV rule adoption.[8] The study found that by 2030, the lifetime cost savings of an EV over an internal combustion engine will be more than $3,000.

Average New Electric Vehicle Lifetime Costs and Benefits



Average electric vehicle price and first-owner and secondary effects of increased electric vehicle penetration from 2023 through 2030.

6 Estimates calculated by the Regional Air Quality Council using GREET, 2017

7 MJB & A, *Xcel Energy Electric Vehicle Cost-Benefit Analysis, Plug-in Electric Vehicle Cost-Benefit Analysis: Xcel Energy's Service Area in Colorado,* April 2019

8 ICCT, *EV Colorado Cost Whitepaper,* 2018

PART II: BACKGROUND TO THE 2020 EV PLAN—COLORADO'S ZEV LANDSCAPE, ACHIEVEMENTS AND PROGRESS ON THE 2018 EV PLAN

Colorado is well-situated for a transportation transformation to EVs. State-level EV planning, a progression of legislation and clean vehicle regulatory standards, state and community-level EV planning, utility planning, strategic infrastructure investments, fleet transition, incentives, programming and steady EV growth are occurring simultaneously and propelling the state forward. However, much more still needs to be done. The following section describes the EV landscape in Colorado and progress toward achieving the actions, strategies and goals of the 2018 EV Plan.

The 2018 Colorado Electric Vehicle Plan

In January of 2018, Colorado released its first electric vehicle plan.[9] The 2018 Colorado Electric Vehicle Plan was the result of *Executive Order D 2017-015*, which directed CEO and partner agencies to develop a plan for building out EV fast-charging corridor stations across the state to facilitate economic development, boost tourism and reduce harmful air pollution. The first part of the 2018 EV Plan set actions and strategies needed to achieve this directive, and the second part went above and beyond by setting goals and strategies for accelerating EV adoption in the state and ensuring Colorado remains a leader in the EV market.

Given the desire for Colorado to remain responsive to the dynamic nature of the EV market, the 2018 EV Plan was presented as a living document to be updated on a regular basis. A 2019 update was postponed to 2020 in order to provide an opportunity to align with the goals of newly elected Governor Polis' administration. Actions, goals and strategies with time frames beyond 2020 that are still relevant or unfinished are included in the 2020 EV Plan.

Leadership, commitment, collaboration and public support resulted in significant progress on the actions, goals and strategies in the 2018 EV Plan.

Executive Direction and Leadership

One of Governor Polis' first executive orders, *Executive Order B 2019 002 Supporting a Transition to Zero Emission Vehicles,* includes supporting the acceleration of widespread electrification of cars, buses and trucks and adopting the 2018 EV Plan goal of 940,000 light-duty EVs in Colorado by 2030. The Executive Order (EO) directed the creation of a Transportation Electrification Workgroup to support widespread transportation electrification across the state. It also directed consideration of a ZEV rule by the state Air Quality Control Commission, which requires automakers to sell a certain percentage of ZEVs in Colorado, and directed the Colorado Department of Transportation (CDOT) to develop a clean transportation plan. As noted in the Clean Vehicle Regulatory Section, the ZEV rule, which includes early action credit, was adopted in August 2019 with support from the auto industry. This unprecedented collaboration and negotiated rulemaking will result in more EVs available in Colorado, sooner. The Transportation Electrification Workgroup conducts regular meetings and issued a summary document of its progress as called for in the EO. CDOT is in the process of developing a clean transportation plan.

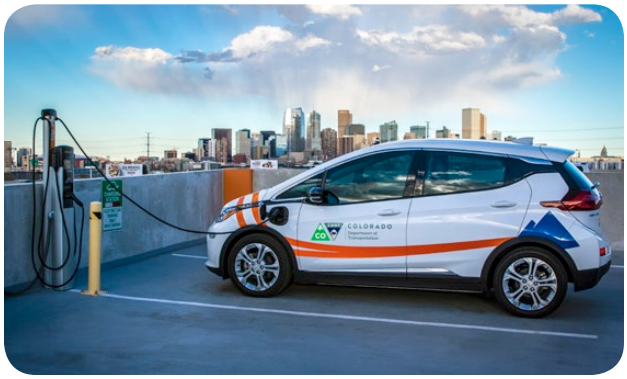
9 Colorado Energy Office, January 2018, *Colorado Electric Vehicle Plan*

Further, the EO directed CDPHE to allocate the remainder of the $68.7 million the state received from the Volkswagen settlement toward supporting transportation electrification. Colorado's Volkswagen Settlement Beneficiary Mitigation Plan (BMP)[10] describes how the state will prioritize and award its $68.7 million allocation of the national trust fund and outlines the specific project eligibility designed to maximize the impact of these dollars for sustainable transportation infrastructure. The BMP has directed these funds to five eligible mitigation actions:

- EV Charging Equipment ($10.3 million)
- Zero Emission Transit Bus Replacements ($30 million)
- Zero Emission Medium- and Heavy-Duty Vehicle Replacements including school buses ($21.5 million)
- Diesel Emissions Reduction Act (DERA) Program ($1.5 million)
- Administrative Costs ($5.4 million)

Issued in December 2019, *Executive Order D 2019 016 Amending and Replacing Executive Order D 2018 026 Concerning the Greening of State Government* sets new goals and directives related to the use of EVs in the government fleet to reflect the state's commitment to efficient and sustainable operations. Other directives for state agencies and departments include:

- Reduce GHG emissions from State of Colorado fleet vehicles by at least 15% by the end of FY 2022–2023 from a FY 2014–2015 baseline;
- Provide documentation or plans for new construction showing that at least 20% of parking spaces will be pre-wired for charging, and that at least 5% will have EV chargers installed;
- Prioritize purchase or lease of EVs for light-duty applications;



- Work with the Department of Personnel and Administration to place electric or other zero emission mid- and heavy-duty vehicles in the state fleet except in such cases where this type of vehicle cannot meet an Agency or Department's programmatic needs; and
- Ensure each EV that is added to the fleet shall be used as an opportunity to provide education and outreach to the public and State of Colorado employees.

Progression of EV Legislation

Legislation enabling the adoption of EVs in Colorado has progressed over time. Existing legislation prior to the 2018 EV plan:

- Allows for the resale of electricity for EV charging stations without the provider being regulated as a public utility (40-1-103.3 C.R.S.).
- Allows for tenants in multi-unit dwellings to install Level I or II charging stations at leased premises at their own expense (38-12-601 and 38-33.3-106.8 C.R.S.).

10 Volkswagen Diesel Emission Settlement, 2019: https://www.colorado.gov/pacific/cdphe/VW

Significant legislation passed during the 2019 session indicates strong support in Colorado for taking action on transitioning to EVs and reducing GHG emissions:

HB19-1159—Modify Innovative Motor Vehicle Income Tax Credits

Modifies income tax credits for innovative motor vehicles by extending credits out to 2025 for the purchase or lease of EVs and allows ride-sharing companies to claim the full tax credit if vehicles are provided to drivers under a short-term rental program. Colorado's tax credit is one of the highest in the country and has been in place since 2012.

HB19-1261—Climate Action Plan to Reduce Pollution

Adopts statewide goals for reducing greenhouse gas pollution 26% below 2005 levels by 2025, 50% by 2030 and 90% by 2050, and gives broad authority to the Air Quality Control Commission to adopt rules to make progress toward these goals. GHG emission reductions that result from implementation of the Colorado EV Plan 2020 will contribute to reaching the goals of this legislation.

SB19-236—Sunset Public Utilities Commission

Updates utility regulation to require the use of the full social cost of carbon (see Appendix A: Definitions) in evaluating utility plans for electric generation, energy efficiency and beneficial electrification (including transportation electrification). Requires the state's largest utility to reduce emissions 80% below 2005 levels by 2030 and requires the state's second largest utility to get PUC approval for its electric resource plan. This legislation is expected to lead to rapid decreases in the carbon intensity of electricity generation in Colorado.

SB19-077—Public Utility Implementation of an Electric Vehicle Infrastructure Program

Authorizes a public utility to provide charging stations as a regulated or unregulated service, requires public utilities to file an application for a program to support transportation electrification every three years starting in 2020, and provides guidance to the PUC on utility EV program evaluation.

SB19-239—Addressing Impacts of Changes Related to Commercial Vehicles

Requires the Colorado Department of Transportation (CDOT) to convene a group of stakeholders affected by the adoption of new and emerging transportation technologies and business models to develop policy recommendations to address resulting impacts. CDOT published a report of findings in late 2019.[11] Following the 2020 Legislative Session, CDOT may take future action to implement these recommendations.

HB19-1198—Powers and Duties of the Electric Vehicles Grant Fund

Expands eligible uses of the Electric Vehicle (EV) Grant Fund. Colorado EV drivers are assessed a registration fee of $50 per year, with $30 allocated to the Highway Users Trust Fund and $20 allocated to the EV Grant Fund, to be used to fund charging stations through the Charge Ahead Colorado program.

HB19-1298—Electric Motor Vehicle Charging Station

Authorizes an owner of a plug-in EV charging station to install a sign that identifies the station and prohibits parking in the space if a vehicle is not an EV or if the parked EV is not charging. The penalty for a violation is a $150 fine and a $32 surcharge.

11 CDOT, *Emerging Mobility Impact Study,* 2019: https://www.codot.gov/library/studies/emerging-mobility-impact-study

Clean Vehicle Regulatory Standards

In November 2018, Low Emission Vehicle (LEV) standards[12] were adopted in Colorado by the Air Quality Control Commission. These standards set emission requirements for new light-duty and medium-duty motor vehicles sold in Colorado beginning with the 2022 model year.[13] Thirteen other states besides Colorado have adopted these standards under Section 177 of the Clean Air Act (42 U.S.C.§7507).

In August 2019, Colorado became the tenth state in the US to adopt a Zero Emission Vehicle (ZEV) standard.[14] The Colorado rule was approved by an 8–1 vote by the Air Quality Control Commission and supported by automobile manufacturers representing more than 99% of the market. The standard requires automakers to sell more than 5 percent zero emission vehicles by 2023 and more than 6 percent zero emission vehicles by 2025. Automakers supported the rule because it allowed for proportional and early action credits, and also because of the state's supportive policies and investments.

Utility Planning and Investments

Colorado has two investor-owned utilities with the largest, Xcel Energy, providing 53% of the state's electricity and Black Hills Energy providing 4%.[15] The following activities direct investor-owned utility investments, planning and rate-making in regards to EV charging and adoption.

Investigation of Transportation Electrification | 17I-0692E

In November of 2017, the Colorado Public Utilities Commission (PUC) opened a proceeding to investigate topics related to the electrification of the transportation sector. As part of the proceeding, the PUC held informational meetings and workshops, and participants submitted comments, reports and other materials. In addition, the PUC formed a working group to develop a report providing recommendations on how to move transportation electrification forward in Colorado.[16]

Public Service Line Extension Policy | 18AL-0852E/18AL-0862G

As required by 40-5-101.5, C.R.S., Xcel Energy made a filing at the PUC in 2018 with a proposal to update its distribution line extension policies, including policies for new or upgraded electricity service at EV charging stations. After hearing testimony from parties, the PUC decided that EV charging stations will no longer be subject to differentiated treatment as compared to other sources of electric load under the line extension policy, which will result in more equitable upfront costs associated with installing charging infrastructure.

Public Service Electric Vehicle Charging Rate | 19AL-0290E

In May of 2019, Xcel Energy proposed a new electric rate specifically for public EV charging stations and vehicle fleets such as Denver's RTD in response to a new statutory requirement in SB19-077. Ultimately, the PUC approved a settlement agreement among parties that included a modified version of the EV rate.

12 Colorado Department of Health and the Environment, *Low Emission Vehicle Standards,* 2018: https://www.colorado.gov/pacific/cdphe/Low_Emission_Vehicle_Standard

13 Colorado Department of Health and the Environment, *Air Quality Commission Approves Low Emission Vehicles Standards,* 2018: https://www.colorado.gov/pacific/cdphe/LEV-standards

14 Colorado Department of Health and the Environment, *Zero Emission Vehicle Mandate Proposal,* 2019: https://www.colorado.gov/pacific/cdphe/zero-emission-vehicle-mandate-proposal

15 SWEEP, *Colorado Utility Energy Efficiency Programs,* Updated in December of 2018: https://www.swenergy.org/utilities/states/colorado

16 Colorado Public Utility Commission, *Colorado PUC Electric Vehicle Working Group Report,* 2019: https://evcharging.enelx.com/images/azura-pages/utilities/2019-01_CoPUC_Electric_Vehicle_Report.pdf

While the rate is available to both public charging and fleet charging customers, it is more beneficial to fleets. The settlement agreement also requires Xcel Energy to bring forward to the PUC an additional EV charging rate in 2021 that will support public fast-charging applications.

Electric Vehicle Infrastructure | 19A-0471E

In 2019, Xcel Energy filed a preliminary "make ready" application at the PUC to invest up to $9 million in partnership with public and private fleets to expand EV charging infrastructure in its service territory. Xcel Energy proposed to apply its new distribution line extension policy and to install, own and maintain new panels, conduit and wiring up to the charging station. The charging station will be the customer's responsibility. At the time of this plan writing, a settlement has been filed but not yet approved.

Transportation Electrification Program Application Requirements | 19M-0574E

In October of 2019, the PUC opened a proceeding to solicit comments and information from utilities and stakeholders regarding what should be included in the utility applications for transportation electrification programs required by 40-5-107(1)(a), C.R.S. Parties filed two rounds of comments and are awaiting further action from the PUC. Both investor-owned utilities will be required to submit first full transportation electrification plans to the PUC by May 15, 2020.

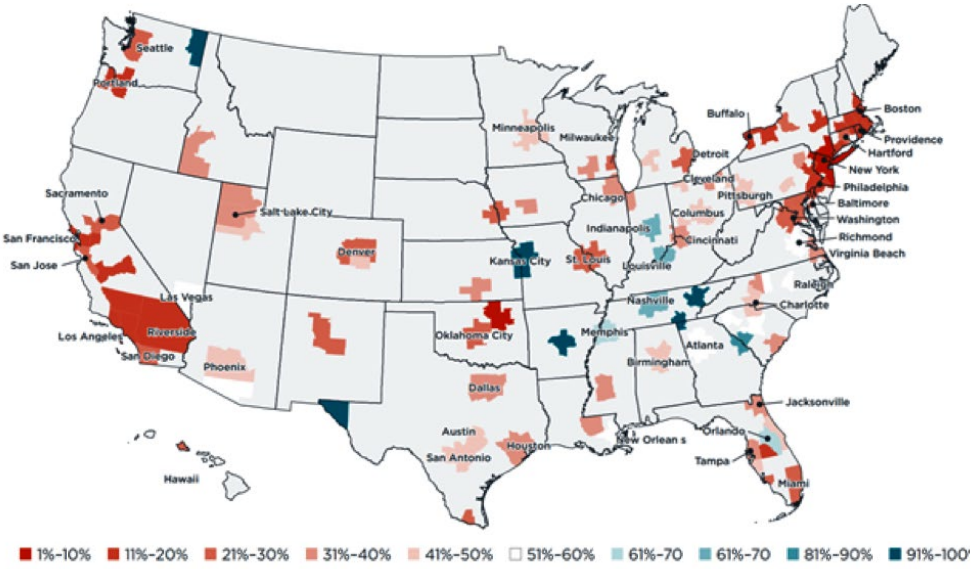
Municipal utilities provide approximately 16% of Colorado's electricity, and rural cooperatives provide 28%.[17] Utilities such as Colorado Springs Utilities, Fort Collins Utilities and Holy Cross Energy have begun to undertake EV planning and investments. Holy Cross Energy (HCE) provides free smart EV charging stations to residential customers and discounted smart EV charging stations to commercial workplace customers. To date, HCE has provided 113 EV charging stations to its customers. Data collected from these chargers will allow HCE to create programs and rates that will reduce the cost of operation for all electric transportation while providing the utility with grid flexibility and capacity to increase renewable energy penetration. Tri-State, the generation and transmission utility that provides power for most of the state's rural cooperatives, recently announced that it will provide funding for charging stations for each of its member cooperatives. CEO will be conducting a survey of municipal and rural electric cooperatives in 2020 to assess activities to date for the purpose of sharing best practices and promoting further progress.

17 SWEEP, *Colorado Utility Energy Efficiency Programs,* Updated in December of 2018: https://www.swenergy.org/utilities/states/colorado

EV Community Charging Plans, Investments and Incentives

A recent study by the International Council for Clean Transportation[18] projected EV growth across the US and charging gaps needed to support the anticipated growth. According to this study, the Denver metropolitan area is forecast to have only a fraction of what will be needed.

Charging Infrastructure in 2017 as a Percentage of that Needed by 2025 by Metropolitan Area



The Charge Ahead Colorado[19] program is a joint effort of CEO and the Regional Air Quality Council (RAQC) established in 2013. Through a combination of funding from the Colorado EV Grant Fund, federal Congestion Mitigation and Air Quality (CMAQ) program and VW settlement, Charge Ahead Colorado awards grants to support the purchase and installation of EV charging equipment at public buildings, workplaces, retail locations and other sites statewide. Since its inception, the program has awarded approximately $6 million in grants for almost 1,000 EV charging stations. Since the 2018 EV plan, Charge Ahead Colorado has given priority to workplace and multi-family housing unit locations.

EV Corridor Planning

The Regional Electric Vehicle Plan for the West Memorandum of Understanding or, REV West MOU,[20] was signed by the Governors of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming with the goal of aligning each state's EV plans, policies and investments to allow for seamless travel across the Intermountain West region. Since the group's inception it has completed a Baseline Report[21] on existing policies and infrastructure, developed Voluntary Minimum Standards for EV stations funded with state dollars, and coordinated corridor build-out efforts to connect the member states to one another and neighboring regions. In December of 2019, the REV West states recommitted to an update of the original 2017 Memorandum of Understanding.[22]

18 ICCT, *Quantifying the Electric Vehicle Charging Infrastructure Gap Across the US,* January 2019: https://theicct.org/sites/default/files/publications/US_charging_Gap_20190124.pdf

19 Colorado Energy Office and Regional Air Quality Council, *Charge Ahead Colorado,* 2019: https://energyoffice.colorado.gov/charge-ahead-colorado

20 REV West, 2017: https://www.naseo.org/issues/transportation/rev-west

21 NASEO, *REV West Electric Vehicle Policy Baseline for the Intermountain States,* October 2018: https://www.naseo.org/data/sites/1/documents/publications/REVWest_Baseline_Final_Combined.pdf

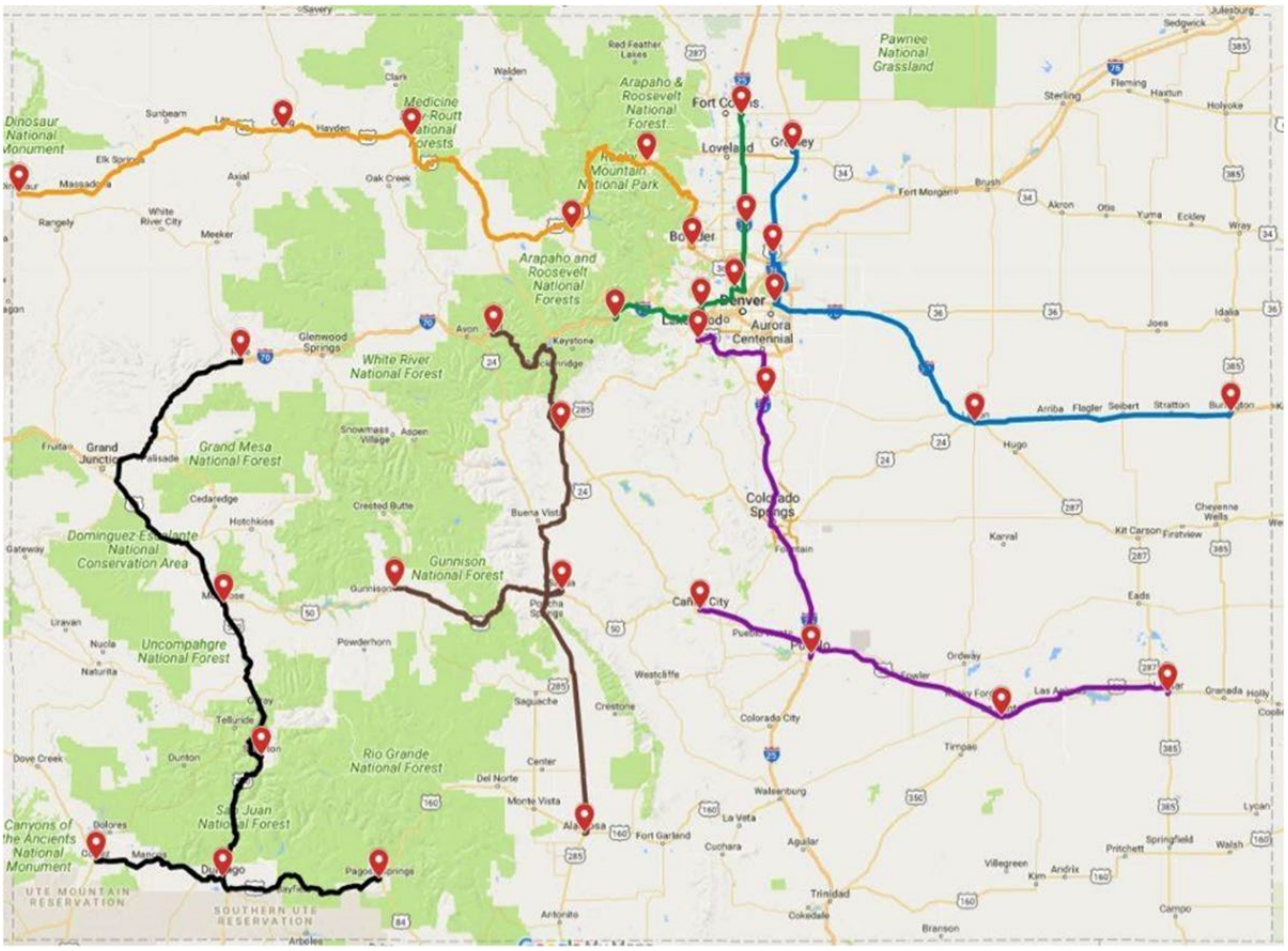
22 *Memorandum of Understanding between Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming Regional Electric Vehicle Plan for the West,* December, 2019

Under the Fixing America's Surface Transportation (FAST) Act, the Federal Highway Administration (FHWA) solicited nominations from US states for national alternative fuel corridor designations starting in 2016 and followed each subsequent year by a call for updates. In 2016, CDOT worked with its state and local partners to develop a packet of nominations for 15 interstate and state highway corridors. FHWA awarded designations for the entirety of I-25, I-70 and I-76. There is currently no funding associated with these designations.

EV Corridor Fast-Charging Investments and Incentives

In November 2018, CEO awarded a $10.33 million grant to ChargePoint for Direct Current (DC) fast charging corridors[23] to build EV stations across the state. The fast-charging stations will be located in communities at 33 sites across six corridors comprised of Interstate, State and US Highways. ChargePoint is currently negotiating site host agreements, submitting utility applications and conducting design and engineering for each site. CEO anticipates the chargers to come online by mid-2020.

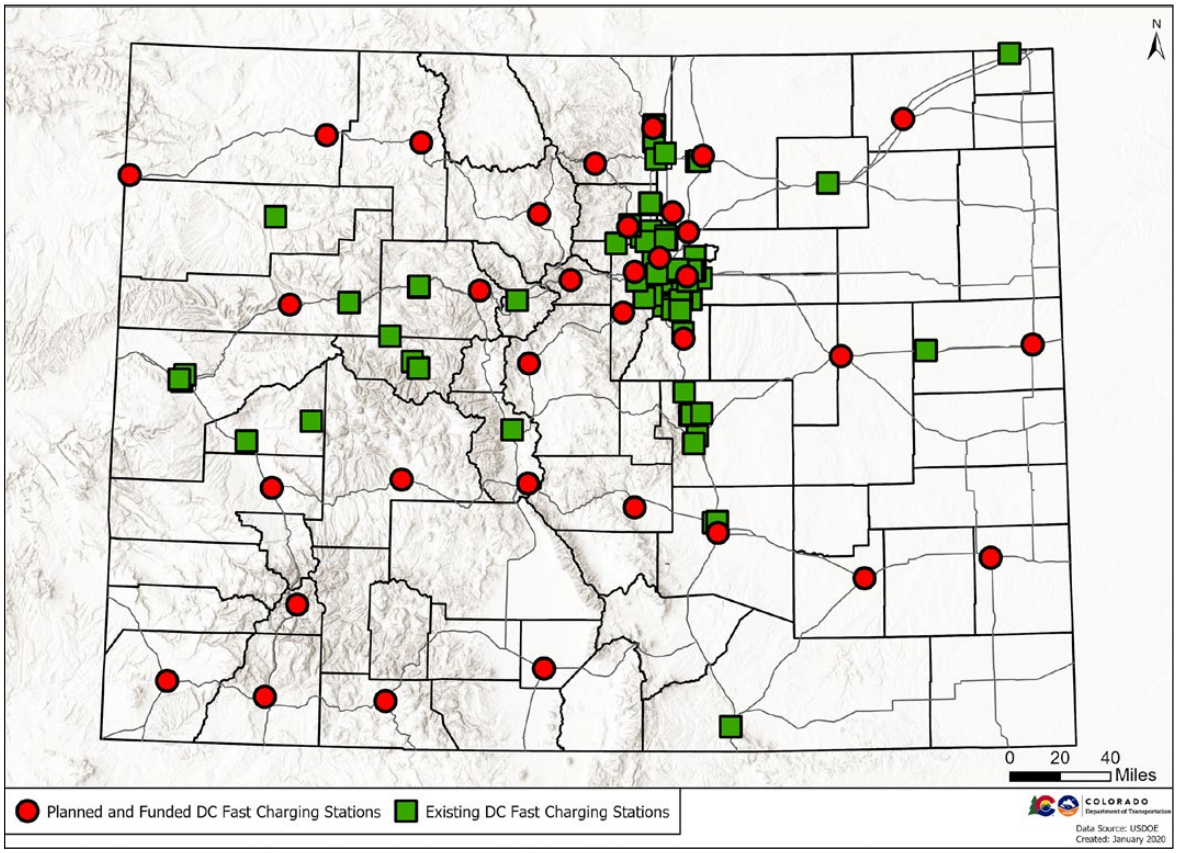
EV Fast-Charging Corridors Site Locations



23 Colorado Energy Office, *Electric Vehicle Fast-Charging Corridors,* 2019: https://energyoffice.colorado.gov/electric-vehicle-fast-charging-corridors

As noted earlier, CEO and RAQC have funded fast chargers through the Charge Ahead Colorado program. In addition, there have been private investments such as those from Electrify America, a subsidiary of Volkswagen, which is administering zero emission vehicle infrastructure investments as required through the Volkswagen Diesel Emission Settlement.[24]

Colorado EV Fast-Charging Network 2020



Vehicle Investments and Incentives

CDOT's Division of Transit & Rail (DTR) manages the CDOT DTR Consolidated Call for Capital Projects that now includes $30 million in Volkswagen settlement dollars available for the purchase of electric (and some other alternative fuel) transit buses. In the spring of 2019, CDOT awarded a total of $13.9 million to six transit agencies for the purchase of 23 battery–electric buses with 20 EV chargers (4 other alternative fuel buses were also awarded). In fall 2019, CDOT received new applications for another 11 battery–electric buses from four transit agencies. CDOT anticipates the remaining funds will be spent within the next two application cycles in 2020 and 2021.

In 2014, RAQC launched the Alt Fuels Colorado program which provides grants to offset the incremental cost difference between traditionally fueled and zero emission mid- and heavy-duty vehicles.[25] The program includes $21.5 million from Volkswagen settlement dollars. The RAQC recently closed its first application round with VW settlement funds since the BMP was modified. Five electric schools buses, four electric tractors (Class 8) and three electric pushback tractors were awarded for a total of $3.7 million.

24 US Environmental Protection Agency, *Volkswagen Clean Air Act Civil Settlement,* October 2019: https://www.epa.gov/enforcement/volkswagen-clean-air-act-civil-settlement

25 Regional Air Quality Council, *ALT Fuels Colorado,* 2019: https://raqc.org/our_programs/alt-fuels-colorado/

Colorado has one of the highest tax credits incentives for EVs in the country.[26] In 2020, this incentive for purchase will range from $4,000 for a light-duty vehicle to $16,000 for a heavy-duty vehicle. These fully refundable credits reduce over time and expire at the end of 2026.

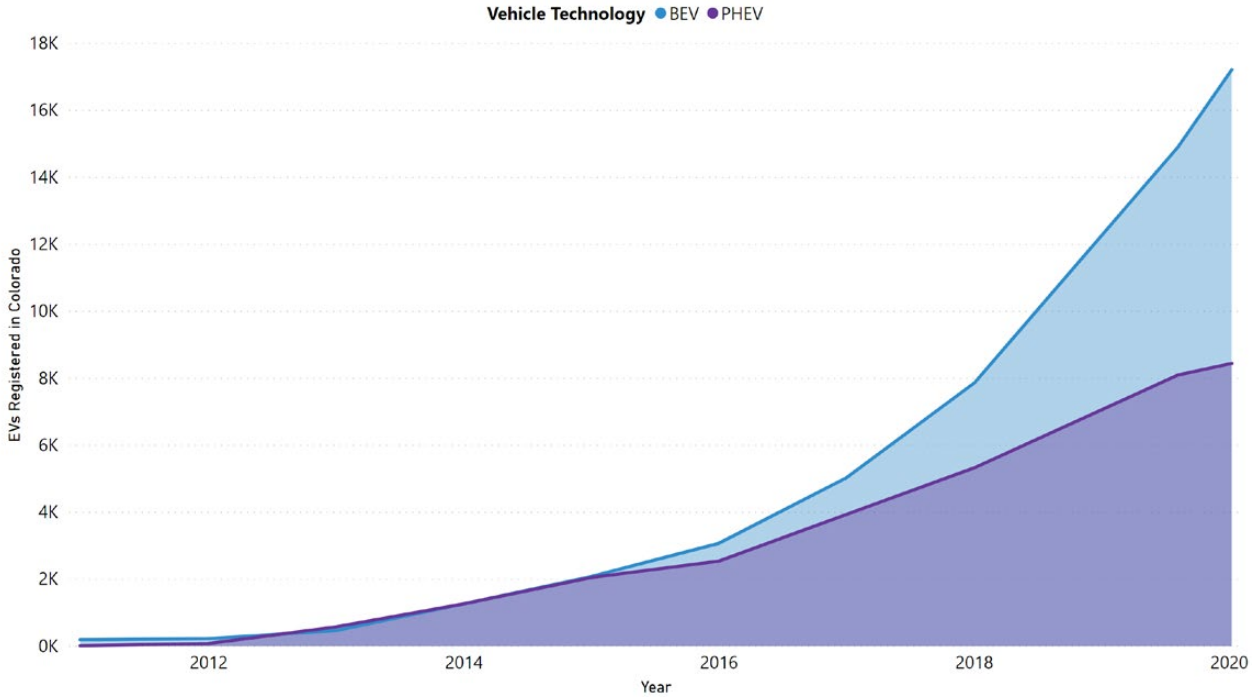
Transit Fleet Electrification

A wide variety of Colorado transit agencies are making progress in bus electrification in addition to CDOT grants. The Regional Transportation District (RTD) has operated 36 electric buses on Denver's 16th Street Mall for several years and has been awarded two new vehicles through the federal Low or No Emission Vehicle 5339(c) grant program, which funds state and transit agencies to purchase or lease low or no emission transit buses. Other recipients of 5339(c) awards include the City of Boulder, Town of Vail, Summit County, Town of Breckenridge, Town of Estes Park and Eagle County. Recently, the Roaring Fork Transportation Authority (RFTA) began a pilot deployment of eight battery electric buses in Aspen with plans to expand its electric fleet in future years. Other agencies from Fort Collins to Colorado Springs are also pursuing transit electrification through a mix of funding sources in a variety of operating environments while working together to develop best practices and learn from each other's challenges and successes.

Light-Duty Vehicle Electrification

As of December 2019, Colorado had over 25,000 registered plug-in EVs and was fifth in the country for market share of battery electric vehicles (BEV).[27] Since the release of the 2018 EV Plan (citing August 2017 sales numbers), the number of EVs registered in Colorado has more than doubled.

Annual Colorado ZEV Registrations (through December 2019)



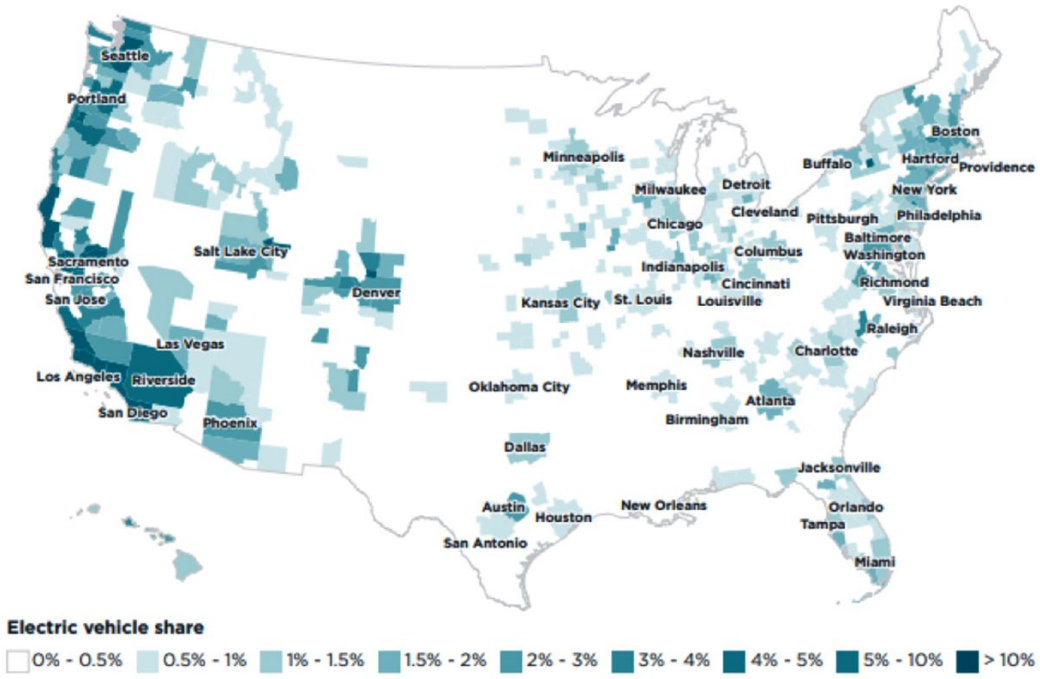
Source: Atlas Public Policy based upon CO Department of Revenue, Division of Motor Vehicles registration data

26 Innovative Motor Vehicle and Truck Credits for Electric and Plug-in Hybrid Electric Vehicles: https://www.colorado.gov/pacific/sites/default/files/Income69.pdf

27 Advanced Technology Vehicle Sales Dashboard. Alliance of Automotive Manufacturers, December 2019: https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/

Colorado shows strong EV growth in relation to the rest of the US overall, particularly along the I-25 and I-70 corridors as illustrated in a recent ICCT study.[28]

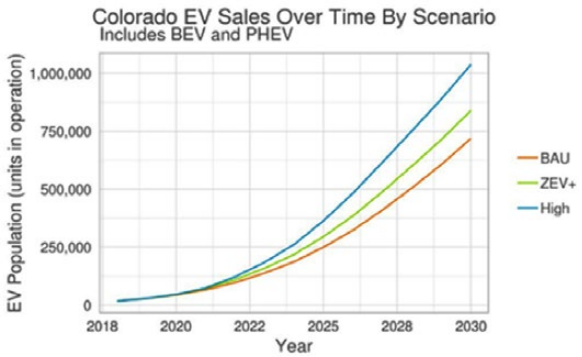
Electric Vehicle Share of New 2018 Vehicle Registrations by Metropolitan Area



Note: new vehicle registration data are from IHS Markit

Colorado will need rapid growth of the ZEV market to continue if the state is to meet the goal of 940,000 ZEVs by 2030. Analysis conducted on behalf of CEO in 2019[29] found that the recently adopted ZEV standard helps make this possible. This analysis, conducted by Navigant Consulting, modeled ZEV sales in Colorado under three scenarios: a Business as Usual (BAU) scenario, a ZEV+ Middle scenario that added in greater model availability and increased marketing, and a High scenario that added in additional infrastructure investment and added incentives. While achievable, this analysis shows that additional policy support and investments will be required to meet the goal. The 2020 EV plan recognizes this requirement by adding a policy and planning section.

Increasing policy support leads to the PEV population for 2030 increasing from ~719,000 vehicles (BAU) to ~1,038,000 vehicles (High) in operation.



PEV Population – Units in Operation

Percentage of Total Population

Scenario	2020	2025	2030
BAU	43,346	249,683	718,787
	0.8%	*4.1%*	*10.2%*
ZEV+	45,701	295,223	838,997
	0.8%	*4.8%*	*11.9%*
High	45,701	363,692	1,037,586
	0.8%	*5.9%*	*14.8%*

Source: Navigant, *CEO EV Growth Analysis,* June 2019.

28 ICCT, *The Surge of Electric Vehicles in United States Cities, Briefing,* June 2019: https://theicct.org/publications/surge-EVs-US-cities-2019

29 Colorado Energy Office, 2019, *Electric Vehicle Growth Analysis Results*

State Government Leads by Example

CEO worked closely with the Department of Personnel and Administration (DPA) and the State Controller to develop a policy for workplace charging at state facilities. As part of the policy, agencies offering free workplace charging must develop a plan that requires employees to opt in and makes annual usage data (i.e. number of vehicles, number of charging sessions, kWh usage) available to CEO and the State Controller.

CEO also worked closely with DPA and state agencies to issue a request for proposal for EV charging stations and related software. Price agreements were executed with multiple vendors in December 2019 that will result in lower costs for charging infrastructure, a simplified decision-making process and consistency across state and local government.

State agencies made purchases, plans and budget commitments toward the 2018 EV Plan fleet goal as follows:

- By of the end of FY19, there were 64 EVs in the state fleet;
- In FY19, 26 EVs were purchased;
- In FY20, state agencies will purchase up to 70 EVs; and
- In FY21, state agencies will purchase up to 129 EVs

These investments will result in the state exceeding its 2018 EV Plan goal of 200 EVs in the fleet or on order by the end of 2020.

Local Planning

Local communities are also taking action. Three communities were recently awarded grants by the Department of Local Affairs (DOLA) to develop EV readiness plans through the Renewable and Clean Energy Challenge. Colorado cities and counties can make the GoEV commitment and join the City and County of Denver and Boulder County to electrify municipal fleets, create EV incentives, electrify public transportation, develop EV access and infrastructure, provide education and awareness and work with their local utility (www.goevcity.org). The following Colorado communities have, or are planning to develop, EV readiness plans:

- Denver—Opportunities for Vehicle Electrification in the Denver Metro area and Across Colorado
- Boulder—Boulder Electric Vehicle Infrastructure and Adoption Assessment
- Boulder County—Pledged to become a GoEV county—www.goevcity.org
- Fort Collins—Electric Vehicle Readiness Roadmap
- Aspen—Aspen Community Electric Vehicle Readiness Plan
- Westminster—Westminster Forward Sustainability Plan
- Pueblo County—DOLA Grant for EV Readiness Plan
- Colorado Springs—DOLA Grant for EV Readiness Plan
- Estes Park—DOLA Grant for EV Infrastructure Plan

Stakeholder Engagement, Public Outreach and Marketing

ReCharge Colorado[30] (formerly Refuel Colorado and managed by CEO) provides coaching services for EVs and infrastructure development for every county in Colorado. ReCharge coaches conduct EV workshops and group buys which offer and bundle group discounts to bring down the individual cost of an EV. ReCharge coaches help consumers, local governments, workplaces and multi-unit housing developments identify monetary savings, grant opportunities and other advantages related to deploying EVs and charging infrastructure. In FY19, Refuel Colorado hosted 12 EV ride-n-drive events with a total of attendance of 601. Two of the 12 Refuel Colorado EV ride-n-drive events were held in the Denver Metro area, and 10 were held in other parts of the state. Ninety-two EVs were purchased through Refuel Colorado-organized EV group buy opportunities during FY19.

State policy makers worked with Lyft during the 2019 legislative session to update legislation for EV tax credits to allow rideshare rental programs to qualify at the same level as consumers. In November of 2019, Lyft deployed 200 long-range EVs into the rental program for their drivers which they estimated will save their drivers $70–100 per week on average.

In January of 2020, CEO and its partners initiated a two-part strategy to increase consumer awareness of EVs in Colorado. CEO released a solicitation to select a firm with extensive experience and subject matter expertise in the EV market to conduct market research on real and perceived market barriers, consumer perceptions about EVs, and messaging and engagement strategies designed to drive consumer adoption. CEO is also working with other partners on developing plans for a potential multi-stakeholder EV outreach and education efforts.

CEO chairs the Colorado Electric Vehicle Coalition (CEVC), a stakeholder group consisting of communities, utilities, industry, auto manufacturers and dealers, trade groups, government, nonprofits, academia, research and other community and industry advocates. This umbrella coalition meets every two months and has six subgroups: Policy, Beneficial Electrification, EV Equity, Transit, Marketing and Outreach, and Retail Charging. The CEVC and subgroups provided input for both the 2018 and 2020 EV plans. This coalition facilitates the sharing of information and networking among stakeholders and also has contributed to the development of state policy, studies and standards.

30 Colorado Energy Office, Recharge Colorado: https://energyoffice.colorado.gov/recharge-colorado

PART III: COLORADO EV PLAN 2020

The Colorado EV Plan 2020 was developed through a collaboration of state partners including CEO, RAQC, CDPHE and CDOT with input from stakeholders through the CEVC. CEO, CDOT, CDPHE and RAQC, with the support of the CEVC, will review and update the Colorado EV Plan every two years, or as needed, in response to changing market dynamics and planning requirements.

COLORADO EV PLAN 2020 VISION

Large-scale transition of Colorado's transportation system to zero emission vehicles, with a long term goal of 100% of light-duty vehicles being electric and 100% of medium- and heavy-duty vehicles being zero emissions (including electric, hydrogen and other zero emissions technologies).

EV GOALS AND OBJECTIVES 2020

GOAL #1: Increase adoption of EVs in the light-duty sector[31] to approximately 940,000 vehicles by 2030.

- This will require maintaining 50% plus annual growth rates. For the near term, interim targets are to increase the number of new light-duty electric vehicles sold on an annual basis from 4,156 in 2017 to:
  - 10,500 by June 30, 2020
  - 23,500 by June 30, 2022

GOAL #2: Develop plans for transition to ZEV for medium-duty, heavy-duty and transit vehicles.

- Medium- and heavy-duty vehicles:[32]
  - CEO, CDOT and RAQC will work with industry, electric utilities and other stakeholders to establish timelines, identify strategies and dedicate sufficient resources to develop a plan for the medium- and heavy-duty sector by July 2021.
- Transit vehicles:[33]
  - CDOT, RAQC and CEO will work with transit agencies, electric utilities and other stakeholders by July 2021 to establish timelines, identify strategies and dedicate sufficient resources for the conversion of the state transit fleet to 100 percent zero emission vehicles no later than 2050, with an interim target of at least 1,000 ZEV transit vehicles by 2030.

GOAL #3: CEO, working with state partners, will develop an EV infrastructure goal by undertaking a gap analysis to identify the type and number of charging stations needed across the state to meet the 2030 LDV, MDV and HDV goals by 2022.

GOAL #4: State government agencies will meet their directives from the *Executive Order D 2019 016 Amending and Replacing Executive Order D 2018 026 Concerning the Greening of State Government* related to EVs and:

- The state will increase the number of state agencies that offer workplace charging from five in January 2020 to 10 by the end of FY 2022.
- State agencies will prioritize purchase of ZEVs for light-duty applications, increasing the number of ZEVs in operation or on order from at least 200 by end of 2020 to 375 by January 2022, with a goal of electrifying all vehicles that have appropriate use cases by 2030.

31 See Definition of light-duty vehicle in Appendix A

32 See Definition of medium- and heavy-duty vehicle in Appendix A

33 See Definition of transit vehicle in Appendix A

GOAL #5: Develop a roadmap to full electrification of the light-duty vehicle fleet.

- As part of the development of the GHG Pollution Reduction Roadmap, the state will evaluate the necessary timeline for light-duty electrification to achieve the target of 90% emissions reductions by 2050.
- The state will conduct an analysis of policy, programs and strategies to achieve this transition and will develop recommendations for administrative and legislative action.
- The state will participate in the development of emissions and ZEV standards for model years 2026 and after to support the changes needed to achieve full electrification of light-duty vehicles.

EV ACTIONS IN SUPPORT OF GOALS

This section of this plan supports achievement of the 2020 EV Vision, Goals and Objectives sections through four areas that work together comprehensively:

1) **Policy, Planning and Guidance**—how the state and its partners will set the stage by developing and supporting policy, guidance and planning to electrify the transportation sector
2) **Programming and Funding**—steps the state will take to tackle adoption barriers providing funding and programming to address market gaps
3) **Supporting Emerging EV Technology and Innovation**—how the state will connect its activities with those of Colorado research collaboratives to support transportation electrification innovation, foster emerging EV technology development and identify data gaps
4) **Engaging People**—approaches to communicating and educating the people of Colorado on the benefits of transportation electrification and how they can access these benefits

Actions, goals and strategies from the 2018 EV Plan that had time frames beyond 2020 and are still relevant and/or unfinished are carried forward into the 2020 EV Plan. Unless otherwise noted, all actions/strategies are to be completed by January 2022. This date may be impacted and modified due to the 2020 COVID-19 pandemic.

Policy, Planning and Guidance Actions

As referenced earlier, analysis conducted on behalf of CEO shows that strong policies, planning and guidance are critical to increasing the number of EVs in the state. This section describes actions in support of EV policies and planning for transportation electrification, state government leading by example, building codes and utility support.

Electrification of the Transportation Sector

CEO, CDOT, CDPHE and RAQC will support the vision of the large-scale transition to EVs in Colorado with a long term goal of 100% of zero emission light-duty vehicles. The state, for the first time, will investigate and develop strategies for the medium- and heavy-duty sector including transit vehicles. This section also includes actions in support of policies that would make the choice of purchasing EVs and e-bikes more appealing to consumers.

Light-Duty Sector

- **ACTION 1**: CEO, CDOT, CDPHE and RAQC will develop a roadmap for a transition to 100% electrification of the light-duty transportation sector. The analysis shall consider short, mid- and long-term strategies including public investment, administrative activity, regulatory activity and potential legislation, as well as the opportunity to inform and participate in development of future Low Emission Vehicle (LEV) standards, Zero Emission Vehicle (ZEV) standards, and light-duty vehicle GHG emissions standards.
- **ACTION 2**: CDOT, with the support of CEO, will take action on the outcomes of the SB19-239 Emerging Mobility Impact Study[34] depending on direction from the Colorado legislature. This includes working with transportation network companies, e-commerce and other emerging mobility providers to promote electrification of their fleets. The intent is to accelerate the electrification of these high mileage fleets compared to the overall light-duty fleet.

Medium/Heavy-Duty Sector

- **ACTION 1**: CEO, CDOT, CDPHE and RAQC will develop an electrification strategy for the medium- and heavy-duty sector by July 2021 including investigating the adoption of a Clean Truck Rule that is analogous to the ZEV rule for light-duty vehicles and engaging industry to develop future strategies and goals for medium and heavy-duty vehicle adoption beyond VW settlement funding.

- **ACTION 2:** RAQC with the support of CDPHE, CDOT and CEO, and in collaboration with other interested agencies and stakeholders, will develop strategies to support adoption of zero emission school buses, which both reduce greenhouse gas emissions and offer significant public health benefits by reducing exposure of children to pollutants.

Transit Sector

- **ACTION 1:** CEO, CDOT and CDPHE will work with stakeholders to investigate adoption of a Clean Transit Rule that requires a long-term transition to zero emission buses.
- **ACTION 2:** CEO, CDOT, CDPHE and the CEVC will explore equity and rural-focused transit options and provide a recommendation for action in the next iteration of the EV Plan.
- **ACTION 3:** CDOT will develop a state-approved master purchasing contract for zero emission vans, cutaways and large buses to streamline transit agency procurement of EVs.
- **ACTION 4:** CDOT will continue and expand transit electrification planning in order to attain 2020 ZEV Plan Transit Goals.
- **ACTION 5:** CEO and CDOT will examine strategies for third-party financing on the incremental capital costs of electric buses through mechanisms including battery leases, utility on bill financing and other mechanisms.

34 Colorado Department of Transportation, 2019 Emerging Mobility Study, 2019: https://www.codot.gov/library/studies/emerging-mobility-impact-study

E-bike Sector

- **ACTION 1:** CDOT will incorporate e-bike considerations as part of its mobility planning.
- **ACTION 2:** CEO will support policies providing e-bike incentives for low income individuals.

Supporting Consumer Choice

- **ACTION 1:** CEO, working with state partners, will develop an EV infrastructure goal by undertaking a gap analysis to identify the types, locations and number of charging stations needed across the state to meet the 2030 LDV, MDV and HDV goals.
- **ACTION 2:** State agencies will support HOV/express lane incentives that encourage adoption of zero emission vehicles.
- **ACTION 3:** The administration will support direct EV sales legislation to allow manufacturers to sell EVs without requiring sales through dealerships in order to allow more EV models access to the state and reduce barriers to EV sales. SB20-167 Electric Motor Vehicle Manufacturer And Dealer passed and was signed into law during the 2020 legislative session.
- **ACTION 4:** CEO will work with legislature to remove Home Owner Association (HOA) barriers to EV charging.

Near-term State Government Lead by Example Planning

The state will support the vision and goals in the EV Plan by taking the following actions to lead by example.

- **ACTION 1:** On an annual basis, DPA and CEO will work with state agencies to identify the charging infrastructure needed for the state's growing fleet of EVs.
- **ACTION 2:** DPA, working with CEO and other agencies, will explore alternative vehicle procurement strategies that improve the state's ability to purchase ZEVs and allow the state to take advantage of tax credits and other incentives.
- **ACTION 3:** CEO and DPA will develop an Electric Vehicle Take Home Policy for state employees that includes considerations for matching electric models with staff activities, installation of home charging equipment and electricity reimbursement schedule by January 2021.

EV Building Code and Parking Guidance

CEO will support the development of building codes and regulations that encourage the installation of EV charging equipment to meet the vision and goals in the EV Plan.

- **ACTION 1:** CEO will develop an Advanced Building Code Adoption toolkit that includes EV infrastructure requirements for new construction. The toolkit will make it easier for local jurisdictions to adopt EV-ready building codes, building on the new EV charging language in the 2021 International Energy Conservation Code (IECC).

- **ACTION 2:** CEO will work with CEVC Policy Subgroup to develop and provide guidance on HB19-1298 Charging Station Parking Enforcement including signage recommendations and best practices by July 2020.

Near-term Electric Utility Engagement

CEO and RAQC support utilities through means available to them such as intervention, workgroup participation and solicited input in their processes to encourage planning and development of EV adoption and infrastructure development.

- **ACTION 1:** CEO will work through CEVC Beneficial Electrification Subgroup on a survey to gather data on utility rates with municipal utilities and rural co-ops to develop new rates that encourage EV charging and adoption by individuals, fleets and transit agencies in spring 2020.
- **ACTION 2:** CEO will convene an EV rates workshop with investor-owned, municipal and rural electric cooperative utilities to discuss and develop best practices by January 2021.
- **ACTION 3:** CEO will work with regulated utilities and market stakeholders to ensure that transportation electrification plans (TEPs) meet the requirements of SB 19-077 while also including strategies that make it attractive to own and operate an EV and make investments in charging infrastructure.
- **ACTION 4:** CEO will encourage unregulated utilities to submit TEPs as part of optional Clean Energy Plans submitted to the PUC and will work with unregulated utilities to encourage investment in transportation electrification.

Near-term Programming and Funding Actions

Colorado state agencies utilize funding sources including the Volkswagen settlement, Colorado EV Funds, federal Congestion Mitigation and Air Quality (CMAQ) program and other state and federal transportation funds to provide funding in the form of both direct public investment and grants which incentivize and promote the electrification of the transportation sector. This funding addresses and helps eliminate the barriers associated with the higher upfront cost of EVs until they reach parity with more mature transportation technologies and infrastructure gaps that are perceived by Colorado consumers as a barrier to purchasing EVs.

Community-Based EV Charging

Studies show that access to charging is key to the growth of electric vehicles. The ICCT study referenced earlier in this plan found in 2017 that across major US markets, about one-fourth of the workplace and public chargers needed by 2025 are in place.[35] The state will undertake the following actions to increase community-based EV charging in Colorado to meet the needs of increased adoption of EVs:

- **ACTION 1:** Through the Charge Ahead Colorado Program, RAQC and CEO will support multi-family and workplace charging by prioritizing grants in or near workplaces and multi-family housing (MFH) in which the facility owner and a high percentage of tenants demonstrate interest in EVs so that at least 15% per year of all awardees are workplaces and MFH.
- **ACTION 2:** CEO, RAQC and CDOT will work to identify new public and private funding sources for the Charge Ahead Colorado program once Volkswagen settlement funds are expended.

35 ICCT, *Quantifying the Electric Vehicle Charging Infrastructure Gap Across the US,* January 2019: https://theicct.org/sites/default/files/publications/US_charging_Gap_20190124.pdf

- **ACTION 3:** CEO, working with CDOT and RAQC, will launch a community-based DC Fast-Charging Plaza grant program that provides funding for buildout of high speed charging stations for use by the public including EV drivers without access to home charging as well as high-mileage fleets including ride-hailing companies in spring 2020.

Corridor-Based ZEV Charging

An EV market study conducted on behalf of the CEO in 2015[36] found in a survey of Colorado drivers that over half indicated a lack of charging, and in particular DC fast charging, was a significant factor in decision not to buy an EV. CEO and CDOT will undertake the following actions to increase DC fast-charging stations locations in Colorado so that more consumers will feel confident in the purchase of an EV.

- **ACTION 1:** CEO will continue to administer the DC Fast-Charging Corridors program with stations anticipated to open mid-2020, while continuing to work with state and local partners to address gaps along Colorado's highway network.
- **ACTION 2:** CEO will monitor usage at installed charging stations and, if necessary, add chargers at high-volume locations to ensure that the corridors program remains responsive to customer needs. CEO will pay special attention to rural charging locations to ensure that there are no gaps in driver access to charging.
- **ACTION 3:** CEO and CDOT will continue to participate in the REV West MOU to support alignment of ZEV policies and investments and encourage a seamless traveler experience across the eight Intermountain West states of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming.
- **ACTION 4:** CEO will work the Colorado Tourism Office on the electrification of tourist routes with a focus on scenic byways, state parks and other destinations including ski areas, and national parks and monuments.

Medium- & Heavy-Duty Electric Vehicles

CDOT and RAQC will undertake the following actions to support the goal of Colorado transit agencies purchasing 1,000 ZEV transit vehicles by 2030.

- **ACTION 1:** CDOT's Division of Transit and Rail will continue to utilize remaining VW settlement funds to support the purchase of zero emission transit vehicles.
- **ACTION 2:** CDOT will incorporate EV Plan transit goals into program planning by January 2021.
- **ACTION 3:** RAQC will fund medium- and heavy-duty ZEVs for 20–25 fleets statewide through the ALT Fuels Colorado Program.

36 Colorado Energy Office, 2015. Electric Vehicle Implementation Study: https://www.colorado.gov/pacific/sites/default/files/atoms/files/EV%20Market%20Study%202015_0.pdf

Supporting Emerging EV Technology/Innovation Actions

Transportation electrification involves an emerging set of technologies that are moving along a research and development pipeline toward mass adoption. The state recognizes that in order to achieve the vision and goals in this plan, it must signal to the market that Colorado is open to innovation, research and commerce in support of this transformation.

Research in Support of EVs and Associated Technologies and Systems

CEO and state agencies will exchange information with Colorado research entities and engage on opportunities for research to support and advance efforts by the state to deploy adequate EV charging technologies and advance the Colorado EV marketplace.

- **ACTION 1:** CEO and Colorado State University (CSU) will engage with the Colorado Energy Research Collaboratory (Collaboratory) and their network of industry, government and university stakeholders to identify and share information on existing EV-related R&D projects in Colorado to relevant stakeholders including the CEVC and state and local agencies. This communication will be conducted in a way that will inform current research, potential end-users and business development, and also foster future collaborations and innovation.
- **ACTION 2:** CSU and the Collaboratory will seek to identify state or external funding mechanisms and industry partnerships in support of a research project in Colorado supporting the development of EV related technology such as battery second use cases, Colorado utility business models, IT systems associated with intelligent transportation systems and zero emission vehicles, and smart and heavy-duty vehicle charging.
- **ACTION 3:** CEO will engage with the University of Colorado and other research universities on graduate student-led Capstone projects studying new charging technologies, onsite renewable electricity generation and battery storage.

Support of the Development of EV Charging Standards

Colorado's Department of Labor and Employment's (CDLE) Division of Oil and Public Safety will develop a regulatory framework to ensure transparency and standards in the marketplace with regard to accuracy in commercial transactions for public EV charging.

- **ACTION 1:** Colorado Department of Labor and Employment (CDLE) will work with stakeholders to develop public EV charging standards to continue consumer confidence with public EV charging transactions.

Support of Hydrogen as an EV Fuel

A hydrogen fuel cell vehicle is a type of electric vehicle that stores its energy as hydrogen instead of in a battery. State partners will study and provide resources for the development of this emerging technology in advantageous ways for Colorado.

- **ACTION 1:** CEO, CDLE, CDOT and RAQC will support the development of hydrogen as a transportation fuel by working with industry and other stakeholders to develop a hydrogen roadmap for Colorado.
- **ACTION 2:** CDLE will introduce legislation to allow existing petroleum brownfield redevelopment funding to be used to provide grants to stimulate the development of fuel cell electric vehicle fueling infrastructure projects.

Development of Public EV Data Resource

Emerging businesses, research and academia, local governments, nonprofits and others will benefit from access to data on EV adoption and performance. CEO, CDOT and RAQC will support the availability of open data to support the EV Market.

- **ACTION 1:** CEO will develop and host an EV registration tracking dashboard.
- **ACTION 2:** CDOT will develop a Performance Data Warehouse consisting of a telematics database and analysis tools to monitor the deployment and performance of electric transit vehicles.

Engaging People Actions

The fourth part of the Colorado EV Plan 2020 is crucial to consumer acceptance and purchase of EVs: engaging with the people of Colorado so that they understand how they benefit from and can access and participate in this transportation transformation.

EV Equity

State agencies will work to ensure that all Coloradans have access to the benefits of transportation electrification.

- **ACTION 1:** CEO will conduct an EV Equity Study to baseline, define and map communities (including rural), EV registrations and EV accessibility (including language barriers), HDV and MDV emission impacts, and criteria by which to evaluate and prioritize programming and outreach.
- **ACTION 2:** CDOT will work to integrate recommendations from CEO's EV Equity Study into its transit electrification grant programs by January 2023.
- **ACTION 3:** CEO, CDOT, RAQC and CDPHE will ensure that MDV/HDV electrification planning for environmental justice (EJ) and equity communities, informed by CEO's study, is included in the MDV/HDV strategy.

- **ACTION 4:** CEO's interventions in PUC proceedings for transportation electrician plans will include a focus on attainment of 40-5-107(2)(g) C.R.S. which ensures the plans increase access for low-income customers.

EV Education & Outreach

State agencies will support and develop EV education and outreach efforts targeted toward consumers and conducted strategically.

- **ACTION 1:** CEO will administer a market research study starting in early 2020 to inform the development of an education and awareness campaign by January 2021.
- **ACTION 2:** CEO and CDOT will develop a dealership engagement strategy that complements the marketing campaign.
- **ACTION 3:** CEO will support the development of a public-focused website developed from marketing research study recommendations.
- **ACTION 4:** CEO, CDPHE, CDOT and RAQC will explore collaboration with non-profit organizations focused on EV outreach and education, with financial and in-kind support from government, industry, utilities and philanthropy.
- **ACTION 5:** ReCharge Colorado coaches will conduct "Know Before You Go" EV workshops, EV ride-and-drives and group buys throughout the year aimed at consumers.

EV Community Readiness

Building on EV community readiness planning at the local level already taking place and mentioned earlier in the Local Planning Section, state agencies will provide additional resources for EV readiness on the local level.

- **ACTION 1:** CEO, with the support of CDOT and DOLA, will provide grants in support of local community EV readiness planning.

Appendix A: Definitions

Battery Electric Vehicle (BEV)—a Battery Electric Vehicle, also known as a pure electric vehicle or an all electric vehicle, contains batteries which can be charged externally and store recovered braking energy. It uses an electric motor as opposed to an internal combustion engine.

Electric Vehicle (EV)—an electric vehicle uses a battery to store energy that powers the motor. Types of electric vehicles include BEV and PHEV.

Electric Vehicle Supply Equipment (EVSE)—Electric Vehicle Supply Equipment supplies electric energy to recharge electric and hybrid vehicles. These chargers come as Level 1 AC Chargers (120V), Level 2 AC Chargers (240V), or DC Fast Chargers.

Fuel Cell Electric Vehicle (FCEV)—fuel cell electric vehicles produce electricity using hydrogen gas and produce no harmful tailpipe emissions, just water vapor.

Group Buys—an EV sales event, promoted by neutral parties, which provides bundled group discounts.

Heavy Duty Vehicle (HDV)—any Class Seven and above motor vehicle having a Gross Vehicle Weight Rating (GVWR) over 26,000 pounds

Hydrogen Fuel Cell Vehicle—a ZEV that is fueled primarily by hydrogen, but may also have off-vehicle charge capability.

Light-Duty Vehicle (LDV)—any Class One or Two motor vehicle designed primarily for transportation of persons and having a design capacity of twelve persons or less with a GVWR of 8,500 pounds or less. This includes full-size pick-ups and min-vans.

Medium-Duty Vehicle (MDV)—any Class Two to Six motor vehicle having a GVWR between 8,500 and 26,000 pounds.

Micromobility—micromobility refers to the use of e-scooters, e-bikes and bikes to travel distances 5 miles or less and often to or from another mode of transportation (bus, train, car).

Plug-In Hybrid Electric Vehicle (PHEV)—Plug-In Hybrid Electric Vehicles 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.

Renewable Natural Gas (RNG)—Renewable natural gas (RNG), or biomethane, is purified biogas which is cleaner than gasoline or diesel and can be used interchangeably with natural gas. It is generated from renewable sources such as water treatment facilities, landfills or from agricultural waste. In some cases, RNG can actually be carbon-negative given the emissions that would otherwise be vented into the atmosphere.

Social Cost of Carbon (SC-CO2)—SC-CO2 is a measure, in dollars, of the long-term damage done by a ton of carbon dioxide (CO2) emissions in a given year. This dollar figure also represents the value of damages avoided for a small emission reduction (i.e., the benefit of a CO2 reduction).[37] In Colorado, SB19-236 requires the PUC to use a social carbon cost of $46 per ton beginning in 2020 when evaluating utility resource plans.

Transit Vehicles—vehicles operated by transit agencies which carry passengers or public riders. It does not include school buses, charter or intercity bus transportation or intercity passenger rail transportation.

Transportation Network Company (TNC)—on demand transportation service such as Uber and Lyft, also known as ride-hailing companies.

Zero Emission Vehicle (ZEV)—a vehicle that produces zero or near-zero exhaust emission of any criteria pollutant (or precursor pollutant) or greenhouse gas under any possible operational modes or conditions including battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and fuel cell electric vehicles (FCEVs).

37 EPA, *The Social Cost of Carbon, Estimating the Benefits of Reducing Greenhouse Gas Emissions,* January 2017, https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html

Appendix B: Vehicle Weight Classes & Categories

Gross Vehicle Weight Rating (lbs)	Federal Highway Administration		US Census Bureau
	Vehicle Class	GVWR Category	VIUS Classes
<6,000	Class 1: <6,000 lbs	Light Duty <10,000 lbs	Light Duty <10,000 lbs
10,000	Class 2: 6,001–10,000 lbs		
14,000	Class 3: 10,001–14,000 lbs	Medium Duty 10,001–26,000 lbs	Medium Duty 10,001–19,500 lbs
16,000	Class 4: 14,001–16,000 lbs		
19,500	Class 5: 16,001–19,500 lb		
26,000	Class 6: 19,501–26,000 lbs		Light Heavy Duty 19,001–26,000 lbs
33,000	Class 7: 26,001–33,000 lbs	Heavy Duty >26,001 lbs	Heavy Duty >26,001 lbs
>33,000	Class 8: >33,001 lbs		

Gross Vehicle Weight Rating (lbs)	EPA Emissions Classification			
	Heavy Duty Vehicle and Engines			Light Duty Vehicles
	H.D. Trucks	H.D. Engines	General Trucks	Passenger Vehicles
<6,000 6,000	Light Duty Truck 1 & 2 <6,000 lbs	Light Light Duty Trucks <6,000 lbs	Light Duty Trucks <8500 lbs	Light Duty Vehicle <8500 lbs
8,500	Light Duty Truck 3 & 4 6,001–8,500 lbs	Heavy Light Duty Trucks 6,001–8,5001bs		
10,000	Heavy Duty Vehicle 2b 8,501–10,000 lbs	Light Heavy Duty Engines 8,501 lbs–19,500 lbs	Heavy Duty Vehicle Heavy Duty Engine >8,500 lbs	Medium Duty Passenger Vehicle 8,501–10,000 lbs
14,000	Heavy Duty Vehicle 3 10,001–14,000 lbs			
16,000	Heavy Duty Vehicle 4 14,001–16,000 lbs			
19,500	Heavy Duty Vehicle 5 16,001–19,500 lbs			
26,000	Heavy Duty Vehicle 6 19,501–26,000 lbs	Medium Heavy Duty Engines 19,501–33,000 lbs		
33,000	Heavy Duty Vehicle 7 26,001–33,000 lbs			
60,000	Heavy Duty Vehicle 8a 33,001–60,000 lbs	Heavy Heavy Duty Engines Urban Bus >33,001		
>60,000	Heavy Duty Vehicle 8b >60,001			

These charts illustrate the vehicle weight classes and categories used by the Federal Highway Administration (FHWA), the US. Census Bureau and the US Environmental Protection Agency (EPA). The vehicle weight classes are defined by FHWA and are used consistently throughout the industry. These classes, 1–8, are based on gross vehicle weight rating (GVWR), the maximum weight of the vehicle, as specified by the manufacturer. GVWR includes total vehicle weight plus fluids, passengers and cargo. FHWA categorizes vehicles as Light-Duty (Class 1–2), Medium-Duty (Class 3–6), and Heavy-Duty (Class 7–8). EPA defines vehicle categories, also by GVWR, for the purposes of emissions and fuel economy certification. EPA classifies vehicles as Light Duty (GVWR < 8,500 lb) or Heavy Duty (GVWR > 8,501 lb). Within the Heavy-Duty class, there is a Medium Heavy Duty Diesel Engine class for engine-only certification, but no Medium-Duty Vehicle class. The September 2011 US Department of Transportation (DOT)/EPA rulemaking on *Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles* uses categories and weights for Heavy-Duty Vehicle Classes 2b through 8, similar to the FHWA weight classes.

COLORADO
Energy Office

COLORADO
Department of Transportation

COLORADO
Department of Public
Health & Environment

RAQC
Regional Air Quality Council