Pikes Peak Area

2022

Transportation Electrification Infrastructure Study
## ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AADT</td>
<td>annual average daily traffic</td>
</tr>
<tr>
<td>AC</td>
<td>alternating current</td>
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<tr>
<td>ACS</td>
<td>American Community Survey</td>
</tr>
<tr>
<td>ADA</td>
<td>Americans with Disabilities Act</td>
</tr>
<tr>
<td>amp</td>
<td>ampere(s)</td>
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<tr>
<td>AQCC</td>
<td>Air Quality Control Commission</td>
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<tr>
<td>BEV</td>
<td>battery electric vehicle</td>
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<tr>
<td>BIL</td>
<td>Bipartisan Infrastructure Law</td>
</tr>
<tr>
<td>BMP</td>
<td>Beneficiary Mitigation Plan</td>
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<tr>
<td>C.R.S.</td>
<td>Colorado Revised Statutes</td>
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<td>CCR</td>
<td>Code of Colorado Regulations</td>
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<td>Colorado Department of Transportation</td>
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<td>CDPHE</td>
<td>Colorado Department of Public Health and Environment</td>
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<td>CEO</td>
<td>Colorado Energy Office</td>
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<tr>
<td>CMAQ</td>
<td>Congestion Mitigation and Air Quality</td>
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<tr>
<td>COG</td>
<td>Council of Governments</td>
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<tr>
<td>DC</td>
<td>direct current</td>
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<tr>
<td>DCC</td>
<td>Drive Clean Colorado</td>
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<tr>
<td>DOLA</td>
<td>Colorado Department of Local Affairs</td>
</tr>
<tr>
<td>DOT</td>
<td>Department of Transportation</td>
</tr>
<tr>
<td>DTR</td>
<td>Division of Transit and Rail</td>
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<td>EISA</td>
<td>Energy Independence and Security Act</td>
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<td>EISA</td>
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<td>EO</td>
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<td>Environmental Protection Agency</td>
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<td>EPAct</td>
<td>Energy Policy Act</td>
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<td>EV</td>
<td>electric vehicle</td>
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<tr>
<td>EVI</td>
<td>Electric Vehicle Infrastructure</td>
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<td>EVSE</td>
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<td>FCEV</td>
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<td>GHG</td>
<td>greenhouse gas</td>
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<td>HB</td>
<td>House Bill</td>
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<tr>
<td>HDV</td>
<td>heavy-duty vehicle</td>
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<tr>
<td>HEV</td>
<td>hybrid electric vehicle</td>
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<td>IJIA</td>
<td>Infrastructure Investment and Jobs Act</td>
</tr>
<tr>
<td>kW</td>
<td>kilowatt(s)</td>
</tr>
<tr>
<td>kWh</td>
<td>kilowatt hour(s)</td>
</tr>
<tr>
<td>LDV</td>
<td>light duty vehicle</td>
</tr>
<tr>
<td>LESA</td>
<td>Low-Emission Smart Area</td>
</tr>
<tr>
<td>MDV</td>
<td>medium duty vehicle</td>
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<td>MMT</td>
<td>Mountain Metropolitan Transit Organization</td>
</tr>
<tr>
<td>MPO</td>
<td>Metropolitan Planning Organization</td>
</tr>
<tr>
<td>NAAQS</td>
<td>National Ambient Air Quality Standards</td>
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<tr>
<td>NEVI</td>
<td>National Electric Vehicle Infrastructure</td>
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<tr>
<td>NORAD</td>
<td>North American Aerospace Defense Command</td>
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<tr>
<td>PHEV</td>
<td>plug-in hybrid electric vehicle</td>
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<tr>
<td>PPACG</td>
<td>Pikes Peak Area Council of Governments</td>
</tr>
<tr>
<td>RAQC</td>
<td>Regional Air Quality Council</td>
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<tr>
<td>RNG</td>
<td>renewable natural gas</td>
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<tr>
<td>TC</td>
<td>Transportation Commission</td>
</tr>
<tr>
<td>U.S.</td>
<td>United States</td>
</tr>
<tr>
<td>VW</td>
<td>Volkswagen</td>
</tr>
<tr>
<td>ZEV</td>
<td>zero emission vehicle</td>
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The Pikes Peak Area Council of Governments (PPACG) Transportation Electrification Infrastructure Study serves as framework to provide guidance on the development, siting, and implementation of electric vehicle (EV) charging infrastructure for public use within the Pikes Peak area.

PURPOSE

PPACG developed this study in light of new and anticipated funding opportunities from the federal and state governments as well as state goals related to transportation electrification. This study assesses existing EV charging assets within our Metropolitan Planning Organization (MPO) and Council of Governments (COG) boundaries and provides direction regarding potential implementation strategies for public charging in the future. Considerations for this study include existing charging infrastructure, vehicle registration data, population and projected population, and funding opportunities for EVs and charging infrastructure.

This study refers to existing efforts as possible, including the 2020 State of Colorado Electric Vehicle Plan, 2022 Colorado Springs Electric Vehicle Readiness Plan, and 2021 Colorado Transit Zero Emission Roadmap. In addition, Colorado Springs’ Mountain Metropolitan Transit (MMT) is developing its own Zero Emission Vehicle (ZEV) Plan beginning in 2022.

The following page depicts the PPACG area and member governments.

STUDY OBJECTIVE

This study is intended to provide support and resources for local jurisdictions and other entities should they choose to pursue grant or other funding related to EVs and EV charging.

It is not intended to be a prescriptive plan for local agencies, and PPACG does not have the authority to mandate investment in electrification.
Environmental impacts from transportation are a concern for our region, the state, and the nation for both health and economic reasons. According to the Colorado Department of Public Health and Environment (CDPHE), transportation is the highest source of greenhouse gases (GHGs) in Colorado.

Federal guidance regarding EVs and GHGs dates to the Clean Air Act of 1970 and the Clean Air Act Amendments, which recast transportation planning to ensure that it will help the region in meeting federal air-quality standards. It encourages reduced auto emissions and fewer trips by single-occupant vehicles, and it promotes the use of alternative transportation modes, including transit, pedestrians and bicycles, as a viable part of the transportation system. Federal funding requires a region to be in compliance of federal air-quality standards; this reinforces the link between transportation planning and federal air-quality standards.

Federal guidance has progressed through various legislation to include the Energy Policy and Conservation Act, the Intermodal Surface Transportation Efficiency Act of 1991, subsequent Surface Transportation Acts, the Energy Policy Act (EPAct) of 1992, and EPAct 2005. Notably, the Energy Independence and Security Act (EISA) of 2007 was put in place to reduce U.S. dependence on petroleum and includes provisions to increase the supply of renewable alternative fuel sources.

The Infrastructure Investment and Jobs Act (IIJA) of 2021 (also called the Bipartisan Infrastructure Law [BIL]) appropriates $550 billion for new infrastructure investments, including alternative fuel and advanced vehicle technologies such as electricity grid upgrades and EV infrastructure.

The National Electric Vehicle Infrastructure (NEVI) Formula Program established under the IIJA will provide $5 billion in dedicated funding to deploy EV charging infrastructure and establish an interconnected network to facilitate data collection, access, and reliability. Of the $5 billion, Colorado will receive $57 million over 5 years.

In addition, the IIJA put into place a $2.5 billion discretionary grant program for charging and fueling infrastructure, to include EV charging and hydrogen, propane, and natural gas fueling infrastructure. At least 50% of the Discretionary Grant Program for Charging and Fueling Infrastructure focuses on rural areas, low- and moderate-income neighborhoods, and communities with a low ratio of private parking spaces.

In accordance with the IIJA, the Colorado Department of Transportation developed Colorado’s National EV Infrastructure (NEVI) Deployment Plan. This plan describes how the state plans to use its NEVI funding. Funds will become available for investment following approval of this plan.
STATE OF COLORADO GUIDANCE
Passed in 2019, Colorado House Bill (HB) 19-1261, the Climate Action Plan to Reduce Pollution, includes targets of reducing statewide GHG emissions 26% by 2025, 50% by 2030, and 90% by 2050 from 2005 levels. Driving EVs is one way identified to help reduce GHGs.

Also in 2019, the Colorado Air Quality Control Commission (AQCC) adopted a ZEV Rule, following Governor Jared Polis’ Executive Order (EO) 2019 002, Supporting a Transition to Zero Emission Vehicles.

In April 2020, the State released the Colorado Electric Vehicle Plan as an update to the 2018 plan, which had set forth goals, actions, and strategies to develop EV fast-charging corridors across the state. The 2020 plan acknowledges several statewide achievements since the 2018 plan, including EV adoption in the state. Between 2017 and 2019 the number of EVs registered in Colorado more than doubled, growing from approximately 11,250 to more than 24,000.

To achieve the vision, goals, and objectives it establishes, the statewide plan provides four categories of strategies and actions:

- Policy, Planning, and Guidance
- Programming and Funding
- Supporting Emerging EV Technology and Innovation
- Engaging People

The GHG Pollution Reduction Roadmap, published in January 2021 to provide an implementation strategy for achieving the targets in HB 19-1261, calls for the state to secure revenue to fund infrastructure and incentives to transition to electric cars, trucks, and buses. To reach the identified targets, Colorado will need to transition to close to 100% electric cars on the road by 2050 and 100% market share for new vehicle sales of zero emissions trucks and buses by 2050. This will require close to 100% of new car sales to be electric by 2040.

In December 2021, the Colorado Transportation Commission (TC) approved a new Colorado Department of Transportation (CDOT) GHG planning standard. 2 Code of Colorado Regulations (CCR) 601-2, Rules Governing Statewide Transportation Planning Process and Transportation Planning Regions, establishes GHG pollution reduction planning levels for transportation to improve air quality, reduce smog, and provides more sustainable options for travelers across Colorado. The GHG Pollution Standard Rule requires CDOT and the state’s five MPOs to determine the total pollution and GHG emission increase or decrease expected from future transportation projects and take steps to ensure that greenhouse gas emission levels do not exceed set reduction amounts.

In addition, HB22-1362 is aimed at the reduction of building GHG emissions and is focused on building codes. This act calls for the creation of an energy code model that includes EV-related requirements for multi-family and commercial buildings, which may impact EV-related infrastructure in the future.

COLORADO ELECTRIC VEHICLE PLAN GOALS
The statewide plan states the following five goals:

- Increase adoption of EVs in the light-duty sector to approximately 940,000 vehicles by 2030.
- Develop plans for transition to ZEV for medium-duty (MDV), heavy-duty (HDV), and transit vehicles.
- The Colorado Energy Office (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.
- State government agencies will meet their directives from the Executive Order D 2019 016.
- Develop a roadmap to full electrification of the light-duty vehicle fleet.
INTRODUCTION  |  TRANSPORTATION ELECTRIFICATION INFRASTRUCTURE STUDY

OVERVIEW OF EVS AND INFRASTRUCTURE

TYPES OF EVS
There are several types of EVs, including options that rely on fuel cells or combine a gas engine in hybrid and plug-in hybrids. The following provides an overview of EVs.

ELECTRIC VEHICLES
EVs, also called battery electric vehicles (BEVs), are fully electric vehicles with rechargeable batteries and no gasoline engine. EVs produce no tailpipe emissions, and their batteries are charged through the electric grid. EVs generally have driving ranges of 150 to 300 miles.

HYBRID ELECTRIC VEHICLES
Hybrid electric vehicles (HEVs) have a gasoline-powered engine and an electric motor. They can recharge their battery through regenerative braking or by being plugged into the electric grid to recharge. However, most HEVs’ driving range on electricity alone is only 20 to 40 miles. HEVs can charge at a level 2 charger, but most PHEVs are not capable of supporting fast charging.

OTHER OPTIONS
Hydrogen fuel cell electric vehicles (FCEVs) produce electricity using hydrogen gas and produce water vapor rather than tailpipe emissions. In addition, renewable natural gas (RNG) and other renewable fuel types may be ZEVs, depending on the method of fuel production.

While these and other options could also help reduce emissions, for the purposes of this study, PPACG will focus on charging infrastructure for EVs and PHEVs.

TYPES OF CHARGING STATIONS
There are three levels of charging stations, or electric vehicle supply equipment (EVSE), for EVs. Charging speed is impacted by which EV you own, your EV’s battery capacity, and the type of charging system you are using. The following information is provided as a reference of basic charging types; however, due to evolving technology and capabilities, charging speeds and other data may change. It should also be noted that a Level 2 or 3 charging station can contain multiple charging ports.

The type of charger selected for a specific site may depend on a variety of factors to include the number of vehicles that will use the charger, how long the vehicles will be parked at the charging station,

A sample of popular EVs on the market with their driving range and charging type. Source: EVgo, www.evgo.com
There are currently three types of DC fast charging system. A Combined Charging System (CCS) connector can be utilized for all three levels of charging. The other two types of DC fast charging are the CHAdeMO and Tesla.

Level 3 charging cannot be utilized by all EVs currently on the market. In addition, Level 3 chargers are more expensive, require specialized infrastructure, and also deteriorate batteries more quickly than slower chargers.

Level 3 stations are ideal for locations where quick charging is needed, such as along highways at gas stations or areas convenient for public use to support tourism and other travelers.
CHAPTER 2
EXISTING CONDITIONS AND ANALYSIS

The first step in developing an electrification study is to identify the existing conditions and assets within the study area. The following chapter discusses area population and growth, emissions, EV adoption rates and barriers, and existing infrastructure.

STUDY AREA OVERVIEW AND POPULATION

The PPACG area contains the entirety of El Paso, Park, and Teller Counties, as seen in Figure 1 on page 2. In total, the area spans approximately 4,900 square miles and is home to 772,495 residents as of the 2020 Census. Much of that area is rural.

Figures 3-6, on the following pages, depict the population density for the region and each county, along with existing charging stations. Details regarding the number of type of charging stations are included later in this chapter.

EL PASO COUNTY

El Paso County is the most populous county in Colorado with 730,395 residents, 66% of whom live in Colorado Springs.

In addition to Colorado Springs, the county contains the Cities of Fountain and Manitou Springs as well as the Towns of Monument, Calhan, and Ramah. The area is home to the Air Force Academy, Fort Carson, Peterson and Schriever Space Force Bases, and the North American Aerospace Defense Command (NORAD) at Cheyenne Mountain Space Force Station.

The county has many tourist destinations, including Pikes Peak, Garden of the Gods, the Broadmoor Hotel, the U.S. Olympic and Paralympic Museum, Manitou Cliff Dwellings, Cave of the Winds, Cheyenne Mountain Zoo, and ProRodeo Hall of Fame.

Growth has been significant in recent history. El Paso County grew by 108,132 people (a 17.4% increase) between 2010 and 2020. While the unincorporated areas had a higher percentage increase (22.18% to 15.64%), the municipal population rose by 71,417 people compared to 36,715 in the unincorporated county. Notably, the Town of Monument’s population grew by 88%. The Cities of Colorado Springs and Fountain grew by 15%.

PARK COUNTY

Park County is considered to be the geographic center of the state of Colorado.
It is about an hour and a half drive on state highways from Denver or Colorado Springs. Its two incorporated towns of Alma and nearby Fairplay are less than 40 minutes from the ski resort town of Breckenridge, a major tourist destination.

Park County’s population grew 7.3% (1,184 people) from 2010 to 2020. Most of the growth (1,113 people) was in the unincorporated county, while the municipalities gained 71 people. The Town of Alma saw a 9.6% population increase to 296 residents.

TELLER COUNTY

Sitting between Park and El Paso counties is Teller County. The county seat is Cripple Creek, and the most populous city is Woodland Park. Camping, fishing, and other outdoor recreational activities are a major draw to Teller County. Cripple Creek draws in many daily visitors to its casinos.

In Teller County, the growth rate was 5.82% (1,360 people) from 2010 to 2020. The County had a similar increase in population in the municipalities (668) and the unincorporated county (692). Woodland Park’s population grew 10% during that span to 7,920 residents.

POPULATION PROJECTION

Population growth is expected to continue throughout the region. According to preliminary population forecasts prepared by the Colorado Department of Local Affairs (DOLA) in October 2021, the PPACG area will have a population of 1,041,973 in 2050.
FIGURE 3: EL PASO COUNTY POPULATION DENSITY AND EXISTING CHARGING STATIONS

FIGURE 4: PARK COUNTY POPULATION DENSITY AND EXISTING CHARGING STATIONS
According to data from EValuate CO and the 2018 American Community Survey (ACS), most of the population within the PPACG area lives in single-family housing (79.09%), and most households have at least one vehicle available. About two-thirds of households have two or more vehicles available. Only 4.14% of households do not have a vehicle. Of the 358,640 residents for which commute data was available, only 23,941 (6.68%) worked from home. It should be noted that this data reflected the area prior to the Covid-19 pandemic, and long-term effects on commuting are not yet known.

The figure above provides a snapshot of area demographics related to transportation.
**EV INFRASTRUCTURE**

Within the PPACG area that is the focus of this study, there were 57 public charging stations per data from the CEO’s EvaluateCO online dashboard as of March 2022. It should be noted, however, that multiple vehicles are often able to charge at each station.

The figure at right shows locations of existing charging stations within the PPACG area, denoted as yellow and orange circles. The purple shading on the figure denotes the number of registered EVs by zip code.

**El Paso County**

With such a large population and so many tourist destinations, El Paso County’s EV infrastructure is critical to meeting the goals in the statewide plan. There were 51 public charging stations in El Paso County. Of these, 46 were in Colorado Springs, two in Manitou Springs, two in Monument, and one in Fountain. These stations totaled 131 Level 2 charging ports and 32 Level 3 DC Fast charging ports.

**Park County**

There was one DC Fast charger in Fairplay with two ports. There was one Level 2 charger in the town of Alma with three ports.

**Teller County**

There were three charging stations in Woodland Park and four in Cripple Creek. All of these stations were Level 2 and total 13 ports.

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**FIGURE 7: EXISTING CHARGING STATIONS AND REGISTERED EVS BY ZIP CODE**

![Map showing existing charging stations and registered EVs by zip code in the PPACG area, with locations in El Paso, Park, and Teller Counties.]
EXISTING CONDITIONS AND ANALYSIS

EXISTING EVS

Of the more than 1.6 million vehicles registered in Colorado, 61,286 were BEVs or PHEVs as of January 2022, according to CEO. Details regarding vehicles in the PPACG area is included in the figure below.

Figure 10, on page 20, depicts current EVs on the road by ZIP Code compared with existing charging stations. The highest numbers of EVs occur in the southeast, northeast, and northern portions of Colorado Springs as well as within Monument, Palmer Lake, Black Forest, and Peyton/Falcon.

FIGURE 8: FEDERALLY DESIGNATED EV CORRIDORS

The Federal Highway Administration (FHWA) is responsible for designating a Alternative Fuel Corridors - networks of EV and other fueling infrastructure along national highway system corridors. The federally designated EV corridors in and near the PPACG area is depicted in the figure below. The figure shows corridors designated as Ready (in green) and Pending (in brown). Ready means the corridor has adequate charging capability, while pending means there is some infrastructure but it is not at the right frequency or locations to be deemed Ready.

Within the PPACG area, only I-25 is a designated EV corridor, although additional highways may be nominated for inclusion in the future. FHWA solicits nominations from state and local officials, and six corridors were added following nomination by CDOT in 2022. Only sites within 1 travel mile of a designated EV corridor are currently eligible for NEVI formula funding, unless a discretionary exception has been granted. Exceptions may include rural areas or areas where grid capabilities are limited.

The Colorado National Electric Vehicle Infrastructure (NEVI) Plan identifies eight existing DC fast chargers within Colorado Springs along I-25 and one in Fountain.

FIGURE 9: EV ADOPTION IN PPACG AREA AS OF JANUARY 2021

TABLE 2: TOP ZIP CODES FOR EVS

<table>
<thead>
<tr>
<th>ZIP CODE</th>
<th>EVS</th>
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<tr>
<td>80906</td>
<td>388</td>
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<tr>
<td>80132</td>
<td>365</td>
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<td>80924</td>
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<td>80831</td>
<td>200</td>
</tr>
<tr>
<td>80918</td>
<td>185</td>
</tr>
<tr>
<td>80922</td>
<td>164</td>
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TOTAL EVS ON THE ROAD: 4,287

BEV: 2,895

PHEV: 1,392

BY COUNTY

<table>
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<tr>
<th>ORIGINAL REGISTRATIONS</th>
<th>EVS ON THE ROAD</th>
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<tr>
<td>El Paso</td>
<td>5,613</td>
</tr>
<tr>
<td>Park</td>
<td>119</td>
</tr>
<tr>
<td>Teller</td>
<td>139</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5,871</td>
</tr>
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</table>

**EV ADOPTION**

Although EVs are a small percentage of the overall automotive picture in Colorado, the numbers are growing steadily, according to the CEO. Colorado is among the top three states for EV and PHEV adoption.

The Colorado Automobile Dealers Association (CADA) has reported growth in market share for EVs over the past three years, as illustrated in the figure below.

The EV market share reached 6% in the fourth quarter of 2021, with nearly 16,000 BEVs and PHEVs sold in Colorado last year.

Hybrids accounted for an additional 7.3% of the market.
In the first quarter of 2022. Of the nearly 58,000 vehicles registered in the state in the first quarter of 2022, 6.3% were BEV and 2.3% were PHEV. An additional 8.8% of vehicles registered were hybrids.

It should be noted that vehicle sales as a whole are down in large part to do limited supply. CADA reports that vehicle production, rather than demand, is limited.

The three top selling brands in Colorado, and within the PPACG region, over the past decade are Tesla, Nissan, and Chevrolet. However, in the first quarter of 2022, Toyota was the top-selling brand for hybrids, BEVs, and PHEVs, followed by Tesla, Ford, and Hyundai.

More manufacturers are offering EVs and PHEVs, with additional models planned for the near future in a variety of price ranges.

**FIGURE 10: ESTIMATED QUARTERLY ALTERNATIVE POWERTRAIN MARKET SHARE IN COLORADO**

![Graph showing estimated quarterly alternative powertrain market share in Colorado.](https://www.colorado.auto/colorado-auto-outlook-archive)

Source: Colorado Automobile Dealers Association, Colorado Auto Outlook, First Quarter 2022, https://www.colorado.auto/colorado-auto-outlook-archive

**FIGURE 11: ESTIMATED MARKET SHARE BY POWERTRAIN TYPE YEAR TO DATE 2022 THROUGH MARCH**

![Pie chart showing estimated market share by powertrain type year to date 2022 through March.](https://www.colorado.auto/colorado-auto-outlook-archive)

Source: Colorado Automobile Dealers Association, Colorado Auto Outlook, First Quarter 2022, https://www.colorado.auto/colorado-auto-outlook-archive

This includes electric light-duty trucks and sport utility vehicles. In 2021, General Motors announced it would stop making gasoline and diesel.

As EV technology becomes more reliable and EVs offer drivers more amenities and a longer driving range, it is anticipated that the market for EVs will grow.
EMISSIONS

According to the EPA, carbon dioxide accounted for 80% of GHG emissions in the United States in 2019, and of those 35% were caused by transportation.

According to the Colorado GHG Pollution Reduction Roadmap, legislative analysts in 2019 estimated that GHG emissions from cars and trucks in Colorado results in an annual impact of $1.5 billion in public health costs, agricultural losses, flood risk and energy system costs.

The Roadmap calls for measures to reduce transportation emissions by 12.7 million metric tons (mmt) by 2030. Electrification of vehicles plays a role in this reduction. As seen in the graphic below, the transportation sector accounted for 30.7 mmt of carbon dioxide emissions in Colorado in 2018.

FIGURE 13: ANNUAL COLORADO TRANSPORTATION SECTION CARBON DIOXIDE EMISSIONS 1980-2018 IN MILLION METRIC TONS

Source: U.S. Energy Information Administration, eia.gov

ELECTRIFICATION OF TRANSIT

Within the PPACG area, MMT provides local fixed-route bus service and Metro Mobility Americans with Disabilities Act (ADA) paratransit services in Colorado Springs and the region. Fountain Municipal Transit serves the City of Fountain. There are also several specialized transit and CDOT transit services.

For the purposes of this study, transit electrification is limited to buses. Within the PPACG area, the CDOT Colorado Transit ZEV Roadmap and the Colorado Springs EV Readiness Plan address transit. In addition, MMT is conducting a separate ZEV Transition Plan.

According to the Colorado Transit ZEV Roadmap, providers that use full-size transit buses are likely to adopt alternative fuel vehicles more quickly than providers that rely on smaller vehicles or vans to serve longer routes or operate on demand-response service.

In Colorado, vehicles must be able to operate with extended ranges to serve rural areas and must be able to operate successfully in areas with cold climates and steep grades. ZEV deployment should occur as proven vehicle models are available to meet current and future transit needs. For these reasons, making the move to EV transit may take longer in Park, Teller, and eastern El Paso counties.

In addition to lowering GHG emissions, transitioning to low or no emissions vehicles for transit may be desirable because they cost less to maintain and provide a better rider experience.

MMT has a goal of 100% low or no emissions fleet by 2035. MMT began a demonstration project in spring 2022 that utilizes four all-electric buses. These vehicles were purchased in part using funds from Volkswagen (VW) Diesel Emissions Settlement of 2016, in which the Department of Justice filed a complaint on behalf of the Environmental Protection Agency against VW for violations of the Clean Air Act.

The Colorado Springs EV Readiness Plan includes two replacement scenarios for MMT.

### TABLE 3: ELECTRIC AND DIESEL BUS COST COMPARISON

<table>
<thead>
<tr>
<th>TYPE OF BUS</th>
<th>INITIAL COST</th>
<th>APPROX. ANNUAL MAINTENANCE COST</th>
<th>APPROX. ANNUAL FUEL COST</th>
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<tr>
<td>Electric</td>
<td>$965,000</td>
<td>$21,000</td>
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<tr>
<td>Diesel</td>
<td>$470,000</td>
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CONSIDERATIONS FOR EV ADOPTION

REGIONAL CONCERNS

While awareness and sales are increasing, EVs still account for a small percentage of vehicles in the PPACG area. Much of the area is rural, and many residents must drive farther to work, amenities, shopping, or other destinations than those living in metropolitan areas. Many residents may question whether the range and limitations of an EV will support their needs.

In addition, the PPACG area is mountainous and features extreme temperatures in the summer and winter, which diminish EV performance. Cold weather in particular can reduce EV range and charging speed. Other concerns include safety and reliability, particularly in context of the Colorado climate.

AWARENESS

The general public still knows relatively little about EVs. Community-based organizations and educational programs can provide accurate and relevant information to increase public awareness and EV adoption. Within Colorado, the CEO ReCharge Colorado program works to advance the adoption of EVs and installation of charging infrastructure. ReCharge Colorado offers coaching services to help consumers, local governments, workplaces, and multi-unit housing developments find funding opportunities and determine cost savings and other benefits.

Drive Clean Colorado (DCC) is a nonprofit organization that supports “equitable clean transportation and efficient mobility choices.” In addition to providing ReCharge Colorado coaching services, DCC’s programs include fleet education roadshows, facilitation of focus and working groups, and the Low-Emission Smart Area (LESA) initiative.

In addition, Drive Electric Colorado is an education initiative led by DCC in collaboration with CEO and ReCharge Colorado. Drive Electric Colorado provides outreach and information related to EVs.

AFFORDABILITY

Cost is a significant barrier for EV adoption as was identified in the Colorado NEVI plan as the biggest barrier to EV adoption by stakeholders. EVs on average cost more than other vehicles, although new and used EVs are becoming available at lower cost points. Upfront costs may be offset in the long term through less routine maintenance and lower costs to power the vehicle.

Colorado offers a $2,500 tax credit for the purchase of an EV and $1,500 for a 2-year lease. These amounts will decrease in 2023 and will cease in January 2026.

A federal tax credit up to $7,500 is available following the purchase of an EV, depending on the capacity of the battery. General Motors and Tesla vehicles no longer qualify for this credit.

In addition, several utility companies offer incentives related to EVs. Black Hills Energy and Mountain View Electric Association offer rebates for the purchase of a new EV or the installation of a residential Level 2 charger. Colorado Springs Utilities offers a rebate program for several criteria, including charging stations at a workplace or multi-unit dwelling, fleet charging stations, and “opportunity” charging stations, which are EVSE that are open to public use.

ACCESSIBILITY

Accessibility to EVSE is a key factor in EV adoption. Most EV owners charge at home, as it is the cheapest and most convenient location to charge. However, home charging is often not an option for people living in multi-family housing. Charging installation in multi-family housing can be problematic because of the difficulty in obtaining permission or funds to install chargers.

Within the PPACG area, approximately 27% of housing units were multi-family per 2018 ACS data. As shown in Figure 13, there is a concentration of multi-family housing units around the east of downtown Colorado Springs. EVSE is fairly well-dispersed in that area.
According to the Colorado GHG Pollution Reduction Roadmap, local air pollution disproportionately impacts lower-income communities and communities of color.

In addition, many low-income communities lack access to public EV chargers. This can also be said for both communities of color and rural areas. These areas are often termed “charging deserts.” A charging desert is an area that lacks significant Level 2 and Level 3 (DC fast) charging infrastructure.

The figure at right depicts existing charging stations compared with disproportionately impacted communities data as provided by CDPHE.

Disproportionately impacted communities are defined by HB 21-1266 as those census block groups where greater than 40% of households are 1) low income, 2) housing cost-burdened, or 3) include people of color, with people of color being determined by the U.S. Census. The bill further defines these communities.

Equity and disproportionately impacted communities are important considerations for many funding opportunities.

**EV Equity Study**

The Colorado GHG Pollution Reduction Roadmap called for the state to develop an EV equity study to ensure access to EVs for all Coloradans. In August 2022, CEO published the Colorado EV Equity Study,
along with an online EV equity dashboard and an Excel-based EV prioritization tool. The equity study includes three sections. Section 1 focuses on opportunities and recommendations. Section 2 focused on mapping EV equity populations, including a review of equity definitions in use in Colorado, provided within Federal guidance, or used by other state or nonprofit organizations. Section 3 focuses on ways to incorporate EV equity into planning and programming and includes an overview of the equity dashboard and prioritization tool.

**ELECTRIC GRID READINESS**

Ensuring the regional electric grid can accommodate the potential addition of charging stations and EV charging needs is critical. Within the PPACG area, electric service is provided by six utility companies: Colorado Springs Utilities, Fountain Electric, Mountain View Electric Association, CORE Electric Cooperative (formerly the Intermountain Rural Electric Association), Southeast Colorado Power Association, and Xcel Energy.

While determining the potential impacts to the electric grid and these providers’ capacities is outside the scope of this study, it is important for local jurisdictions and other entities consider this moving forward and adequately collaborate with local utilities prior to and during EV-related planning activities. Many charger installation challenges are site specific, with some areas of the existing infrastructure able to support charging better than other areas. Commercial charger installation, particularly Level 3 chargers, may require infrastructure upgrades, which can be costly. In addition, utility providers may require capacity and distribution upgrades as EV adoption grows. Some providers are considering incentives or other methods to encourage charging during off-peak hours.

The Colorado NEVI Plan states that “CEO, CDOT, and their partner agencies will continue to work with electric utilities across the state to understand, prepare for, and participate in this significant transition. This includes potential planning for a larger, more robust, and more flexible grid that will be able to meet the increased demand from widespread vehicle electrification while maintaining reliability and resiliency in the face of increasing threats from extreme heat and cold, floods, wildfires, and cyber attacks.” Within the PPACG region, Colorado Springs Utilities is undertaking an electrification strategy plan, which will include EVs as well as other trends in electrification. It was consulted during the development of the Colorado Springs EV Readiness Plan.

Other providers are also undergoing studies, surveys, and other efforts related to electrification. As a state, Colorado ranked seventh among the states in total energy production, and its per capita total energy consumption was lower than two-thirds of the states, as of July 2020, according to the U.S. Energy Information Administration.

The Colorado NEVI Plan also discusses a trend within the state toward renewable sources for electricity, which will reduce carbon emissions. As of March 2022, 39% of the state’s electricity came from wind or solar, 34% from coal, 24% from natural gas, and 3% from hydropower.

**Local Utility Incentives**

Within the PPACG area, Colorado Springs Utilities offers an “electric time-of-use rate” for both residential and business customers. This rate option charges customers lower prices for use during off-peak hours and higher prices during peak hours, which could be beneficial to those wishing to charge vehicles during off-peak hours.

Xcel Energy has created a transportation electrification plan, due to SB19-077, which authorized ownership of electric vehicle charging infrastructure by electric utilities.

Also, Mountain View Electric Association offers a charging equipment rebate program.

**CHARGER NETWORKS AND MAINTENANCE**

There are a variety of ownership and operational models associated with charging stations. According to the Alternative Fuels Data Center, most charterers are either site-owned or third-party owned. For example, a business or local jurisdiction may install a charger which is then operated by a charging network company.

These charging network companies often require memberships for use. Within the United States, there are a number of charging networks from which to choose. ChargePoint is the largest in terms of the number of charging stations and ports; however, most of the are Level 2 charging. Other networks include Tesla, Electrify America (which is owned by Volkswagen Group of America), and EVgo.

Networked charging stations are connected to the internet, which enables monitoring of usage and asset management.

Of the nine DC fast chargers identified by the Colorado NEVI Plan along I-25, three are part of the ChargePoint network, two are EvGateway, one is Electrify America, one is EVgo, and two are non-networked.

The U.S. Department of Transportation (USDOT) offers resources related to identifying partnership opportunities and planning partners for EV infrastructure as part of its Rural Opportunities to Use Transportation for Economic Success (ROUTES) initiative.
Once the existing conditions have been identified and understood, jurisdictions can begin to identify areas and considerations for electrification efforts. This section presents factors that can be used to support these efforts.

**EVSE PLACEMENT FACTORS**

Several factors may be considered when identifying the need for EVSE locations. The following paragraphs discuss some factors that may be relevant to the PPACG area and may be considerations for funding opportunities.

Later in this section, these factors are compared with existing EVSE to identify existing gaps in the area infrastructure. Each factor should be considered and weighted by individual agencies and project sponsors as they are applicable.

**POPULATION**

Areas with high population density were identified as a factor for consideration in gap identification. A map depicting current population density is included as Figure 3 on page 12 and shows that the highest density populations occur largely within of near the City of Colorado Springs. These areas of higher populations currently coincide with the number of EVSE in the area; however, as EV adoption increases, more EVSE will be needed. Potential EV owners and users should be considered when selecting placement for EVSE installation.

For the purposes of gap analysis, a density of more than 5,000 people per square mile was used. This was chosen as 5,000 is just over the median population density for the PPACG area.

**HOUSING**

Many EV users utilize at-home EVSE for most of their charging needs. However, many people that live in multi-family housing units may not currently have the opportunity to charge an EV at home. Adding streetlight or curbside chargers to enable access to EV charging capability is considered a key strategy for increasing EV equity and adoption.

For the gap analysis in Figure 13 on page 25, multi-family housing units (more than five units) and shared parking were identified buffered to a mile, to address accessibility of at-home charging.
DISPROPORTIONATELY IMPACTED COMMUNITIES

This analysis looks at those areas identified as being disproportionately impacted due to housing burden, low income, people of color, or a combination of those categories. A map of these areas was included in the previous section.

The NEVI Formula Program emphasizes equity considerations and states that “Unequal distribution of benefits from the transportation and energy systems has prevented disadvantaged communities and minority-owned and women-owned businesses from realizing equitable benefits from these systems, while other historic barriers to transportation have made facilities inaccessible to individuals with disabilities.”

Projects delivered through the NEVI Formula Program must be consistent with EO 14008 and interim Justice40 Guidance.

LAND USE

Commercial Land Use

Land use patterns such as downtown, commercial areas, and transit hubs were identified as areas in need of EVSE.

The figure at right depicts commercial land use by census tract in the PPACG area. Identifying tracts with larger percentages of commercial use helps identify logical locations where EV users may seek EVSE. These areas are currently largely located in Colorado Springs along major arterials.
### TABLE 4: VEHICLE DWELL TIMES

<table>
<thead>
<tr>
<th>DESTINATION</th>
<th>MINUTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stadiums</td>
<td>228</td>
</tr>
<tr>
<td>Universities</td>
<td>174</td>
</tr>
<tr>
<td>Outdoor Museums (Zoo, Botanic Gardens)</td>
<td>161</td>
</tr>
<tr>
<td>Music/Theater Venues</td>
<td>158</td>
</tr>
<tr>
<td>Casinos</td>
<td>155</td>
</tr>
<tr>
<td>Bowling Alleys</td>
<td>154</td>
</tr>
<tr>
<td>Movie Theaters</td>
<td>135</td>
</tr>
<tr>
<td>Golf Courses/Tennis Courts</td>
<td>131</td>
</tr>
<tr>
<td>Museums</td>
<td>112</td>
</tr>
<tr>
<td>Ice Rinks</td>
<td>109</td>
</tr>
<tr>
<td>Soccer Fields</td>
<td>103</td>
</tr>
<tr>
<td>Churches</td>
<td>101</td>
</tr>
<tr>
<td>Recreation Centers and Yoga/Dance/Gymnastic Studios</td>
<td>77</td>
</tr>
<tr>
<td>Community/Senior Centers</td>
<td>76</td>
</tr>
<tr>
<td>Baseball Fields</td>
<td>75</td>
</tr>
<tr>
<td>Gyms</td>
<td>74</td>
</tr>
<tr>
<td>YMCA</td>
<td>72</td>
</tr>
<tr>
<td>Hiking Trailheads (State or National Park)</td>
<td>67</td>
</tr>
<tr>
<td>Hospitals</td>
<td>65</td>
</tr>
<tr>
<td>Martial Arts Studios</td>
<td>65</td>
</tr>
<tr>
<td>Swimming Pools</td>
<td>63</td>
</tr>
<tr>
<td>Bars</td>
<td>61</td>
</tr>
<tr>
<td>Sit-down Restaurants</td>
<td>60</td>
</tr>
<tr>
<td>Local Parks</td>
<td>60</td>
</tr>
<tr>
<td>Health Facilities</td>
<td>55</td>
</tr>
<tr>
<td>Malis</td>
<td>50</td>
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<tr>
<td>Hair and Nail Salons</td>
<td>45</td>
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<tr>
<td>Big-Box Grocery Stores (Costco, Sam’s Club)</td>
<td>40</td>
</tr>
<tr>
<td>Walmart/Target</td>
<td>33</td>
</tr>
<tr>
<td>Government Offices</td>
<td>32</td>
</tr>
</tbody>
</table>

Source: Colorado PEV Readiness Plan

### Workplace Charging

Areas of high employment density should also be considered when placing EVSE, especially Level 2 chargers. With proper workplace charging implementation, employers can help increase the convenience and affordability of driving electric for their employees. Workplace charging can demonstrate leadership in adopting advanced technologies, and financial grants and other aid is aimed at workplaces that install EVSE.

### Destinations and Vehicle Dwell Times

Along with land use patterns, specific areas that draw large groups of people or where people stay in one location for longer periods are also good candidates for EVSE installation. Unlike traditional gas stations where people can fuel vehicles in minutes, EVSE take longer to charge a vehicle. The 2012 Colorado EV and Infrastructure Readiness Plan recommends vehicle dwell times as a potential factor in determining whether a location is suitable for revenue-generating charging. The table at left identifies dwell times for common businesses and attractions. Using these dwell times will help determine the type of charger to install as well as its location.

### MAJOR CDOT CORRIDORS

Areas of high traffic are also areas where users may require EVSE. In addition to the Federally Designated EV Corridors, illustrated in Figure 2 on Page 4, it is important to consider all high-traffic roadways in the PPACG area.

![FIGURE 18: MAJOR CDOT CORRIDORS](image)

For the purposes of this study, major corridors with the highest annual average daily traffic (AADT) were selected and buffered to a mile. These roads include:

- Park County: SH 24, SH 9, and SH 285
- Teller County: SH 24 and SH 67
- El Paso County: I-25, SH 24, SH 21 (Powers Blvd), SH 115, and SH 94

Threshold distance between charging stations that defines a “gap”: This analysis used a one distance-based rule to define all gaps. The shortest distance an electric vehicle can go on one full charge is about 84 miles. It is likely that EV ranges will increase over time (including entry-level models). Conversely, there may also be situations where the gap analysis should consider shorter threshold distances (such as areas with steep topography). This analysis applied buffers of 50 miles from DC fast chargers to cover all bases. When the buffers were run for the PPACG area, no gaps were identified.
EVSE NEEDS

EXISTING CHARGING NETWORK GAPS

There are a variety of ways to determine network gaps, including physical location/placement, demand, and value. Shortfalls in coverage also may include the number and diversity of ports at each charging station. Multiple factors should be considered prior to investment to ensure the chargers’ use.

The PPACG area has done an excellent job of locating EVSE in many areas. To identify placement gaps in the existing network, the factors previously discussed were mapped, and areas of overlap were identified. Those factors are:

• Population/Square Mile ≥ 5,000
• Census Tracts ≥ 25% Commercial
• Major CDOT Corridors Buffered to a Mile
• Disproportionately Impacted Communities
• Multi-family Housing Units Buffered to a Mile

The result is the figure at right. By mapping where potential gaps overlap, these following areas were identified. These areas do not have any EVSE in place and could benefit from EV infrastructure:

• The area between Woodland Park and Fairplay on US 24 and CO 9
• Eastern El Paso County on US 24 and CO 94
• US 285 near Bailey
• CO 115 on the west side of Fort Carson
• The City of Fountain and the I-25 corridor near Fountain
In addition, though Woodland Park and Cripple Creek have some Level 2 charging in place, they lack Level 3/DC fast charging. However, placement gaps must be balanced with demand. Local agencies should take into consideration areas where more EVs are located to determine if there are any existing charging needs that are not being met. Local agencies should also consider those areas transit use in the placement and type of EVSE. Areas where residents frequently use transit may have lower demands for EVSE.

There are also opportunities to add chargers in commercial/retail settings, entertainment venues, or other areas with long dwell times. Installation of EVSE by private businesses can create a more robust network while encouraging consumers to visit those businesses.

### ADDITIONAL EVSE TO ACCOMMODATE GROWTH

**Growth in EV Adoption**

One of the factors that influences EV adoption in an area is whether that area has reliable, robust infrastructure to support EV use and travel.

Colorado Charging Infrastructure Needs to Reach Electric Vehicle Goals, a working paper, was published by the International Council on Clean Transportation (ICCT) in 2021. The figure below identifies El Paso, Teller, and Park Counties as among those that would need considerable growth to meet the goals established by the statewide plan.

Based on the state’s EV goals, the paper quantifies charging needs at the county level by 2030. The paper presents low- and growth scenarios, where the high-growth scenario is based on the state goal of 70% of sales by 2030 and low-growth is based on 42.5% of sales. This equates to 940,000 and 580,000 EV stock in the high- and low-growth scenarios, respectively.

According to the paper, Colorado had 2,100 public chargers in 2020. To meet the EV adoption goals in the statewide EV plan, Colorado would need 7,600 public chargers by 2025 and 24,100 by 2030.

The figure below projects EVSE needs by 2030 throughout the state based on the working paper’s high-growth scenario.

### FIGURE 21: EVSE NEEDS BY 2030

- **# Level 2 charger projection**
- **# DC fast charger projection**
- **Corridor DC fast charger per mile**
- **EV stock %**

The paper utilizes the following definition for EVSE: “the equipment that controls the power supply to a single EV in a single session. An EVSE may provide multiple connectors but only one of these can be active at the same time. For DC fast chargers, this means that each dual-head DC fast charger, which typically does not allow for the charging of two vehicles simultaneously, is considered one charger. For Level 2 chargers, which do allow for the charging of multiple vehicles simultaneously, each connector is considered one charger.”
For the PPACG area, this paper suggests a total of between 72 and 102 DC Fast chargers along major highway corridors and an additional 169 to 249 in non-corridor areas, depending on the growth scenario. In addition, the paper suggests between 966 and 1,515 public Level 2 chargers, depending on the growth scenario. The bulk of these chargers would be located in El Paso County, with limited numbers in Park and Teller Counties.

The table below provides details on the projected number of charging stations needed by county in both the low- and high-growth scenarios.

This working paper makes several assumptions in the development of these projections. For example, county-level EV driver housing characteristics are based in part on the portion of the given housing type stock in the specific county compared to the state, thus counties with more of the state’s multi-family housing units will see higher percentages of the county’s EV drivers in multi-family housing. The paper also assumed that 80% of EV owners in 2020 use their EVs to commute and this percentage increases to approach the percentage of all light-duty vehicles used for commuting in the given county in 2018 according to the American Community Survey so that by 2040 the housing characteristics of the EV drivers in each county are identical to all county residents.

Other studies and plans may have different assumptions and growth models. The Colorado Springs EV Readiness Plan presents multiple growth scenarios that estimate between 92,000 and 133,000 EVs in the city by 2030. The plan recommends 7,000 to 10,000 Level 2 and Level 3 chargers by 2030.

### Specific Charging Station Types

It is important to note that not all EV can use all charging station types, and some individuals may have a higher desired level of service (Level 3 vs. Level 2). Once a potential location or sponsor is identified for a project, further analysis could focus on a particular set of stations, combining different charging types. Some stations only have a few ports, raising concerns that a queue could form if too many vehicles arrive at the site at one time.

For the PPACG area, the Electric Vehicle Infrastructure (EVI) Projection Tool, developed by the U.S. Department of Energy, recommends prioritizing installation of Level 3/DC Fast chargers before Level 2 chargers. This is because Level 3 chargers enable long-distance travel and provide for drivers without home charging.

### Population and Development Growth

As stated in Chapter 2, population growth has occurred within the PPACG area and that growth is anticipated to continue in the future. New construction and anticipated growth data can be used by local governments and other entities to help identify areas where demand is likely to grow in the future. For example, demand may rise near areas where new housing construction is highest, such as the north, northeast, and southeast Colorado Springs metropolitan areas.

Other opportunities to consider EVSE installation include new commercial developments and redevelopment projects.

**TABLE 5: 2030 EVSE PROJECTIONS (LOW GROWTH/HIGH GROWTH)**

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>HOME</th>
<th>WORKPLACE</th>
<th>PUBLIC LEVEL 2</th>
<th>DC FAST NON-CORRIDOR</th>
<th>DC FAST CORRIDOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Paso</td>
<td>19,782/33,172</td>
<td>1,785/2,941</td>
<td>915/1,436</td>
<td>169/249</td>
<td>56/80</td>
</tr>
<tr>
<td>Park</td>
<td>489/870</td>
<td>78/138</td>
<td>31/50</td>
<td>0/0</td>
<td>9/13</td>
</tr>
<tr>
<td>Teller</td>
<td>316/509</td>
<td>39/60</td>
<td>20/29</td>
<td>0/0</td>
<td>7/11</td>
</tr>
<tr>
<td>PPACG Area</td>
<td>20,587/34,551</td>
<td>1,902/3,139</td>
<td>966/1,515</td>
<td>169/249</td>
<td>72/102</td>
</tr>
</tbody>
</table>

CHAPTER 4

IMPLEMENTATION CONSIDERATIONS

This section identifies considerations and funding opportunities related to the development of a robust EV infrastructure network in the PPACG area.

EVSE DEPLOYMENT

Although currently most owners of EVs in the region predominantly charge their vehicles at home, widespread deployment of EVs would require an increase in public and private charging infrastructure. A more robust EVSE system would benefit residents when they are away from home as well as tourists traveling to or through the areas. In addition, it may enable a larger number of potential EV owners, including people who may not have convenient access to at-home charging, such as those in multifamily housing areas or renters who may be unable to install a home charger.

Greater infrastructure deployment at and near EV driver residences, workplaces, and public locations may be needed to support market growth. For commercial fleet vehicles, buses, and mobility services (fleets of company-owned EVs for car-sharing), private chargers are typically located in a central depot, garage, or holding facility, allowing vehicles to charge in between scheduled services. Planning for EV infrastructure in the PPACG region should align with the electrification goals of the municipalities within it and those overall EV goals of Colorado.

Costs to purchase and install charging infrastructure is significant and warrants careful and strategic planning. There are many considerations related to siting and choosing the appropriate charger type for

ONGOING ACTION

While this study does not include specific projects or recommendations on behalf of the region, cooperation and communication may be valuable for both jurisdictional and regional perspectives. PPACG is in the process of determining interest in and establishing a Regional Working Group for those interested in further exploring issues related to EVs and infrastructure.
each situation. The table at right shows per-charge capital costs by charger type.

**TABLE 6: EV CHARGER COSTS**

<table>
<thead>
<tr>
<th>CHARGER TYPE</th>
<th>PER-CHARGER CAPITAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Level 1</td>
<td>$520</td>
</tr>
<tr>
<td>Home Level 2</td>
<td>$2,312</td>
</tr>
<tr>
<td>Workplace</td>
<td>$3,535</td>
</tr>
<tr>
<td>Public Level 2</td>
<td>$4,959</td>
</tr>
<tr>
<td>Level 3/DC Fast (50 kW)</td>
<td>$54,968</td>
</tr>
<tr>
<td>Level 3/DC Fast (150 kW)</td>
<td>$98,198</td>
</tr>
<tr>
<td>Level 3/DC Fast (350 kW)</td>
<td>$168,708</td>
</tr>
</tbody>
</table>

*Source: Colorado Charging Infrastructure Needs to Reach Electric Vehicle Goals, ICCT*

**PLANNING CONSIDERATIONS**

The following are planning considerations from Charge Ahead Colorado’s Best Practices for Electric Vehicle Charger Selection, Installation, and Operation:

- Utility providers could set more favorable electricity rates for EV chargers, as Colorado Springs Utilities offers. Most EVs can be programmed to wait until a specific time to charge, like midnight or midday, when electricity costs less.
- Municipalities within the PPA network could streamline their permitting process for EV charger installation. They could also modify zoning laws to allow charging station installation at the curb.
- Public, workplace, transportation network company, and multi-unit dwelling LV installations
- EVSE installations for communities, including disproportionately impacted communities
- EVSE for MDVs and HDVs including, electrified refrigerated trailers
- Networks and plazas of DC fast charging infrastructure; and,
- Infrastructure needs to support the powering of hydrogen fuel cell motor vehicles.

**WORKPLACE CHARGING**

The Alternative Fuels Data Center has specific guidance related to workplace charging. This includes planning, installation, and management issues such as enforcement, liability, station sharing, and pricing. That resource can be found online at https://afdc.energy.gov/fuels/electricity_charging_workplace.html.

**U.S. DOT RURAL ELECTRIFICATION TOOLKIT**

In February 2022, U.S. DOT published Charging Forward: a Toolkit for Planning and Funding Rural Electric Mobility Infrastructure. This document discusses benefits, challenges, and solutions for electrification in rural communities to include cost analysis, funding, and financing for installation, operations, and maintenance. The toolkit discusses corridor-, community-, and site-level planning considerations and describes a variety of installation and ownership models for EVSE. It is available online at https://www.transportation.gov/rural/ev/toolkit/pdf.
CDOT RESOURCES

CDOT maintains a number of educational, financial, and other resources on its website that can be utilized for implementation activities. The Electrification and Energy site is housed within the Innovative Mobility program and can be accessed at https://www.codot.gov/programs/innovativemobility/electrification.

FUNDING OPPORTUNITIES

The following is an overview of programs and grants tailored to electrification efforts that are applicable to the PPACG area. It is not meant to be an all-encompassing list of funding sources. Additional funding opportunities may be available, and it is recommended that jurisdictions and project sponsors reference the U.S. DOT toolkit and also reach out to CDOT for additional information.

FEDERAL FUNDING PROGRAMS

The U.S. DOT Charging Forward toolkit includes federal funding programs and a thorough matrix that details eligibility. The toolkit will be updated as new programs and guidance are defined under the IIJA and should be referenced by local agencies or entities seeking project funding. The following lists significant federal funding programs for the PPACG area and resources for the eligibility of EV projects for other funding sources.

**National Electric Vehicle Infrastructure Formula Program**

The NEVI Formula Program will provide funding to states to strategically deploy publicly accessible EVSE and to establish an interconnected network to facilitate data collection, access, and reliability.

Funding is available for up to 80% of project costs, including the acquisition, installation, and network connection of EVSE to facilitate data collection, access, and reliability, proper operation and maintenance of EVSE; and long-term EVSE data sharing.

Funding is expected for availability in late 2022. The Colorado Plan for the NEVI Program and additional information can be found online at https://www.codot.gov/programs/innovativemobility/electrification/nevi-plan.

In addition, U.S. DOT will establish a grant program for EVSE deployment. This grant program will be established by November 15, 2022.

**FHWA Brochure on National Highway System Funding**

In addition to NEVI, there are many new and existing funding sources that can be utilized for EV projects. In April 2022, FHWA released a brochure outlining how to access funding opportunities for charging infrastructure. A table of funding and financing programs with EV eligibilities is included at right.

### DOT FUNDING AND FINANCING PROGRAMS WITH EV ELIGIBILITIES*

<table>
<thead>
<tr>
<th>LEGEND</th>
<th>FORMULA PROGRAMS</th>
<th>DISCRETIONARY PROGRAMS</th>
<th>OTHER ALLOCATED PROGRAMS</th>
<th>INNOVATIVE FINANCE PROGRAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National Highway Performance Program (NHPP)</td>
<td>Rebuilding American Infrastructure with Sustainability and Equity (RAISE) (formerly known as BUILD)</td>
<td>Federal Lands and Tribal Transportation Planning and Formula Program (FLTTP)</td>
<td>State Infrastructure Banks (SIBs)</td>
</tr>
<tr>
<td></td>
<td>$28.4 B*</td>
<td>$1.5 B</td>
<td>$1.3 B*</td>
<td>Varies</td>
</tr>
<tr>
<td></td>
<td>Surface Transportation Block Grant Program (STBGP)</td>
<td>Infrastructure for Rebuilding America (INFRA) Grant Program</td>
<td>Puerto Rico Highway Program (PRHP)</td>
<td>Transportation Infrastructure Financing and Innovation Act (TIFA)</td>
</tr>
<tr>
<td></td>
<td>$12.5 B*</td>
<td>$1.64 B*</td>
<td>$173 MP</td>
<td>$250 MP</td>
</tr>
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<td></td>
<td>Congestion Mitigation &amp; Air Quality Improvement Program (CMAQ)</td>
<td>Advanced Transportation and Technologies and Innovative Mobility Deployment</td>
<td>Territorial Highway Program (THP)</td>
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<tr>
<td></td>
<td>$2.5 B*</td>
<td>$560 MP</td>
<td>$46 MP</td>
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</tr>
<tr>
<td></td>
<td>National Highway Freight Program (NHFP)</td>
<td>Discretionary Grant Program for Charging and Fueling Infrastructure</td>
<td>Rural Surface Transportation Grant Program</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1.4 B*</td>
<td></td>
<td>$300 MP*</td>
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<td></td>
<td>State Planning and Research (SPR)</td>
<td>Reduction of Truck Emissions at Port Facilities Program</td>
<td>Rural Surface Transportation Grant Program</td>
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<td>$983.3 MP</td>
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<td>Metropolitan Planning (PL)</td>
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<td>Rural Surface Transportation Grant Program</td>
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<td></td>
<td>$438.1 MP</td>
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<td>Carbon Reduction Program</td>
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<td>$1.2 B*</td>
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<td></td>
<td>National Electric Vehicle (NEVI) Formula Program</td>
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<tr>
<td></td>
<td>$685 M*</td>
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</tbody>
</table>

* 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).

**Rural EV Infrastructure Funding Matrix**

As part of the previously mentioned Rural Electrification Toolkit, USDOT has developed a matrix of Federal programs that can fund rural EV infrastructure. The matrix notes the type of EV activities that are eligible for funding under different programs, as well as the eligible entities. The matrix, which will be expanded in future updates of the toolkit to reflect new programs, can be found online at [https://www.transportation.gov/rural/ev/toolkit/ev-infrastructure-funding-and-financing/funding-matrix](https://www.transportation.gov/rural/ev/toolkit/ev-infrastructure-funding-and-financing/funding-matrix).

**FTA Programs**

There are several FTA programs that support the electrification of transit. The Low or No Emission Vehicle Program is specifically aimed at alternative fuel buses and bus facilities, while the Grants for Buses and Bus Facilities Competitive Program also provides funds for the modernization of transit systems. The FTA website ([https://www.transit.dot.gov/funding](https://www.transit.dot.gov/funding)) should be references for details regarding these 5339 funds and other funding sources.

**COLORADO PROGRAMS AND GRANTS**

CDOT maintains a website for state programs and grants related to electrification: [https://www.codot.gov/programs/innovativemobility/electrification/state-programs-and-grants](https://www.codot.gov/programs/innovativemobility/electrification/state-programs-and-grants). This site should be consulted prior to planning and implementation activities, as programs and grants may change over time. The following is not an all-encompassing list but describes funding opportunities for the PPACG area focused on EV and EVSE.

**VW Diesel Emissions Settlement**

The State of Colorado received $68.7 million from the legal settlement related to the VW emission fraud case. These funds are used for projects that reduce nitrogen oxide emissions from the transportation sector and are dispersed by CDOT’s Division of Transit and Rail (DTR) in accordance with the Beneficiary Mitigation Plan (BMP). Previous awardees and additional information regarding these funds is available on the CDOT website.

The Alternative Fuel Vehicle Replacement Program has been fully allocated.

In 2022, Transit Bus Replacement Program were awarded as part of the CDOT DTR Super Call for Capital, Planning, Administrative and Operating Transit Projects.

**EV Fast-Charging Plazas**

The Colorado Energy Office (CEO) DC Fast Charging Plazas program provides funding for large banks of fast chargers across Colorado. Eligible costs include DC fast chargers, power conversion hardware, and associated equipment; networking and data plan; utility upgrades such as transformers and extensions; solar and storage equipment that are exclusively dedicated to the charging equipment; and other equipment and non-labor project costs including design and engineering, and permitting.

Projects within El Paso County are considered Front Range Urban, while those in Park and Teller County communities are considered Rural.

**Charge Ahead Colorado**

Charge Ahead Colorado is a great resource and guide for support for EVs and deployment of EVSE across Colorado. The Charge Ahead Colorado program, started in 2012, is a joint program between the Regional Air Quality Council (RAQC) and CEO to reduce harmful air pollutants and encourage the diversification of the State of Colorado’s transportation fuels mix. The program provides information on and financial support for EVs and EVSE. The Clean Air Fleets website at [www.CleanAirFleets.org](http://www.CleanAirFleets.org) provides the latest information on the Charge Ahead Colorado program.

The CEO and RAQC jointly administer the Charge Ahead Colorado EV charging infrastructure grant program. Grants are available for EVs and community-based Level 2 and Level 3 charging stations. Program objectives include improving air quality, encouraging deployment of EVs across the state, and supporting implementation of the Colorado Electric Vehicle Plan 2020. Since its inception, the Charge Ahead Colorado program has made awards for more than 1000 EV charging stations across the state.

RAQC administers Charge Ahead Colorado grants for the Denver Metro area, CEO manages grants for all areas of the state outside of Metro Denver. CEO funding

is directed to private non-profit or for-profit corporations, state agencies, federal agencies, public universities, and public transit agencies, in addition to local governments, landlords of multi-family apartment buildings and homeowner associations (as defined more specifically in Colorado Revised Statutes (C.R.S.) Article 33.3 of title 38). Charge Ahead Colorado typically has three application rounds per year in January, May and October. Public and private entities interested in installing a Level 2 or Level 3 charging station are encouraged to apply. Applications for stations at workplaces, multi-family housing and tourist destinations are of particular interest.

Public, private and non-profit organizations to include local governments, school districts, businesses, and apartment complexes in El Paso, Teller, and Park Counties are eligible to apply for EVSE grants through the CEO and RAQC. CEO and RAQC will pay for up to 80% of the cost for level 2 and level 3 charging stations up to the following maximums:

- Level 2, Fleet Only Charging Stations: $6,000
- Level 2, Dual Port Station (up to 25kW): $9,000
- Level 3, Multiple Connection Standard Station (minimum 50kW+): $35,000
- Level 3, Ultra-fast Multiple Connection Standard Station (minimum 100kW+): $50,000 (limited availability at the discretion of the awarding agency)

There are typically three application windows per year: January, May, and October.

Previous grantees in the region include the City of Colorado Springs, Academy School District 20, and USAA Colorado Springs.

ALTERNATIVE FUEL PROGRAMS

Although outside of the focus of this study, several funding opportunities exist for other alternative fuel projects to include hydrogen and natural gas. The Alternative Fuels Data Center provides an online list of federal incentives, laws and regulations, funding opportunities, and other federal initiatives related to alternative fuels and vehicles, advanced technologies, or air quality. Interested jurisdictions or other entities should visit https://afdc.energy.gov/laws/fed_summary.
REFERENCES


Colorado Springs Gears up for surge in EVs. Green Car Stocks. (2021, January 19). Retrieved April 12, 2022, from https://www.greenstocks.com/colorado-springs-gears-up-for-surge-in-evs/#:~:text=As%20EV%20makers%20introduce%20more%20models%20to%20the,anywhere%20from%2090%2C000%20to%20130%2C000%20EVs%20by%202030


Drive Electric Colorado. Retrieved April 12, 2022, from https://driveelectriccolorado.org/


PUBLIC COMMENTS

A public comment period was held August 12, 2022, through September 13, 2022. The following public comments were received. These, along with discussion by our committees and Board of Directors, were integrated into the document by the project team as possible and used during the document approval process.
Thank you for the opportunity to comment on the PPACG Report.
First of all, it is a very nice report. It has a lot of very useful information and I appreciate the work that went into the making report.
The stated goals are quite lofty with a 50% reduction of GHGs by 2030. I realize it is outside of the scope of the report but putting more EV on the road does not reduce GHGs. Unless the charging stations are powered strictly by non-fossil fuels it only moves the problem from vehicles to power generation. As EVs increases the demand on our power grid the percentage of power generated by renewable could actually decrease. Without some mention of the effect of EVs on the power grid, the report is incomplete.

The Transportation Electrification Infrastructure Study is distorted to emphasize Battery Vehicles (BVs). BVs are at best an interim solution with limited public acceptability due to long charging times and limited range that is significantly affected by varying elevations and cold/hot temperatures. Their niche application is best described as intracity, short distance trips and recharging where garaged. The long-term solution across all modes of transportation is Hydrogen Fuel Cells for domestic use and Hydrogen Internal Combustion Engines for public transportation (buses, trains), long-haul trucking, construction equipment, and agriculture. The human factors associated with the use of Hydrogen is similar to the use of gasoline/diesel, rapid refueling and reliable range, and will result in it being more readily accepted by the public. BV technology cannot and will not satisfy the power and duty cycle requirements of long-haul trucking, trains, construction equipment, and agriculture. Recommend only limited investment in BV recharging facilities at locations that the consumer will find convenient for its limited adoption. Recommend infrastructure investments supporting the introduction of Hydrogen propulsion systems. That is the wise investment in the long-term solution consumers will ultimately choose over BVs. Installing thousands of BV charging stations will have little impact on increasing the acceptance of BVs by the general public, mainly due to its onerous human factors and performance limitations.
I'm an engineer and I know what I'm talking about. I will never own a BV and instead wait to invest in a hydrogen powered vehicle, the real solution.
Taxpayer funding would be better spent on Hydrogen vehicle infrastructure.

Very nice article on your PPACG “2022 Transportation Electrification Infrastructure Study” in Friday’s Gazette. Thank you and your team for pulling the information together and writing the Study. I read the article and then the draft Study. Please find my comments below.

In order to help you, and others, understand and address my comments I’ve included a brief description of my background. I’m an electrical engineering (M.S.E.E., P.E.). I spent 40 years working for IBM and Lockheed Martin as a system engineer/chief engineer on very complex hardware and software systems. I’ve since retired but am still active as an engineer designing electrical infrastructure design for missionary projects in third world countries. I tend to read studies very carefully with: 1) a big picture view of what other information might need to be included in order to implement and 2) is there sufficient detail to both implement and cost. My comments are below.

I just finished reading the draft. Well done.

Unless I missed it, I did not see any mention of how to address the problem of “squatting:” people who tie up chargers for much longer than required for their vehicle. There ought to be a quite high penalty for overstaying.
I would also like to see addressed how vehicles will be staged at charging stations that are fully in use to ensure the line is orderly and managed by first come, first served at the next vacancy. Until the infrastructure gets much more robust, it could lead to some wild west moments with people cutting the line.

Still, the overall draft was quite impressive. It’s easy to see a lot of effort went into it.

Historically, did government underwrite and plan the placement of gas stations when cars were coming into use?

I am just wondering why government using our money is investing in an electric car infrastructure.

Shouldn’t that be up to that industry to make an investment based on their risk and perception of consumer demand rather than government mandate imposing this upon us?

The study was mostly correct boilerplate, DC level 3 fast charging data for speed is inaccurate. Current model EVs will charge to 100% of their range 220-330 miles in an hour so the information needs to be updated. There will be a very limited need to support non CCS or Tesla chargers moving forward. The ratio is significantly diminishing since that standard has been deprecated.

Depending on the planned ownership of the level 2 & 3 chargers will have an impact on their "correct" usage. Currently non Tesla EVs are offered a significant duration of free charging so as a consumer why would I want to pay anything to charge at home. That leads to "misuse" of the chargers, not that it's illegal, but an unintended consequence. The other issue with non Tesla or SuperChargers is ease of use and reliability. I know that is not part of the study but it does create a challenge to the consumer. VW agreed to create a large network with Electrify America but don’t seem to have a great incentive for maintenance.

In an ideal world most daily use driving should be done at home during non-peak or high usage of the grid, DC fast charging is required for "road trips" and those should be focused on travel corridors for the benefit of tourism which generates significant revenue for the economy. Level 2 chargers are best utilized in high density parking areas (shopping centers, parking garages, office parking, etc. As a resident of the most populous county in Colorado (El Paso) we always seem to be underserved in the transportation arena and charging is no exception. Hopefully the system will be funded and delivered efficiently and both Tellier and El Paso counties can get at least their fair share.
Comments:
1. Good Writeup/Well Written: The study is well organized and well written with plenty of table and graphs to aid the reader in understanding this complex topic.
2. Add Impact of HB1362: Please reference and address the recently passed Colorado State Bill HB1362. Does HB1362 change any of the Study’s findings?
3. Charging Station Definition: “Charging Stations” needs to be defined more precisely. Is a charging station a single electrical plug? Does this definition affect any of the Study’s text, tables and graphs? The “EV infrastructure” paragraph on page 14 is particularly confusing without a precise definition: “...To meet the EV adoption goals in the statewide EV plan, Colorado would need 7,600 public chargers by 2025 and 24,100 by 2030. ...It should be noted, however, that multiple vehicles are often able to charge at each station.”
4. Number of Charging Stations: The graph of “Public charging in Oct 2020 as a percentage of that needed by 2030” in Figure 11 is an important in that it shows just how much work needs to be accomplished to build the necessary charging stations to service the anticipated demand. But it is not of sufficient detail to actually implement and to secure funding. I would like to see an additional table showing the number of charging stations required per type per year per zip code. This, in conjunction with the cost data in Table 6, would enable planners in El Paso, Teller and Park counties to estimate total charging station implementation costs.
5. Assumption Used to Compute the Number of Charging Stations: The number of charging stations shown in Figure 11 references the working paper “Colorado Charging Infrastructure Needs to Reach Electric Vehicle Goals”. I would like to see the underlying assumptions that the paper used to estimate of the number of charging stations. The number of charging stations can vary wildly based on whether the demand was assumed uniformly distributed throughout the day or was based on peak demand during certain hours. (This is no different than grocery stores that add more checkout counters during peak after work hours to reduce customer wait times.) The queuing assumption used by the cited working paper is important because the number of Type 2 and 3 charging stations and total cost may be under estimated.
6. Is Additional Power Generation Capacity Needed: Charging stations by their very nature consume electricity. Will existing generation capability be sufficient in the out years to accommodate these new charging station loads? Or does Colorado, and specifically El Paso, Park and Teller countries, need to build new power plants?
7. Study Objectives: I could not find any specific study objectives listed in the Study. A list would help me and other readers better understand the purpose of the Study.
8. Study Conclusions and Recommendations: You and your team spent a lot of effort pulling all the data/information together into a compressive package. Again, it would help me and other readers better understand the Study, and the Study results, if you listed specific recommendations and/conclusions.
9. Lack of Specific Recommendations in Chapter 3: Maybe I missed them but I couldn’t find any specific Study recommendations. I did a search on the phase “recommend” the only specific recommendation in the entire report that turned up is stated in paragraph “Funding Opportunities” on page 14 of Chapter 4. “Additional funding opportunities may be available, and it is recommended that jurisdictions and project sponsors reference the U.S. DOT toolkit and also reach out to CDOT for additional information.”
Please do not hesitate to email or call if you have any questions.

Note: These were received during the Public Comment Period held August 12, 2022, to September 13, 2022. Comments were addressed as possible within the study document; although some items fell outside the scope of work for this document, they were referenced within the document as areas that may warrant further analysis.