

# Boulder County Regional Transportation Electrification Goals

## Technical Memo

This document is intended to serve as a Technical Supplement to the 2022 Regional Transportation Electrification Plan for Boulder County.

The supplement provides additional background information and assumptions built into the development of the two overarching goals included in the plan, as well as greenhouse gas emissions (GHG) reduction estimates.

### Goal 1: Electric Vehicle (EV) Adoption

**Goal 1**  
**Transition 30% of all vehicles registered in Boulder County to zero-emissions by 2030.**

The overarching EV adoption goal for 30% of all vehicle registrations by 2030 is aligned with the GoEV<sup>1</sup> goals that have been adopted by several communities in Boulder County. The goal includes both battery electric and plug-in hybrid light-, medium- and heavy-duty vehicles and results in an estimated 84,000 EVs in 2030, based on total vehicle registration data provided by Boulder County, vehicle ownership per capita in 2021, and anticipated population growth.

Blue shaded numbers are inputs extracted from a cited source. Orange shaded numbers are calculated.

Metric	2021	2030
Population	332,892 <sup>2</sup>	354,737 <sup>3</sup>
Vehicles per person	0.789	
Total number of registered vehicles	262,721 <sup>4</sup>	279,961
Number of registered vehicles that are electric	7,560	83,988
Percentage of vehicles that are electric	3%	30% <sup>1</sup>

Sources:

1. **GoEV Goal:** [GoEV City Commitments](#)
2. **Population:** [Colorado State Demographers Office](#)
3. **Population forecast:** [Colorado State Demographers Office](#)
4. **Total number of registered vehicles:** Vehicle registration count obtained by Boulder County from Boulder County Motor Vehicle Division
5. **Total number of electric vehicles on the road:** [Atlas Public Policy EValueate CO Dashboard](#)

# Goal 2: EV Charging Stations

**Goal 2**  
**By 2030, install a combined 2,380 public level 2 and DC fast charging ports.**

The number of public EV charging ports required to adequately serve Boulder County in 2030 is drawn from a 2021 working paper prepared by the International Council on Clean Transportation (ICCT), in coordination with the Colorado Energy Office (CEO) and Colorado Department of Transportation (CDOT)<sup>1</sup>. The ICCT paper estimates the number of charging ports required in each Colorado county to accommodate growth in EV adoption. Analysis inputs include EV stocks informed by the EV uptake rate and vehicle stock-turnover model, EV-driver charging behaviors, and county demographic factors. A general methodology and sources are outlined in the working paper.

The goal shown above for 2,380 public level 2 and DC fast charging ports was set using the ICCT paper’s high growth scenario (Table F1 in the paper). This scenario aligns with the state’s goal of 940,000 light-duty battery electric and plug-in hybrid EVs by 2030.

Another common approach to setting charging station goals is to use ratios of EVs to public charging ports based on national or state trends. The ICCT paper provides a statewide estimate of the ratio of charging ports to EVs, and the number of charging ports required to serve 940,000 light-duty battery electric and plug-in hybrid EVs by 2030. However, even though Boulder County’s goal for 30% electric vehicles is more ambitious than the county’s share of the statewide EV goal (see below), using the ICCT paper’s statewide ratio of charging ports to EVs to estimate the number of charging ports to serve 84,000 EVs in Boulder County resulted in fewer charging ports than the paper’s Boulder County specific forecast. It is therefore assumed that the ICCT report methodology includes other local scaling factors that increase the estimated charging need in Boulder County. For this reason, and without access to the details of the ICCT paper’s county-specific calculations, it was determined that the ICCT paper’s forecast for Boulder County public charging ports is a good fit at this time.

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	<b>2021 Population</b>	<b>EVs in 2030</b>
<b>State of Colorado EV Goal</b>	5,773,714 <sup>2</sup>	940,000 light-duty battery and plug-in hybrid EVs <sup>4</sup>
<b>Boulder County share of CO EV Goal</b>	330,859 <sup>3</sup>	53,866 light-duty battery and plug-in hybrid EVs
<b>Boulder County 30% EV Adoption (Goal 1)</b>		84,000 EVs (light-, medium- and heavy-duty battery and plug-in hybrid EVs)

An estimated 80% of EV owners do most of their charging at home and many medium- and heavy-duty vehicles contributing to Goal 1 will be part of a commercial fleet with access to

private workplace charging. It is therefore anticipated that there will be a significantly increased demand for home and workplace charging in 2030. However, the number of private charging stations is not publicly available and therefore not included in this goal.

The goal therefore includes only the number of public Level 2 and DC fast charging ports that can be easily tracked at the county scale using the EValuate CO dashboard.

Blue shaded numbers are inputs extracted from a cited source.

	2021	2030
<b>Number of public Level 2 charging ports in Boulder County</b>	532 <sup>4</sup>	1,920 <sup>1</sup>
<b>Number of public DC fast charging ports in Boulder County</b> (includes corridor and non-corridor chargers)	50 <sup>4</sup>	460 <sup>1</sup>
<b>Total public charging ports</b>	582	2,380

It is recommended that this goal be reevaluated as more is learned about public charging patterns and needs.

Source:

1. [ICCT Working Paper 2018-08. Colorado charging infrastructure needs to reach electric vehicle goals](#)
2. [Colorado 2020 Census Data](#)
3. [Colorado Information Marketplace](#)
4. [Atlas Public Policy EValuate CO Dashboard](#)

## Greenhouse Gas Emissions Impact

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**324,900 MT CO<sub>2</sub>e annual emissions savings in 2030**

The annual emissions reduction associated with achieving the Boulder County regional EV adoption goal is estimated based on the difference between the annual GHG emissions of an internal combustion engine (ICE) light-duty vehicle compared to those of a light-duty battery EV. The estimated emissions impact of EV adoption accounts for the emissions associated with electricity used to charge vehicles, based on Xcel Energy’s projected 2030 grid electricity emissions factor. The estimate does not factor in emissions factors for utilities other than Xcel Energy that serve Boulder County and does not account for any increases in efficiency for ICE vehicles over time. The estimate does not differentiate emissions between light-, medium-, and heavy-duty vehicles.

The emissions avoided due to new EVs is estimated at 324,900 MT CO<sub>2</sub>e per year if Boulder County achieves Goal 1 above, with approximately 84,000 EVs by 2030, or an additional 76,428 ICE vehicles “off the road” compared to 2021.

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Metric	
<b>ICE vehicles replaced with EVs (84,000 EVs on the road by 2030 – 7,560 EVs on the road in 2021)</b>	76,440
<b>Average vehicle miles traveled per year per vehicle</b>	11,500 miles / year <sup>1</sup>
<b>Average emissions per vehicle mile traveled for ICE vehicles*</b>	410 grams CO <sub>2</sub> e / mile <sup>2</sup>
<b>Average emissions from one ICE vehicle in one year*</b>	4.715 MT CO <sub>2</sub> e / year
<b>Average EV kWh usage / mile**</b>	0.346 kWh / mile <sup>3</sup>
<b>2030 Xcel Energy grid electricity emissions factor</b>	256.8 lbs CO <sub>2</sub> e / MWh <sup>4</sup>
<b>Average emissions from one EV in one year (2030)</b>	0.46 MT CO <sub>2</sub> e/ year
<b>Annual emissions avoided from new EVs (2022 – 2030)</b>	324,900 MT CO <sub>2</sub> e / year
* Based on light-duty vehicles and includes up-stream emissions associated with gasoline production, in addition to tailpipe emissions.	
** Based on battery-electric vehicles only	

Sources:

- Average VMT for a passenger vehicle in the US:** [EPA \(2018\) Greenhouse Gas Emissions from a Typical Passenger Vehicle](#)
- Average emissions per mile for a conventional vehicle:** [EPA, Greenhouse Gas Emissions from Electric and Plug-in Hybrid Vehicles Beyond Tailpipe Emissions Calculator and calculation information. \(Select any vehicle, year, and zip code to view average ICE vehicle emissions per mile.\)](#)
- Average electric vehicle electricity usage per mile:** [Eco Cost Savings, Average Electric Car kWh Per Mile \[Results from 231 EVs\]](#)
- 2030 Xcel Energy grid electricity emissions factor:** [Xcel Energy \(2016\)](#) & [Xcel Energy \(2021\)](#) & [Xcel Energy Clean Energy Plan \(2021\)](#). Calculated assuming an 85% reduction from 2005 levels by 2030.